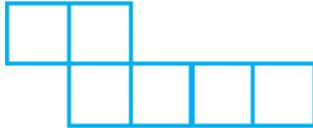


## Exercise 15.1

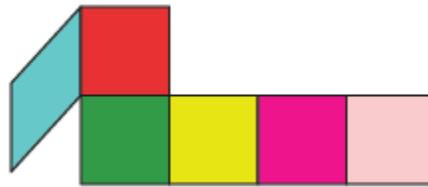
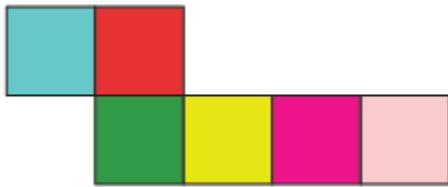
1. Identify the nets which can be used to make cubes (cut out copies of the nets and try it):

(i)

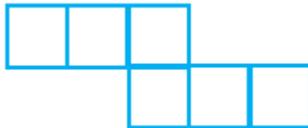


**Solution:-**

The given net cannot be folded as cube.  
Because, it can be folded as below,

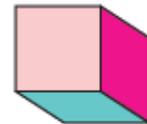
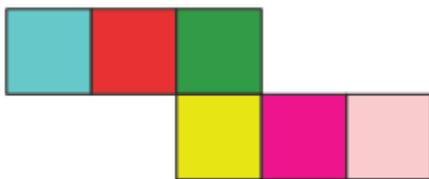


(ii)



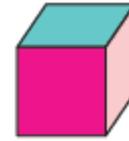
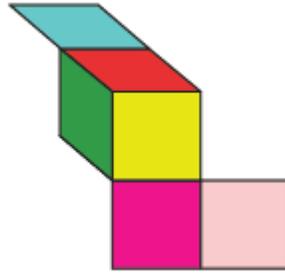
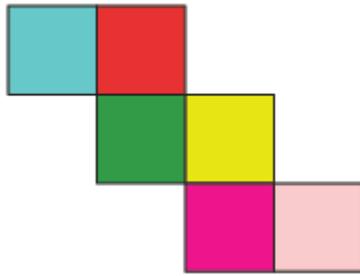
**Solution:-**

The given net can be folded as cube.  
Because, it can be folded as below,

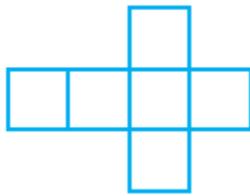


**Solution:-**

The given net can be folded as cube.  
Because, it can be folded as below,

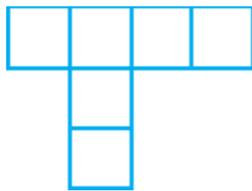
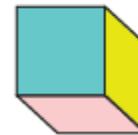
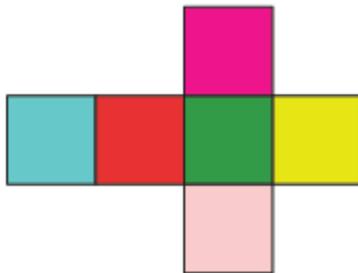


(iv)



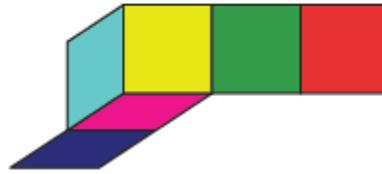
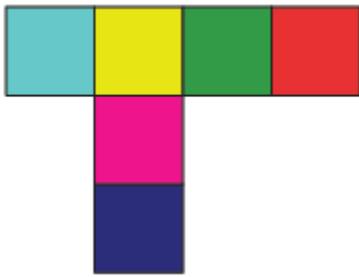
**Solution:-**

The given net can be folded as cube.  
Because, it can be folded as below,

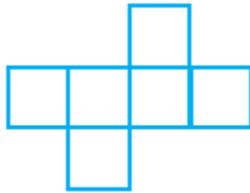


**Solution:-**

The given net cannot be folded as cube.  
Because, it can be folded as below,

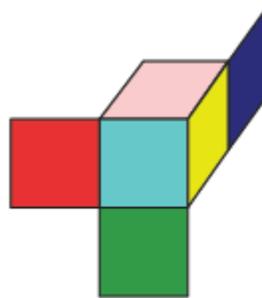
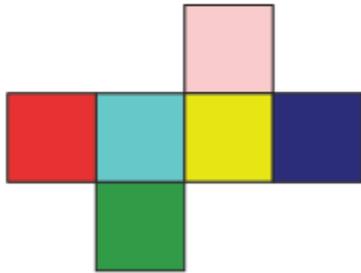


(vi)

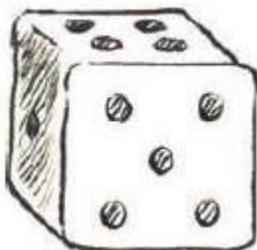


**Solution:-**

The given net can be folded as cube.  
Because, it can be folded as below,



**2. Dice are cubes with dots on each face. Opposite faces of a die always**



**have a total of seven dots on them.**

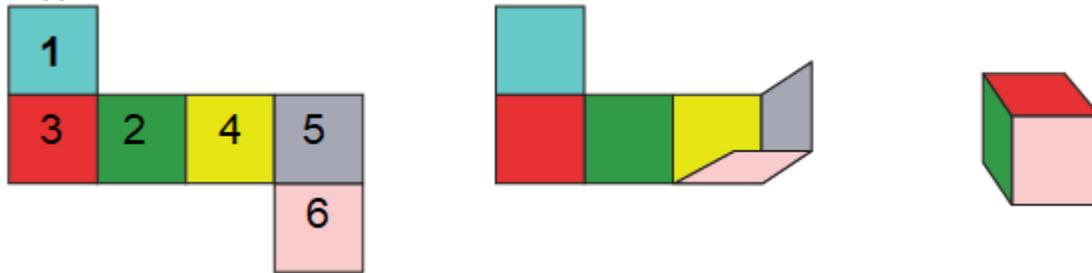
**Here are two nets to make dice (cubes); the numbers inserted in each square indicate the number of dots in that box.**



Insert suitable numbers in the blanks, remembering that the number on the opposite faces should total to 7.

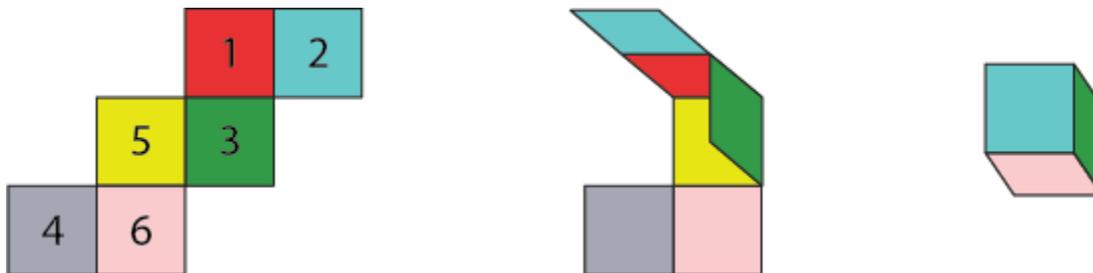
**Solution**

:- (i)



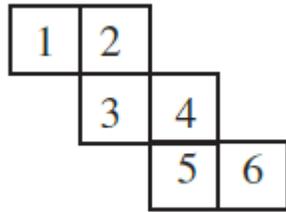
By observing the above figure the sum of the opposite faces is equal to 7. So, the given net can be folded into a net of dice.

(ii)



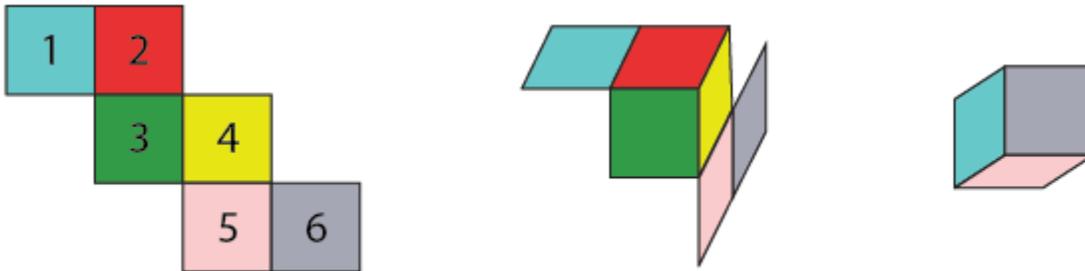
By observing the above figure the sum of the opposite faces is equal to 7. So, the given net can be folded into a net of dice.

**3. Can this be a net for a die? Explain your answer.**



**Solution:-**

The given net is folded as dice is shown in figure below,



No, this cannot be a net for a die.

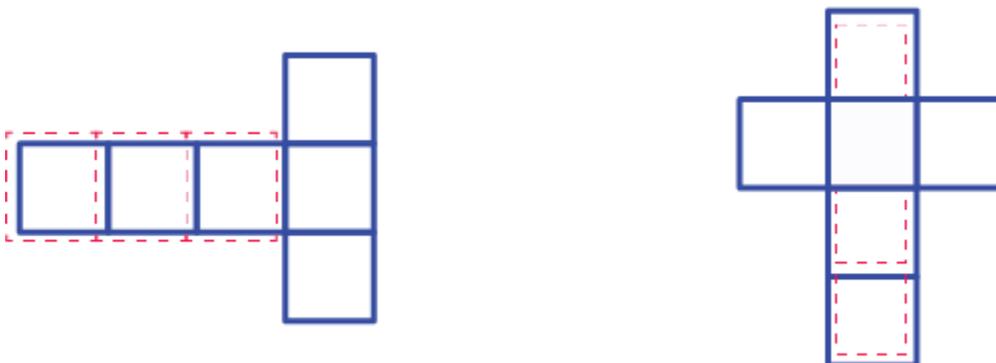
By observing the figure we can say that, one pair of opposite face will have 1 and 4, another pair of opposite face will have 3 and 6 the sum of these two opposite faces are not equal to 7.

**4. Here is an incomplete net for making a cube. Complete it in at least two different ways. Remember that a cube has six faces. How many are there in the net here? (Give two separate diagrams. If you like, you may use a squared sheet for easy manipulation.)**

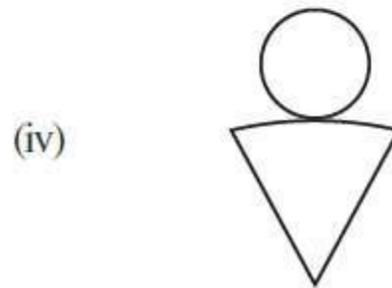
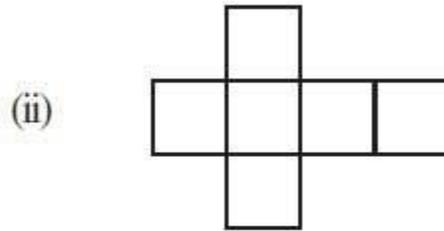
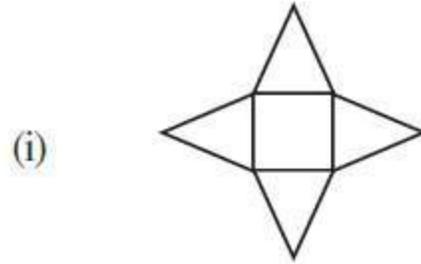
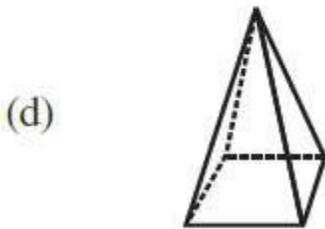
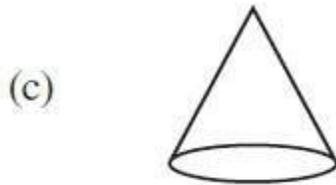
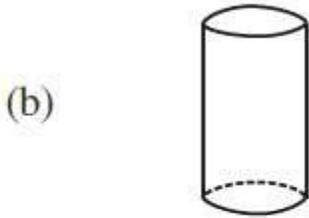
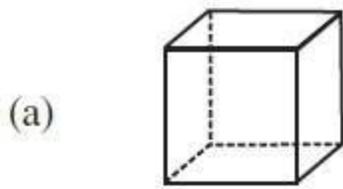


**Solution:-**

In the given net there are 3 faces and it can be completed as shown below,

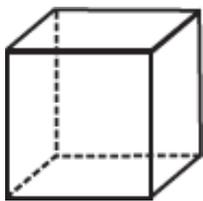


**5. Match the nets with appropriate solids:**

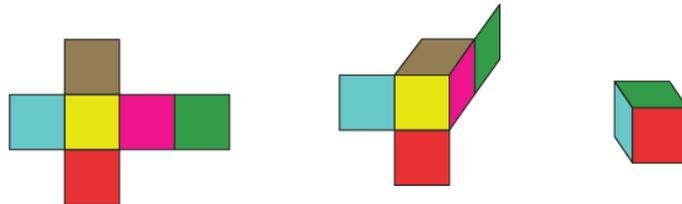


**Solution:-**

**(a)**

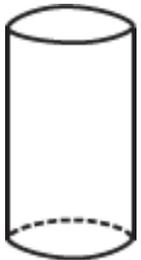


**(ii)**

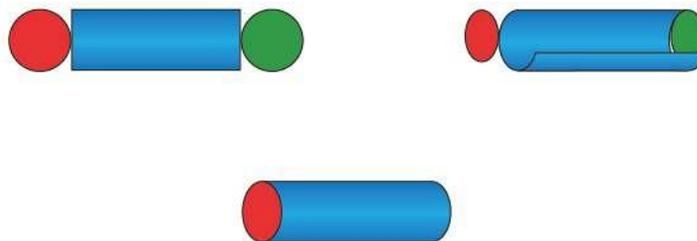


Because, the net (ii) can be folded as square.

**(b)**



**(iii)**



Because, the net (iii) can be folded as cylinder.

(c)



(iv)



Because, the net (iv) can be folded as cone.

(d)



(i)

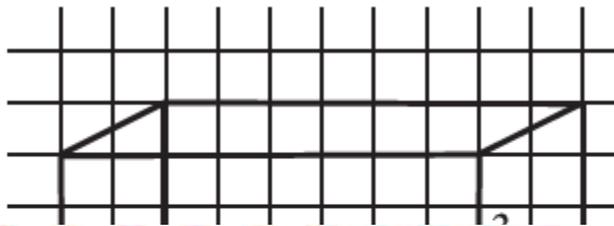


Because, the net (i) can be folded as pyramid.

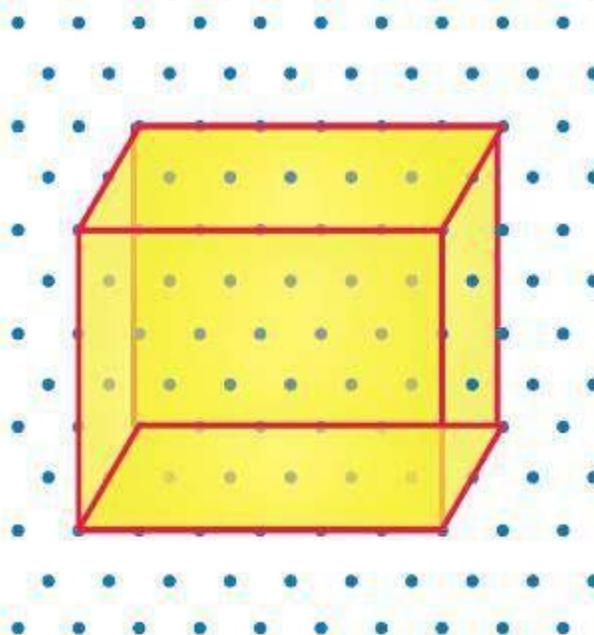
## Exercise 15.2

1. Use isometric dot paper and make an isometric sketch for each one of the given shapes:

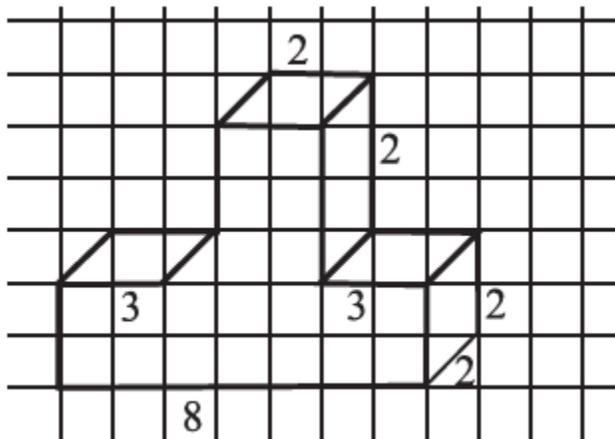
(i)



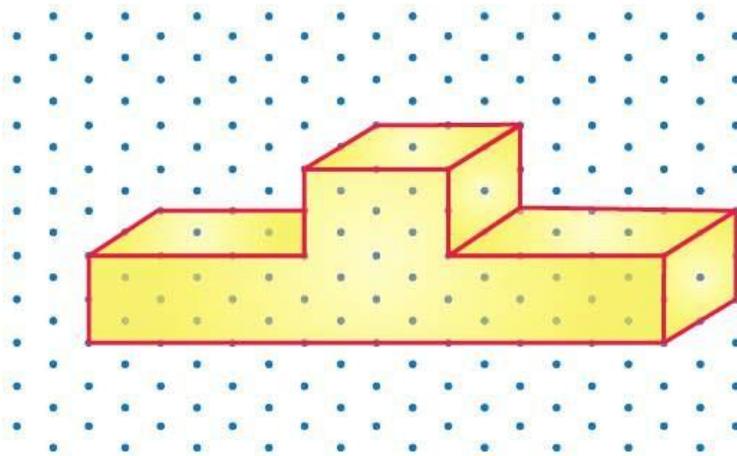
Solution:-



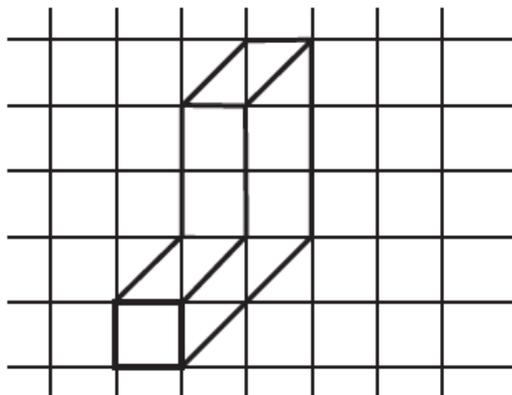
(ii)



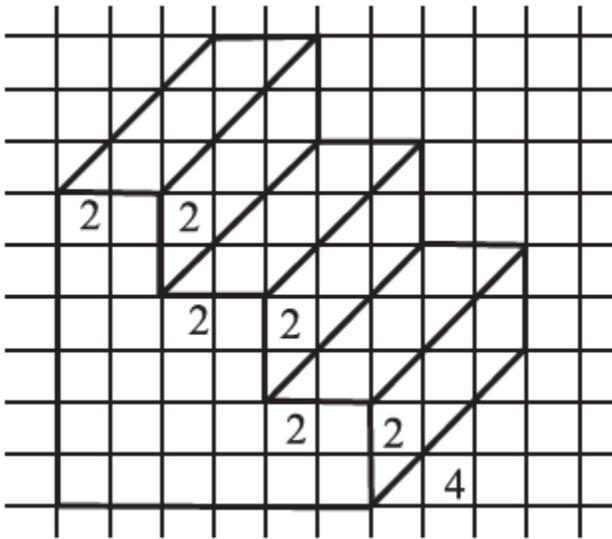
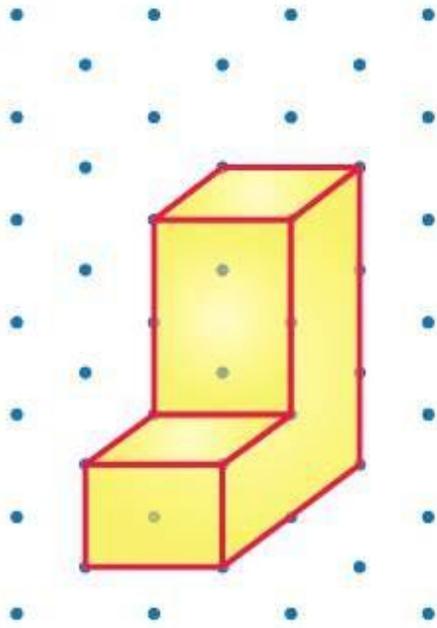
Solution:



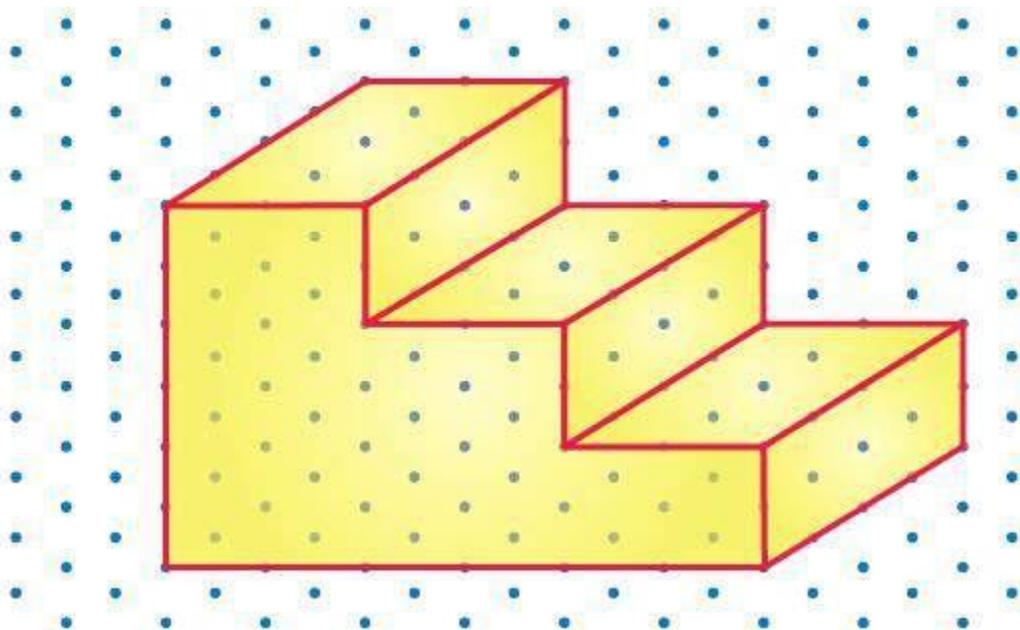
(iii)



Solution:-



(iv)  
Solut

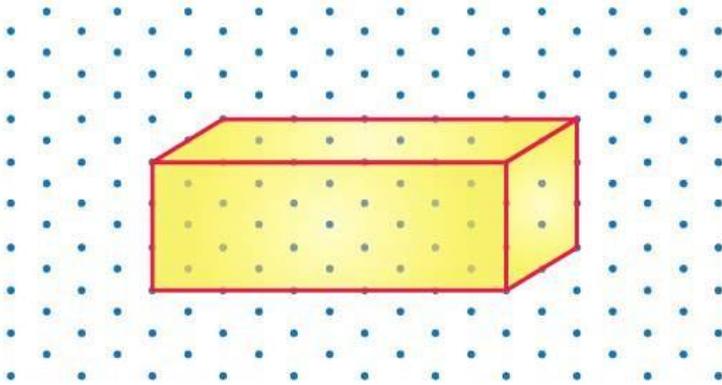


**2. The dimensions of a cuboid are 5 cm, 3 cm and 2 cm. Draw three different isometric sketches of this cuboid.**

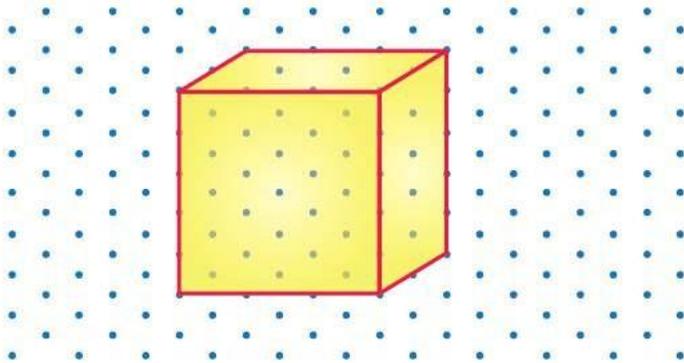
**Solution:-**

From the question it is given that dimension of a cuboid are 5 cm, 3 cm, and 2 cm. The three different isometric sketches of this cuboid is shown below,

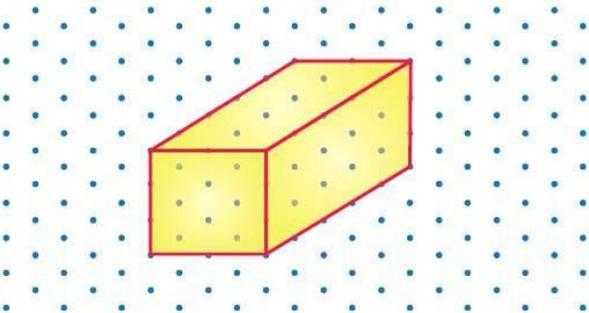
1



2



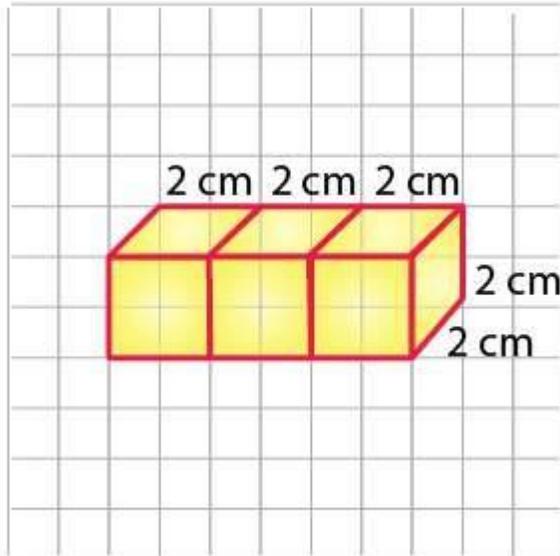
3



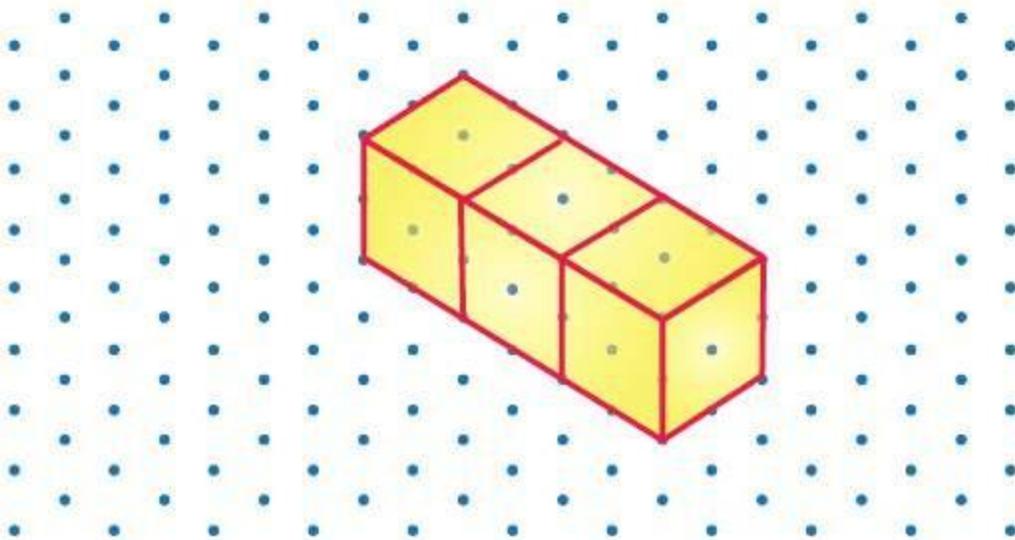
3. Three cubes each with 2 cm edge are placed side by side to form a cuboid. Sketch an oblique or isometric sketch of this cuboid.

**Solution:-**

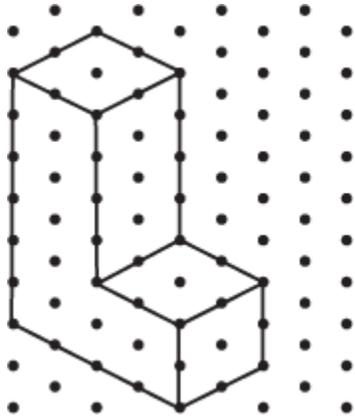
Oblique sketch



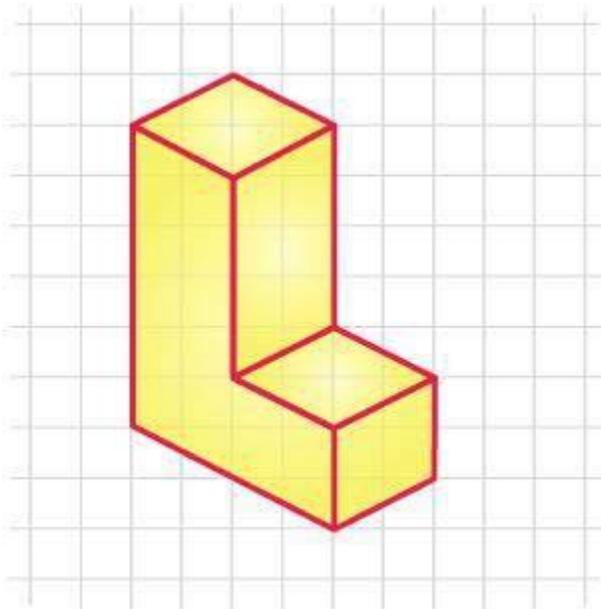
Isometric sketch



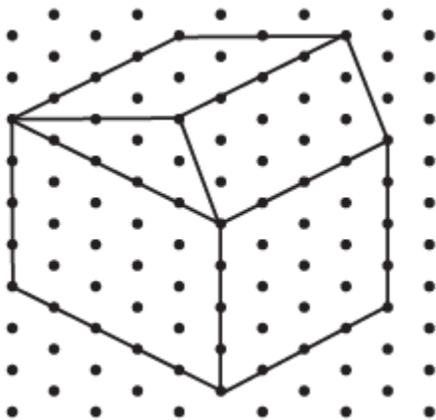
4. Make an oblique sketch for each one of the given isometric shapes: (i)



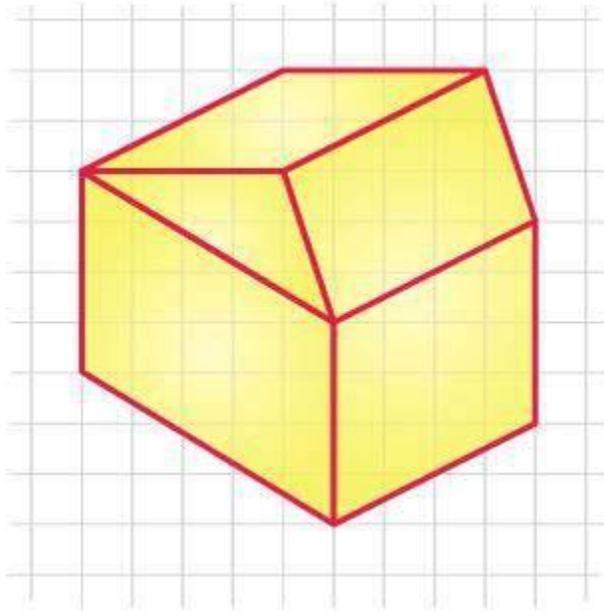
**Solution:-**



**(ii)**



**Solution:-**



5. Give (i) an oblique sketch and (ii) an isometric sketch for each of the following:

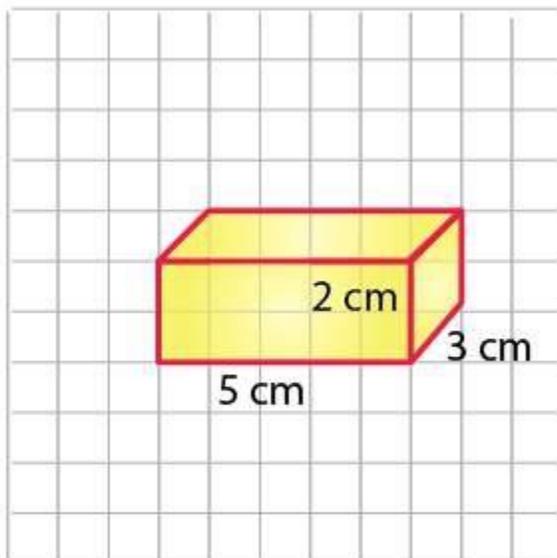
(a) A cuboid of dimensions 5 cm, 3 cm and 2 cm. (Is your sketch unique?)

(b) A cube with an edge 4 cm

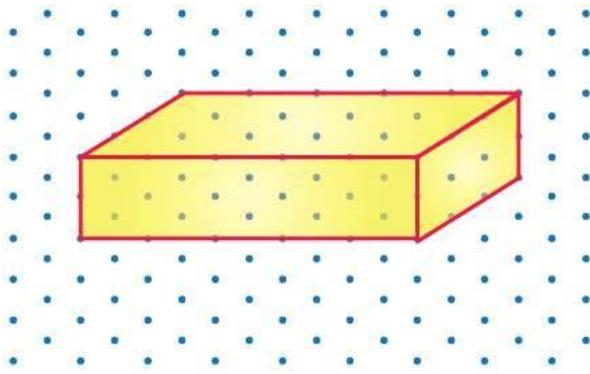
long. Solution:-

(a)

(i) Oblique sketch

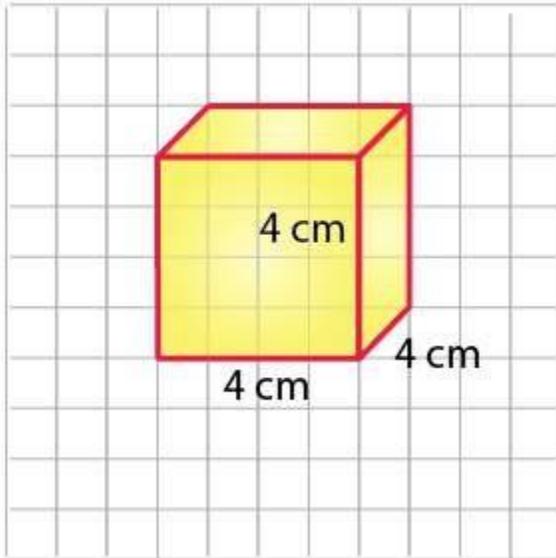


(ii) Isometric sketch

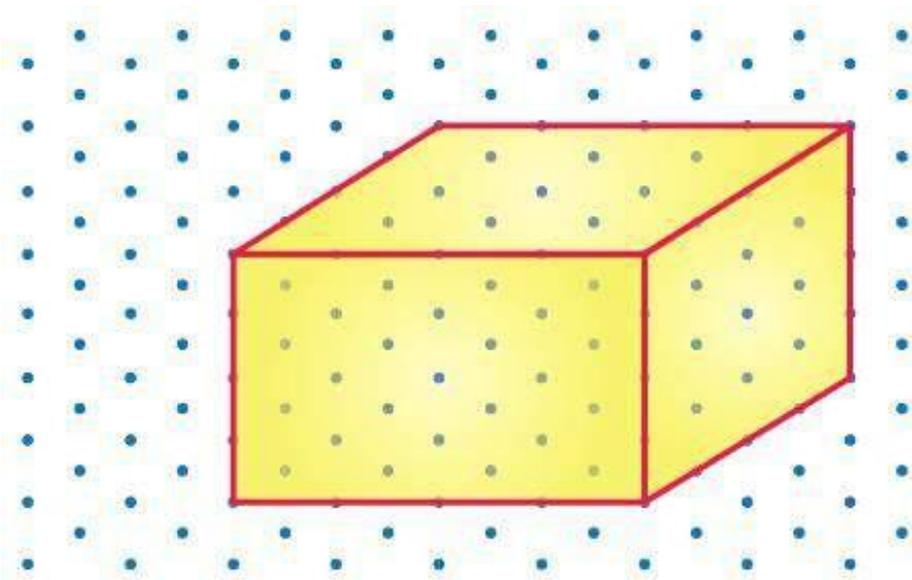


(b)

(i) Oblique sketch



(ii) Isometric sketch



## Exercise 15.3

1. What cross-sections do you get when you give a  
(i) vertical cut (ii) horizontal  
cut to the following solids?

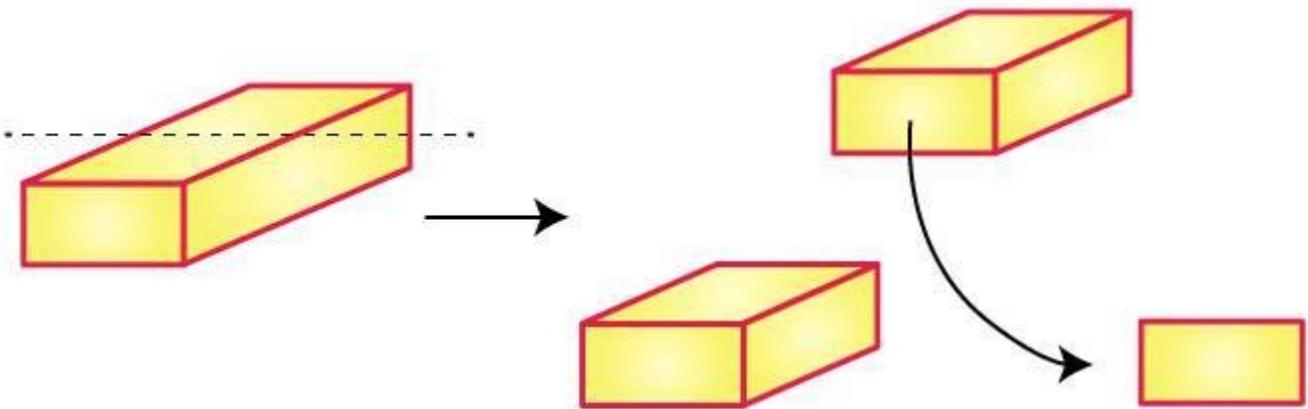
(a) A

brick

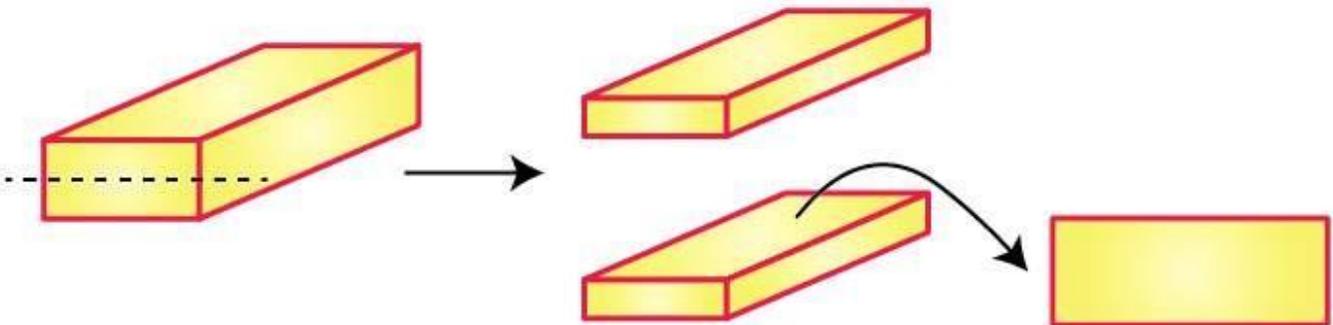
**Solution**

∴-

The cross-section of a brick when it is cut into vertically is as shown in the figure below,



The cross-section of a brick when it is cut into horizontally is as shown in the figure below,

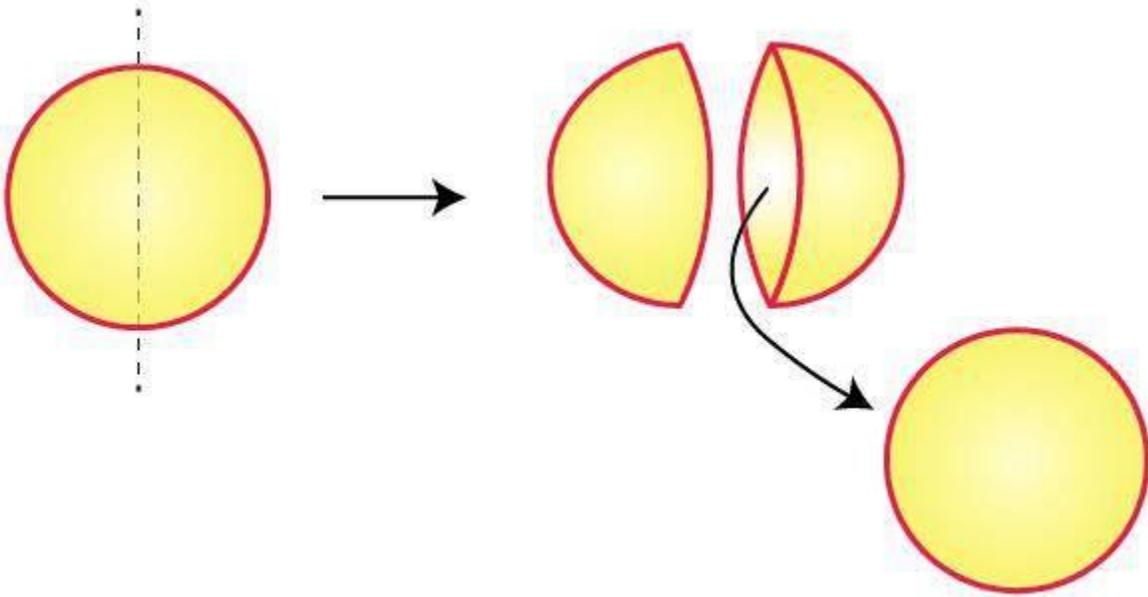


(b) A round

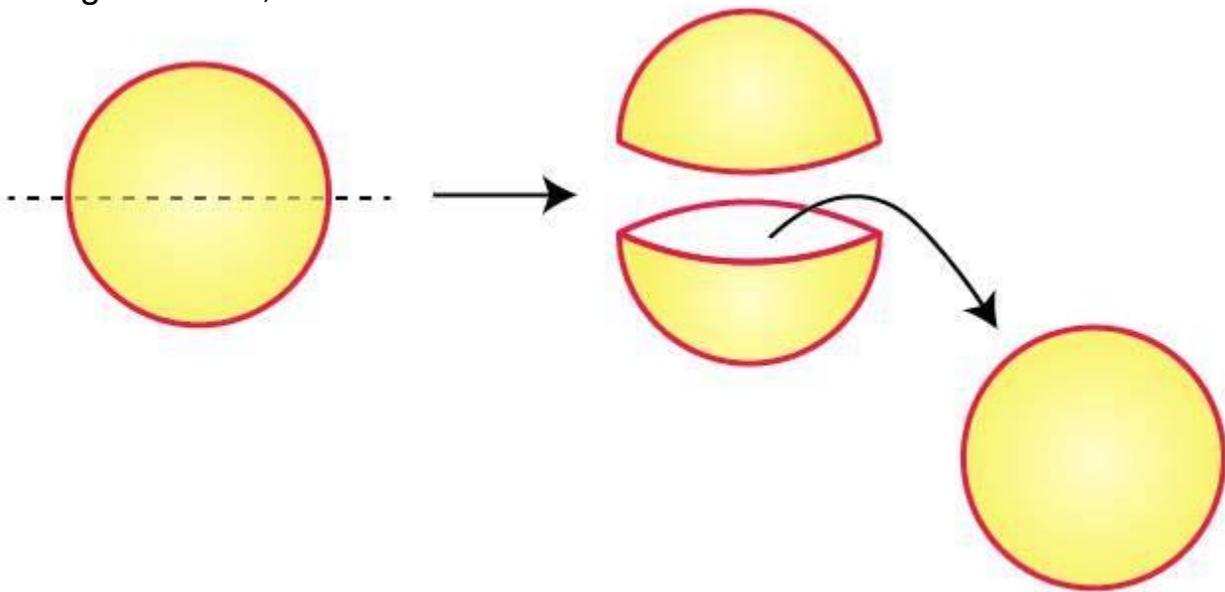
apple

**Solution:-**

The cross-section of a round apple when it is cut into vertically is as shown in the figure below,



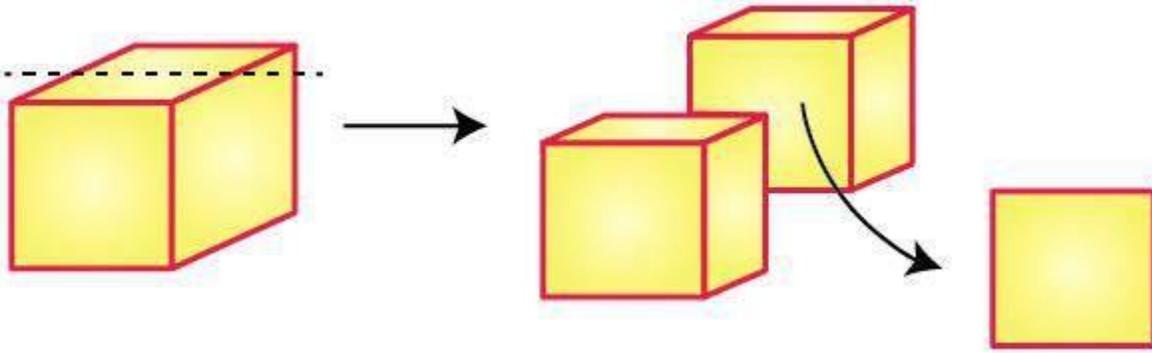
The cross-section of a round apple when it is cut into horizontally is as shown in the figure below,



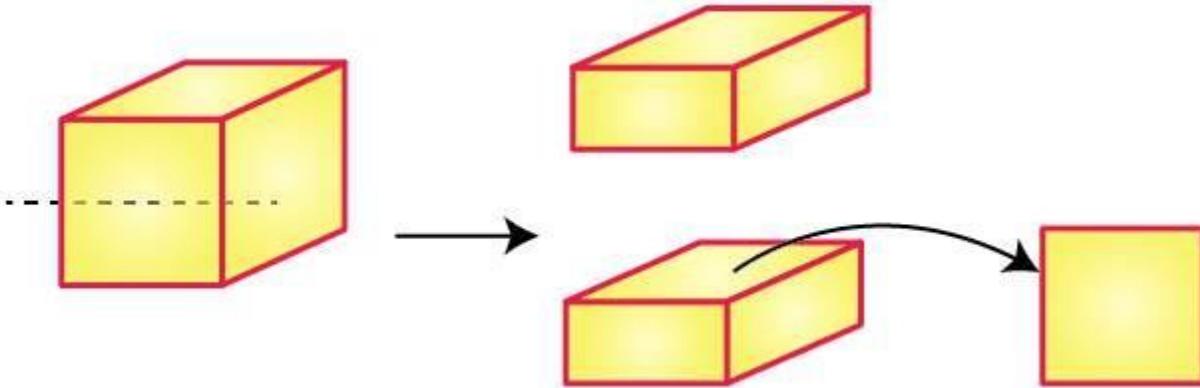
**(c) A die**  
**Solution**

∴-

The cross-section of a die when it is cut into vertically is as shown in the figure below,

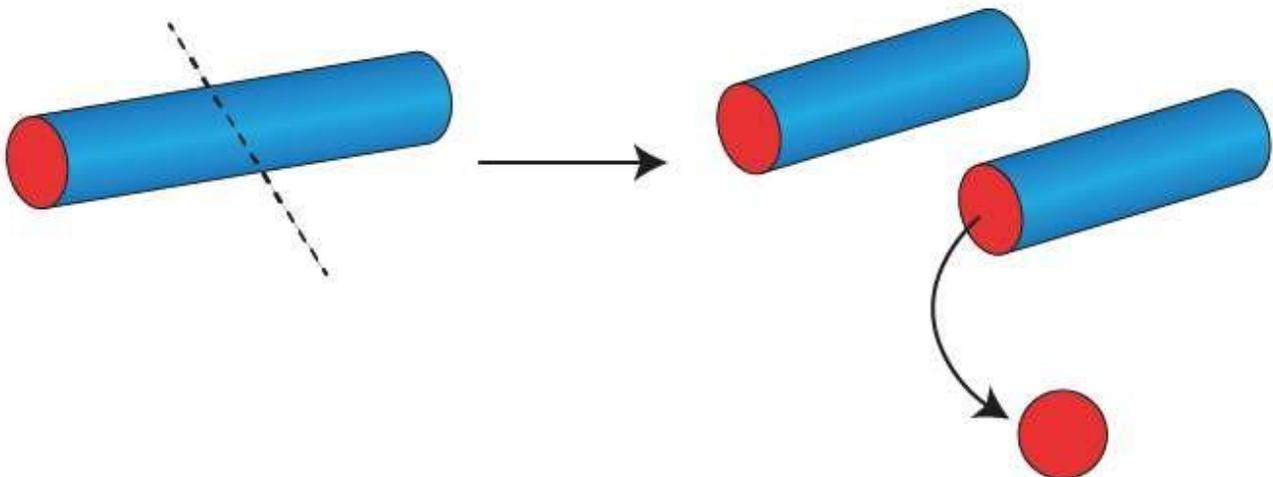


The cross-section of a die when it is cut into horizontally is as shown in the figure below,

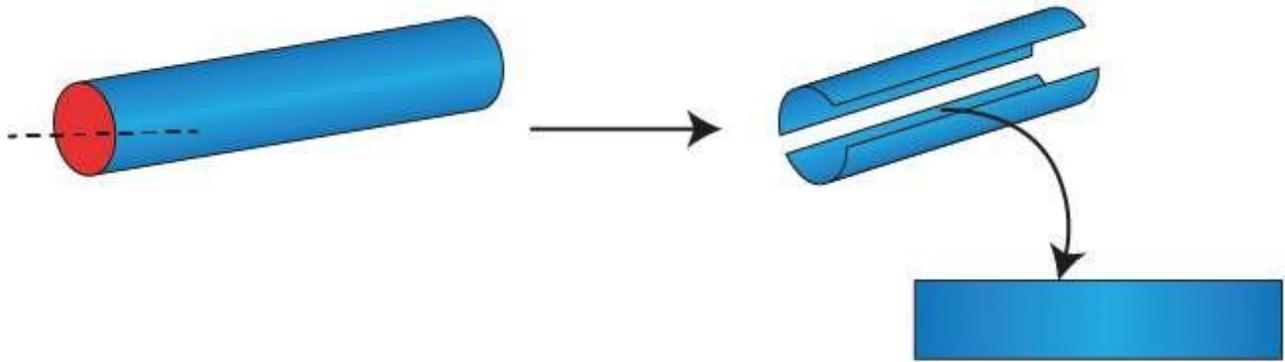


**(d) A circular pipe Solution:-**

The cross-section of a circular pipe when it is cut into vertically is as shown in the figure below,

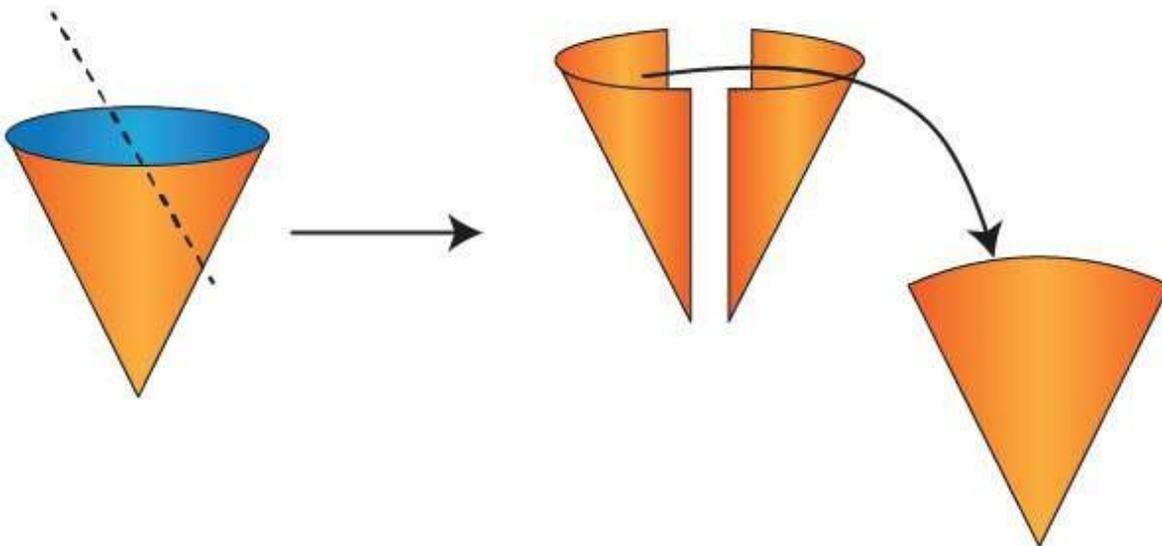


The cross-section of a circular pipe when it is cut into horizontally is as shown in the figure below,

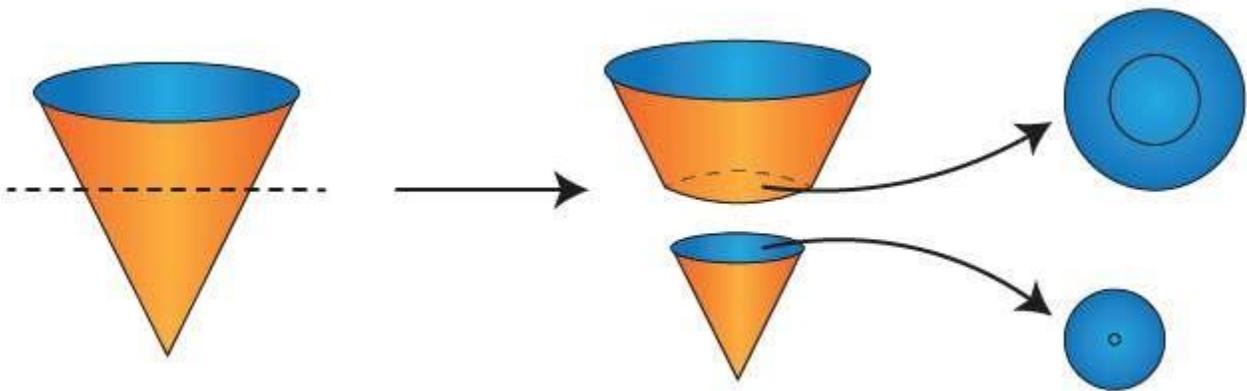


**(e) An ice cream cone Solution:-**

The cross-section of an ice cream when it is cut into vertically is as shown in the figure below,



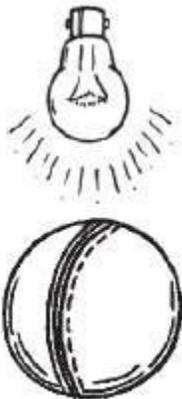
The cross-section of an ice cream when it is cut into horizontally is as shown in the figure below,



### Exercise 15.4

1. A bulb is kept burning just right above the following solids. Name the shape of the shadows obtained in each case. Attempt to give a rough sketch of the shadow. (You may try to experiment first and then answer these questions).

(i)



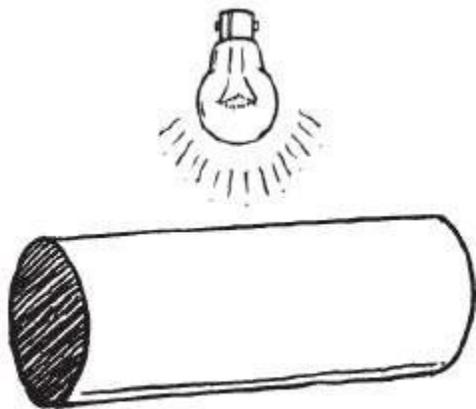
A ball

**Solution:-**

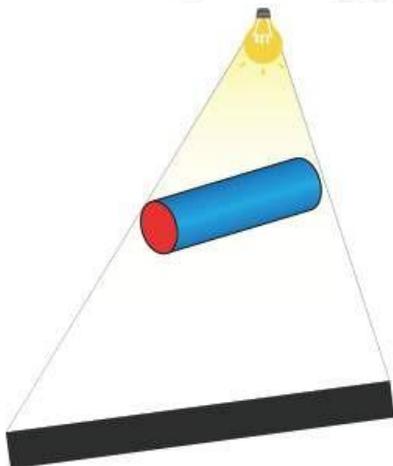


The shape of the shadow obtained from a ball is circle.

(ii)



A cylindrical pipe



**Solution:-**

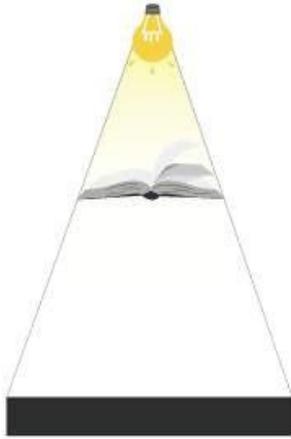
The shape of the shadow obtained from a cylindrical pipe is rectangle.

(iii)



A book

**Solution:-**

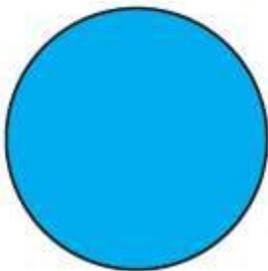


The shape of the shadow obtained from a book is rectangle.

**2. Here are the shadows of some 3-D objects, when seen under the lamp of an overhead projector. Identify the solid(s) that match each shadow. (There may be multiple answers for these!)**

(i)

A circle

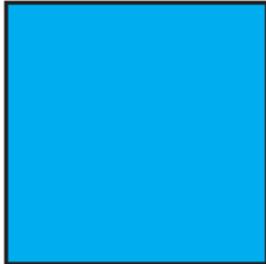


**Solution:-**

Cricket ball, water bottle cap, Disc

(ii)

A square

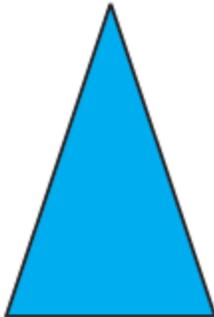


**Solution:-**

Die, chalk box etc.

(iii)

A triangle



**Solution:-**

Birthday cap etc.

(iv)

A rectangle



**Solution:-**

Book, keyboard, Mobile etc.

**3. Examine if the following are true statements:**

**(i) The cube can cast a shadow in the shape of a rectangle. Solution:-**

The above statement is true.

**(ii) The cube can cast a shadow in the shape of a hexagon. Solution:-**

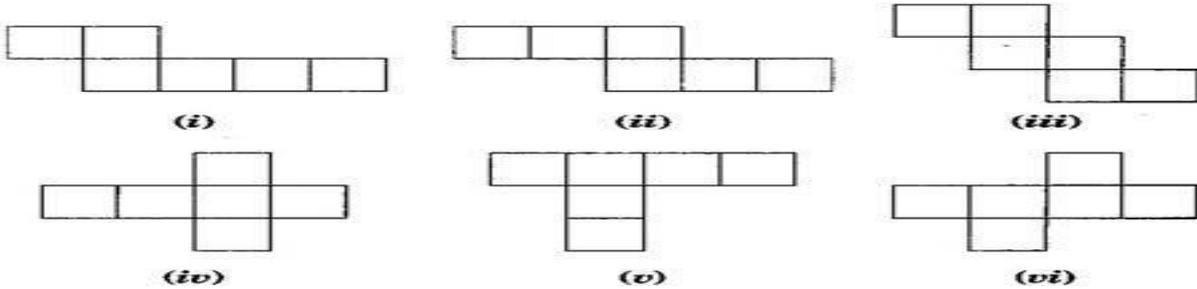
The above statement is false.

**MIND MAP**

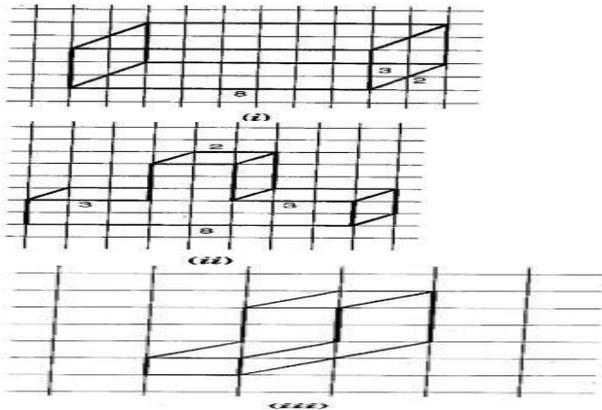
**CH.: 15 VISUALISING SOLID SHAPES**

**TYPE: 1**

Q.1 Identify the nets which can be used to make cubes (cut out copies of the nets and try it)

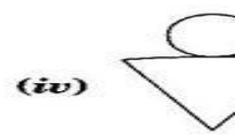
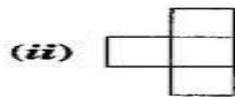
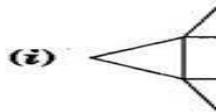
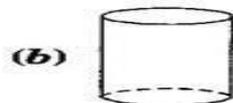
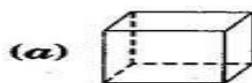


Q.3. Match the nets with appropriate solids



**TYPE: 2**

Q.1. Use isometric dot paper and make an isometric sketch for each one of the given shape.



Q.2. The dimensions of a cuboid are 5 cm, 3 cm and 2 cm. Draw three different isometric sketches of this cuboid.

Q.3. What cross-sections do you get when you give a:

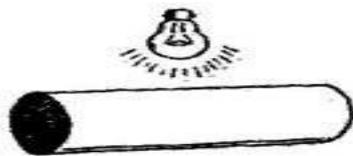
(i) vertical cut (ii) horizontal cut to the following solids?

- (a) A brick (b) A round apple (c) A die  
(d) A circular pipe (e) An ice-cream cone.

Q.4. A bulb is kept burning just right above the following solids. Name the shape of the shadows obtained in each case. Attempt to give a rough sketch of the shadow.



**A ball**  
(i)



**A cylindrical pipe**  
(ii)



**A book**  
(iii)

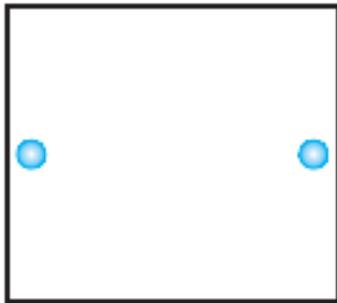
Q.5. Examine if the following are true statements:

- (i) The cube can cast a shadow in the shape of a rectangle.  
(ii) The cube can cast a shadow in the shape of a hexagon.

### Exercise 14.1

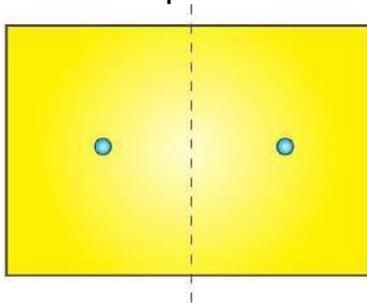
1. Copy the figures with punched holes and find the axes of symmetry for the following:

(a)



**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

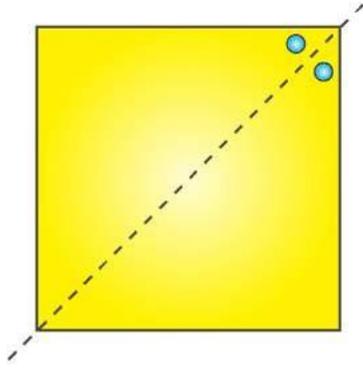


(b)



**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

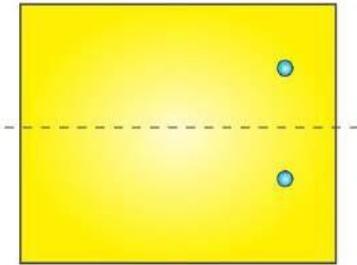


(c)

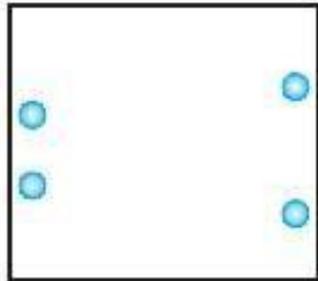


**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

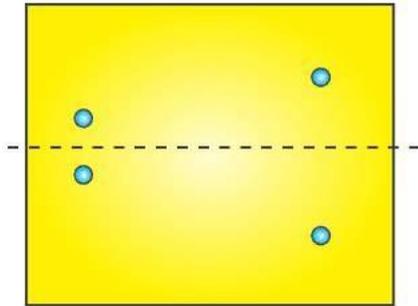


(d)

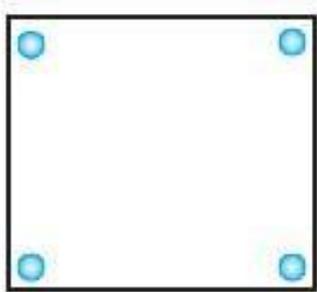


**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

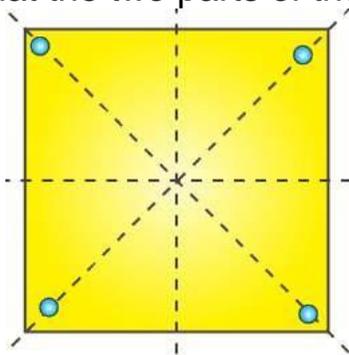


(e)

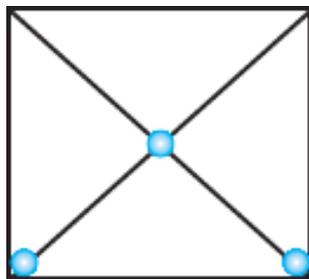


**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

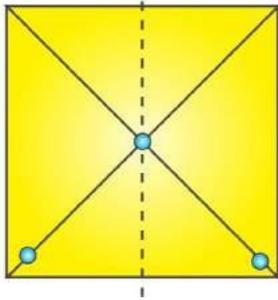


(f)

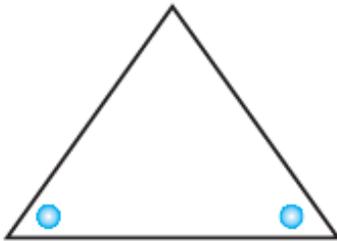


**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

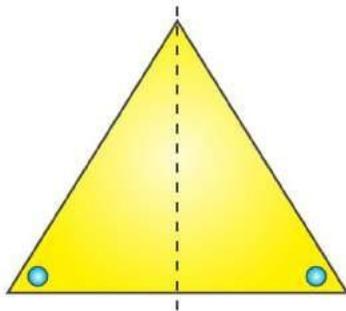


(g)

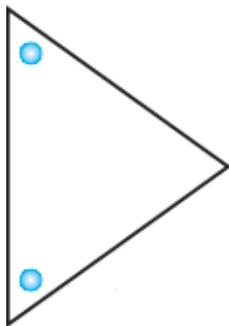


**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

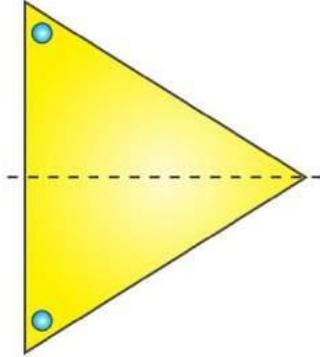


(h)

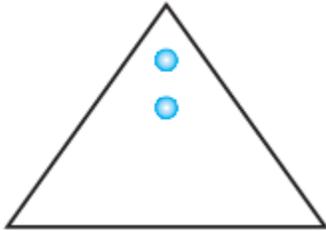


**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

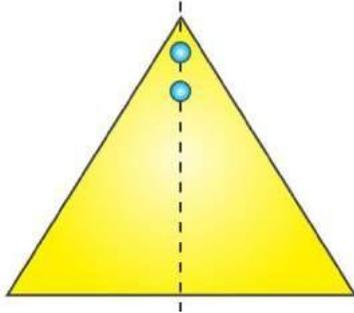


(i)

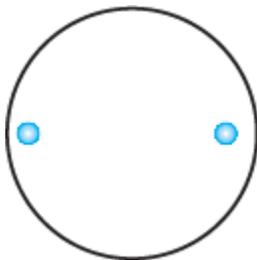


**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

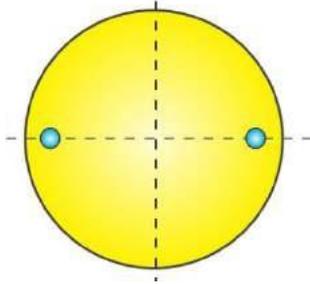


(j)

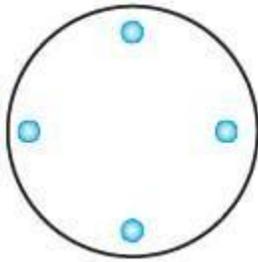


**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

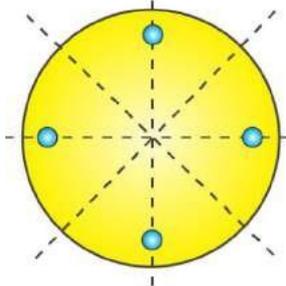


(k)

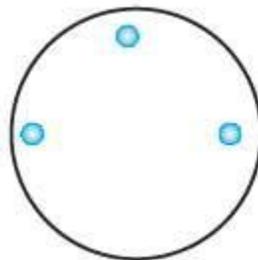


**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

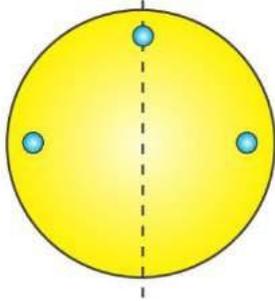


(l)



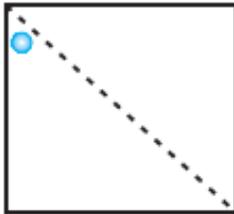
**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.



2. Given the line(s) of symmetry, find the other hole(s):

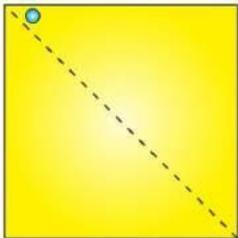
(a)



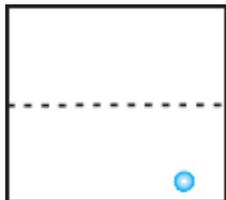
**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

So, other hole is shown in the figure below.



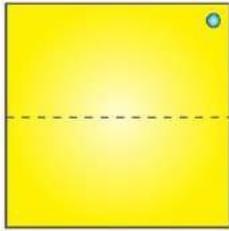
(b)



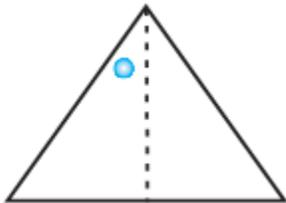
**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

So, other hole is shown in the figure below.



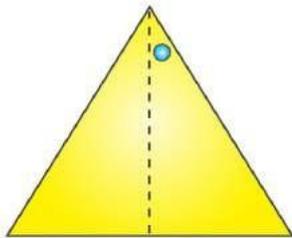
(c)



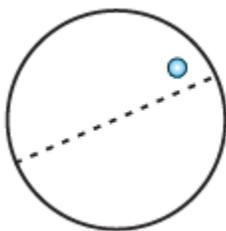
**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

So, other hole is shown in the figure below.



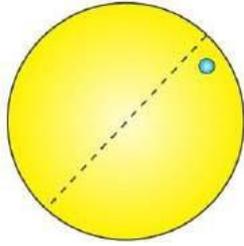
(d)



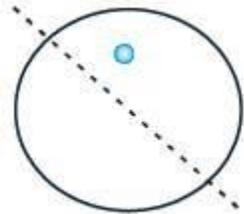
**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

So, other hole is shown in the figure below.



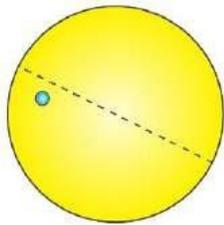
(e)



**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

So, other hole is shown in the figure below.



**3. In the following figures, the mirror line (i.e., the line of symmetry) is given as a dotted line. Complete each figure performing reflection in the dotted (mirror) line. (You might perhaps place a mirror along the dotted line and look into the mirror for the image). Are you able to recall the name of the figure you complete?**

(a)



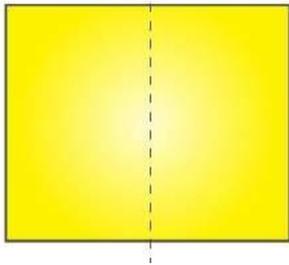
**Solution:-**

The concept of line of symmetry is closely related to mirror reflection. A shape has line symmetry when one half of it is the mirror image of the other half. A mirror

line, thus

helps to visualise a line of symmetry.

While dealing with mirror reflection, care is needed to note down the left-right changes in the orientation.



Name of the figure is square.

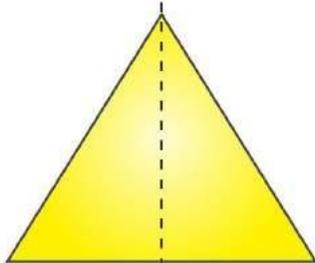
(b)



**Solution:-**

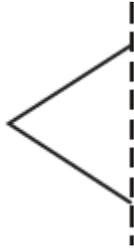
The concept of line of symmetry is closely related to mirror reflection. A shape has line symmetry when one half of it is the mirror image of the other half. A mirror line, thus helps to visualise a line of symmetry.

While dealing with mirror reflection, care is needed to note down the left-right changes in the orientation.



Name of the figure is triangle.

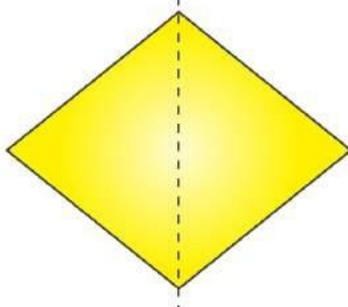
(c)



**Solution:-**

The concept of line of symmetry is closely related to mirror reflection. A shape has line symmetry when one half of it is the mirror image of the other half. A mirror line, thus helps to visualise a line of symmetry.

While dealing with mirror reflection, care is needed to note down the left-right changes in the orientation.



Name of the figure is rhombus.

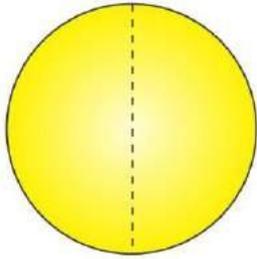
(d)



**Solution:-**

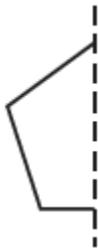
The concept of line of symmetry is closely related to mirror reflection. A shape has line symmetry when one half of it is the mirror image of the other half. A mirror line, thus helps to visualise a line of symmetry.

While dealing with mirror reflection, care is needed to note down the left-right changes in the orientation.



Name of the figure is circle.

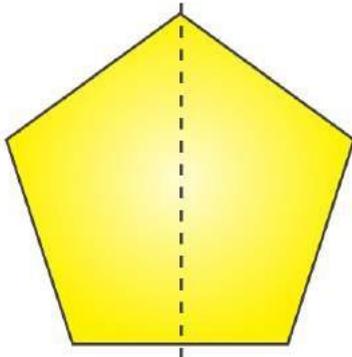
(e)



**Solution:-**

The concept of line of symmetry is closely related to mirror reflection. A shape has line symmetry when one half of it is the mirror image of the other half. A mirror line, thus helps to visualise a line of symmetry.

While dealing with mirror reflection, care is needed to note down the left-right changes in the orientation.



Name of the figure is pentagon.

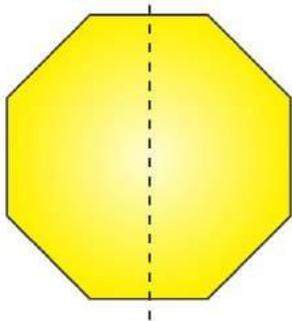
(f)



**Solution:-**

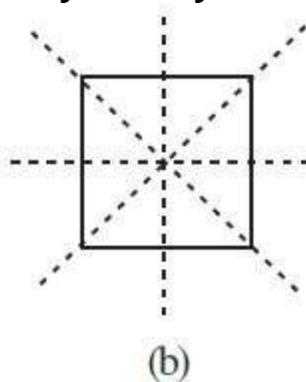
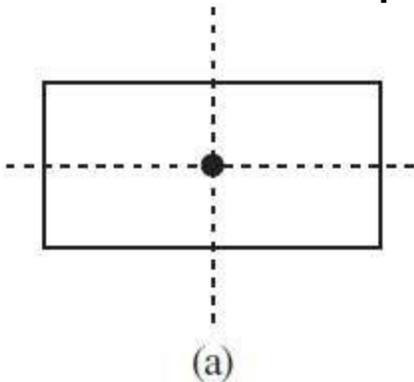
The concept of line of symmetry is closely related to mirror reflection. A shape has line symmetry when one half of it is the mirror image of the other half. A mirror line, thus helps to visualise a line of symmetry.

While dealing with mirror reflection, care is needed to note down the left-right changes in the orientation.



Name of the figure is octagon.

**4. The following figures have more than one line of symmetry. Such figures are said to have multiple lines of symmetry.**

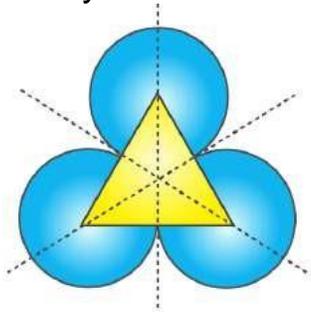


**Identify multiple lines of symmetry, if any, in each of the following figures: (a)**

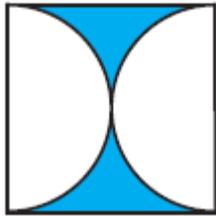


**Solution:-**

Figure given has 3 lines of symmetry. So, it has multiple lines of symmetry.

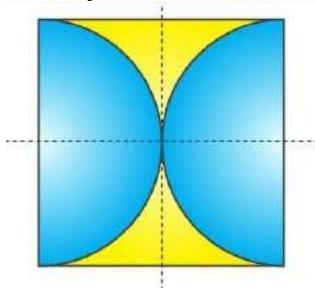


(b)

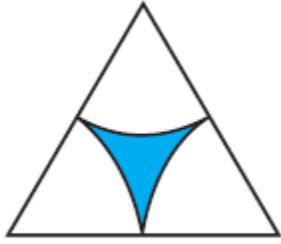


**Solution:-**

Figure given has 2 lines of symmetry. So, it has multiple lines of symmetry.

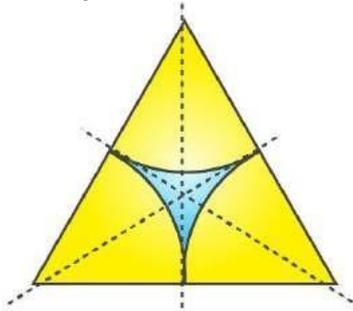


(c)



**Solution:-**

Figure given has 3 lines of symmetry. So, it has multiple lines of symmetry.

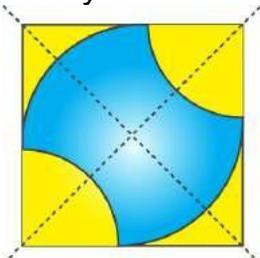


(d)

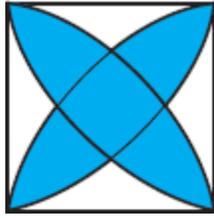


**Solution:-**

Figure given has 2 lines of symmetry. So, it has multiple lines of symmetry.

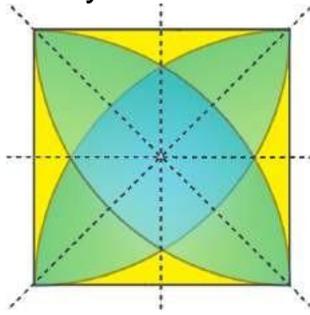


(e)

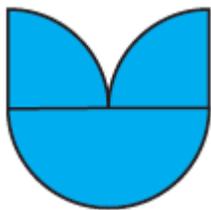


**Solution:-**

Figure given has 4 lines of symmetry. So, it has multiple lines of symmetry.

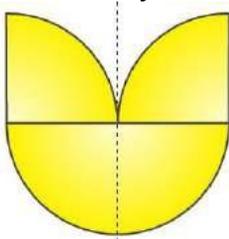


(f)

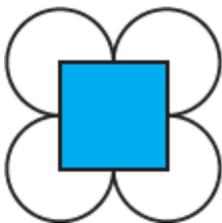


**Solution:-**

Figure given has only 1 line of symmetry.

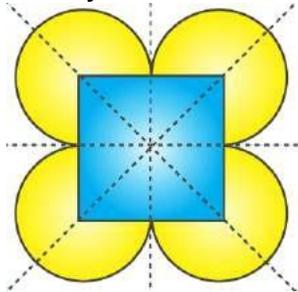


(g)

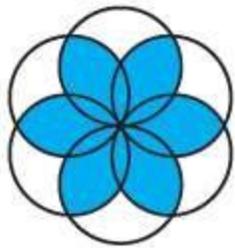


**Solution:-**

Figure given has 4 lines of symmetry. So, it has multiple lines of symmetry.

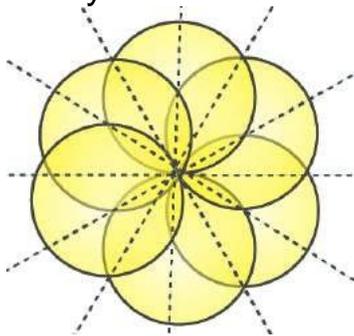


(h)



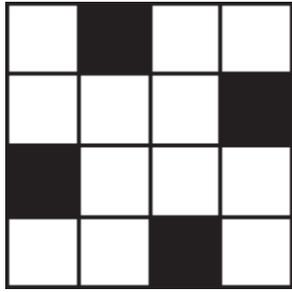
**Solution:-**

Figure given has 6 lines of symmetry. So, it has multiple lines of symmetry.

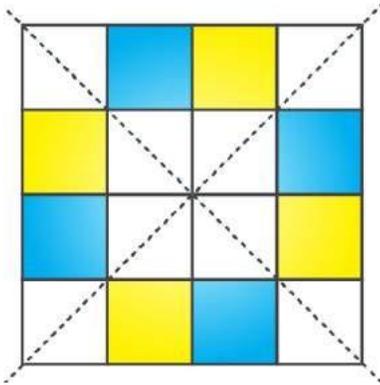


**5. Copy the figure given here.**

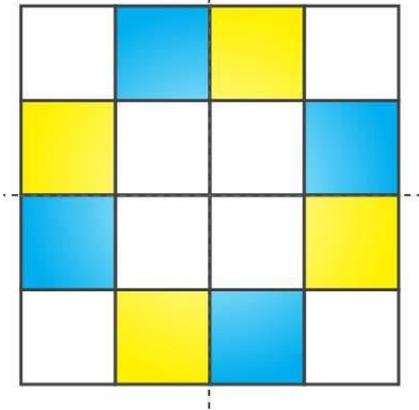
**Take any one diagonal as a line of symmetry and shade a few more squares to make the figure symmetric about a diagonal. Is there more than one way to do that? Will the figure be symmetric about both the diagonals?**



**Solution:-**



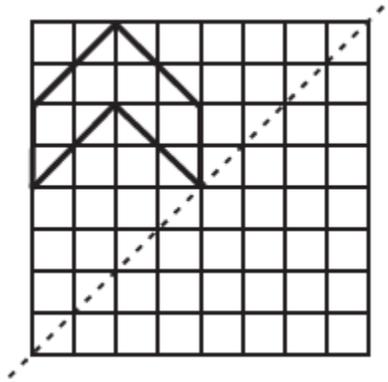
By observing the above figure,  
Yes, the figure will be symmetrical about both diagonals.



By observing the above figure,  
Yes, the figure can be made symmetrical by more than one way.

**6. Copy the diagram and complete each shape to be symmetric about the mirror line(s):**

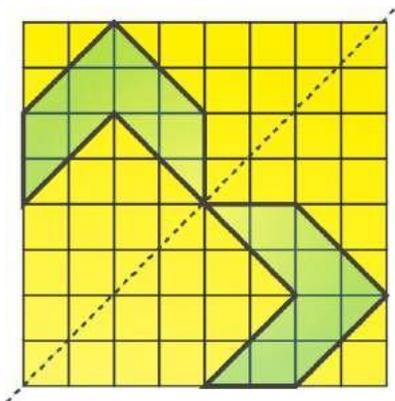
**(a)**



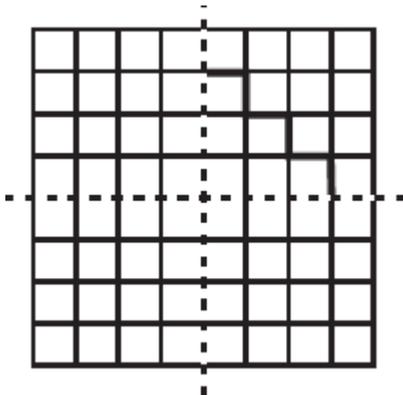
**Solution:-**

The concept of line of symmetry is closely related to mirror reflection. A shape has line symmetry when one half of it is the mirror image of the other half. A mirror line, thus helps to visualise a line of symmetry.

While dealing with mirror reflection, care is needed to note down the left-right changes in the orientation.



(b)

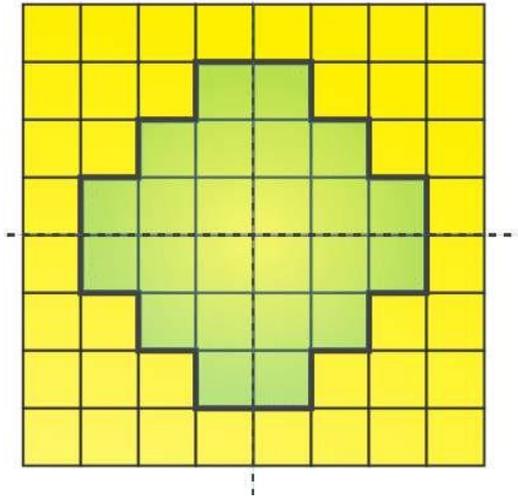


**Solution:-**

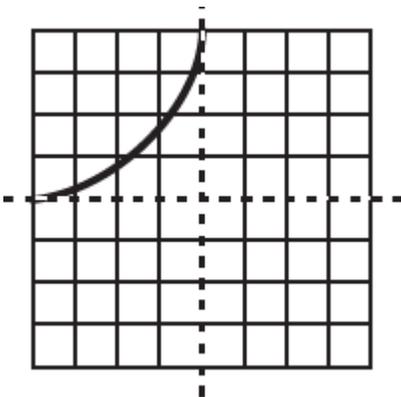
The concept of line of symmetry is closely related to mirror reflection. A shape has line symmetry when one half of it is the mirror image of the other half. A mirror line, thus

helps to visualise a line of symmetry.

While dealing with mirror reflection, care is needed to note down the left-right changes in the orientation.



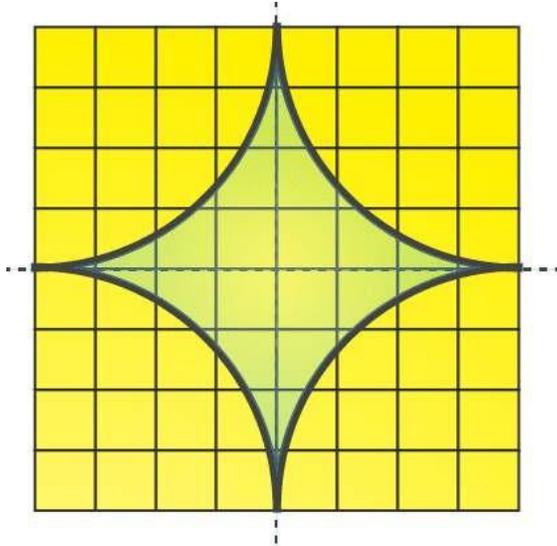
(c)



**Solution:-**

The concept of line of symmetry is closely related to mirror reflection. A shape has line symmetry when one half of it is the mirror image of the other half. A mirror line, thus helps to visualise a line of symmetry.

While dealing with mirror reflection, care is needed to note down the left-right changes in the orientation.

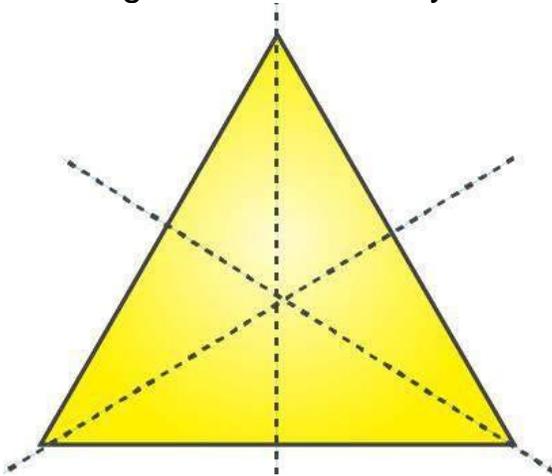


**7. State the number of lines of symmetry for the following figures:**

**(a) An equilateral triangle Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

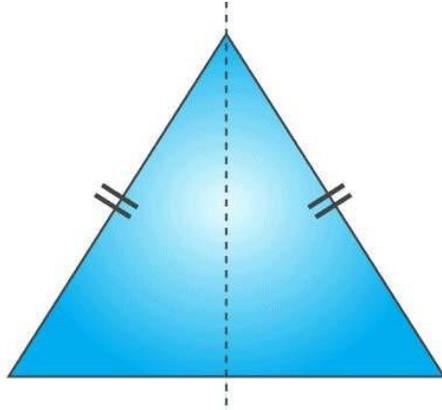
An equilateral triangle has 3 lines of symmetry is shown in the figure below,



**(b) An isosceles triangle Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

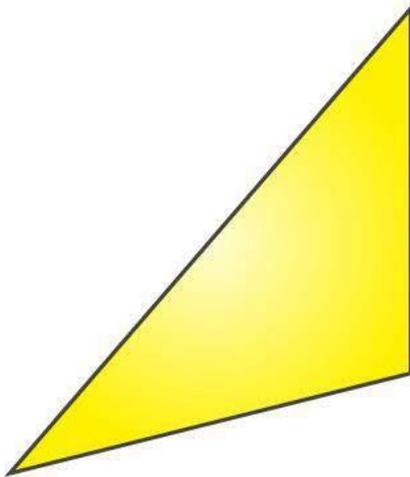
An isosceles triangle has 1 lines of symmetry is shown in the figure below,



**(c) A scalene triangle Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

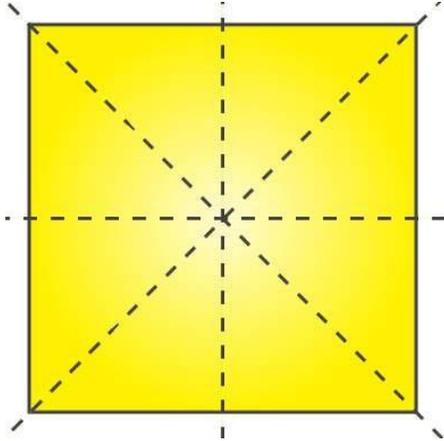
A scalene triangle has no line of symmetry is shown in the figure below,



**(d) A square Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

A square has 4 lines of symmetry is shown in the figure below,

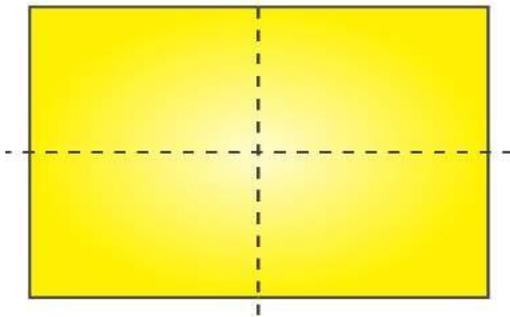


**(e) A  
rectangle**

**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

A rectangle has 2 lines of symmetry is shown in the figure below,

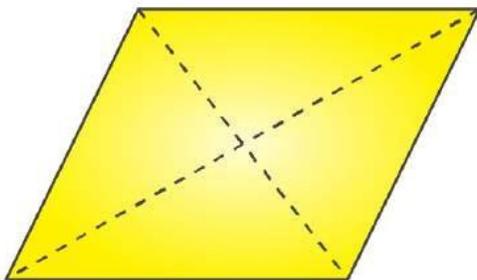


**(f) A  
rhombus**

**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

A rhombus has 2 lines of symmetry is shown in the figure below,

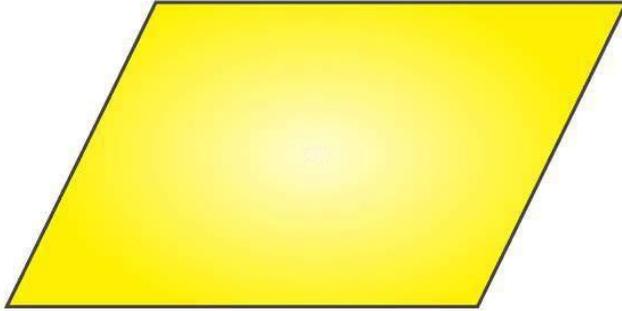


**(g) A parallelogram**

**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

A parallelogram has no line of symmetry is shown in the figure below,

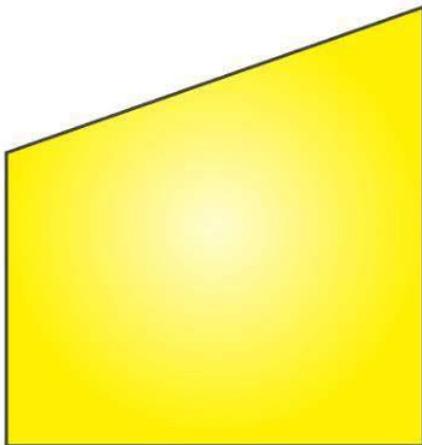


**(h) A quadrilateral**

**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

A quadrilateral has no line of symmetry is shown in the figure below,

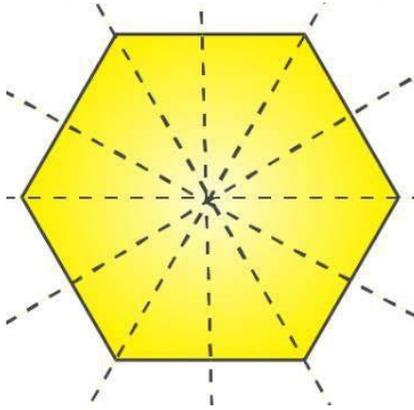


**(i) A regular hexagon**

**Solution:-**

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

A regular hexagon has 6 lines of symmetry is shown in the figure below,



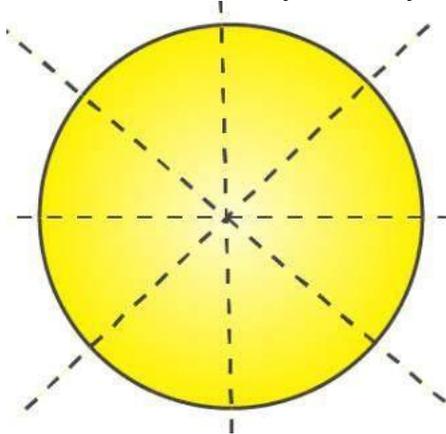
(j) A  
circle

**Solution**

∴-

A figure has a line of symmetry, if there is a line about which the figure may be folded so that the two parts of the figure will coincide.

A circle has infinite lines of symmetry,



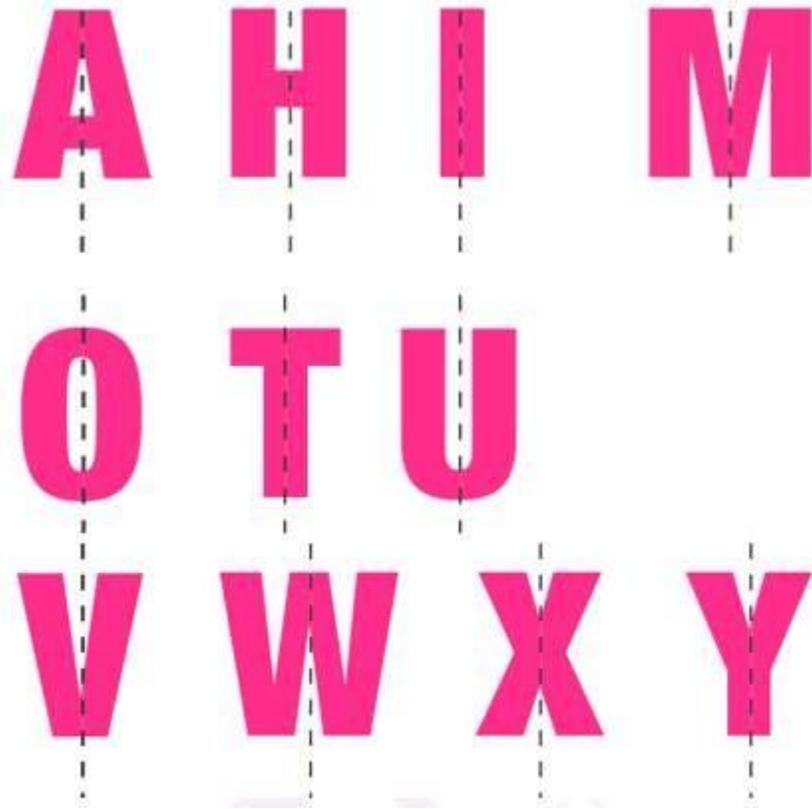
**8. What letters of the English alphabet have reflectional symmetry (i.e., symmetry related to mirror reflection) about.**

(a) a vertical mirror                      (b) a horizontal mirror  
(c) both horizontal and vertical

**mirrors Solution:-**

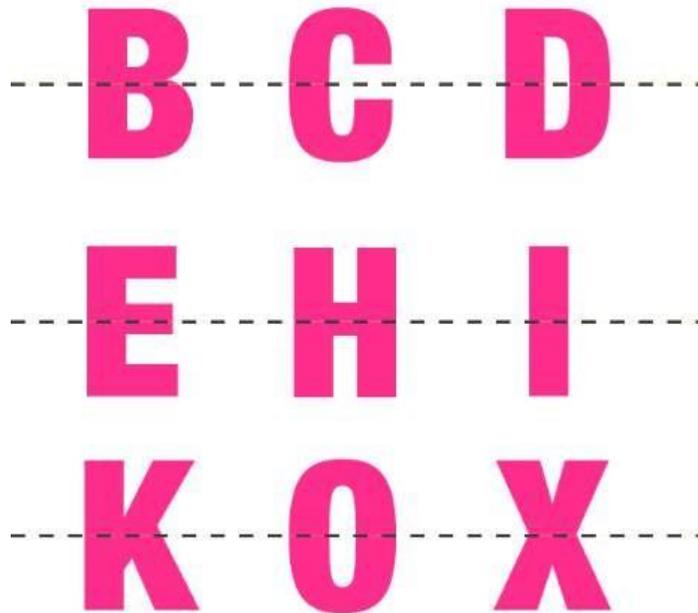
(a) a vertical mirror

The English alphabet have reflection symmetry about a vertical mirror are, A, H, I, M, O, T, U, V, W, X, Y



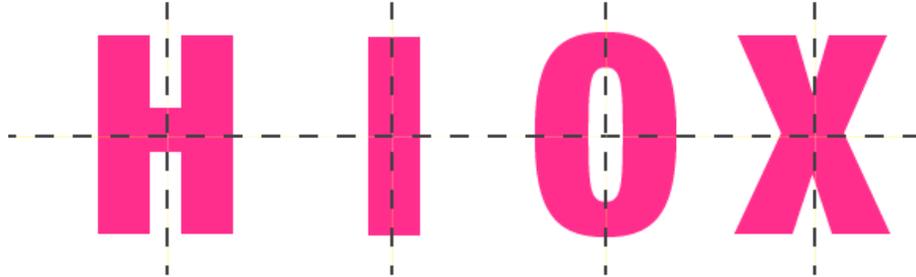
**(b)** a horizontal mirror

The English alphabet have reflection symmetry about a horizontal mirror are, B, C, D, E, H, I, K, O, X



(c) both horizontal and vertical mirrors

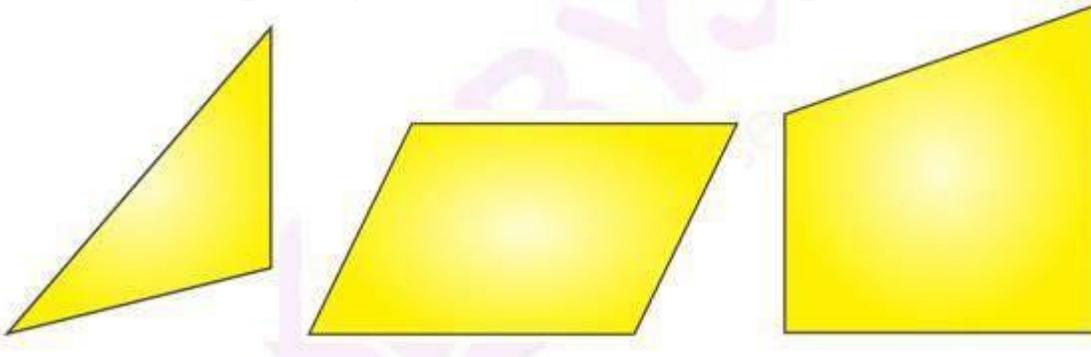
The English alphabet have reflection symmetry about both horizontal and vertical mirrors are, H, I, O, X



**9. Give three examples of shapes with no line of symmetry. Solution:-**

A shape has a no line of symmetry, if there is no line about which the figure may be folded and also parts of the figure will not coincide.

A scalene triangle, a quadrilateral and a parallelogram



**10. What other name can you give to the line of symmetry of**

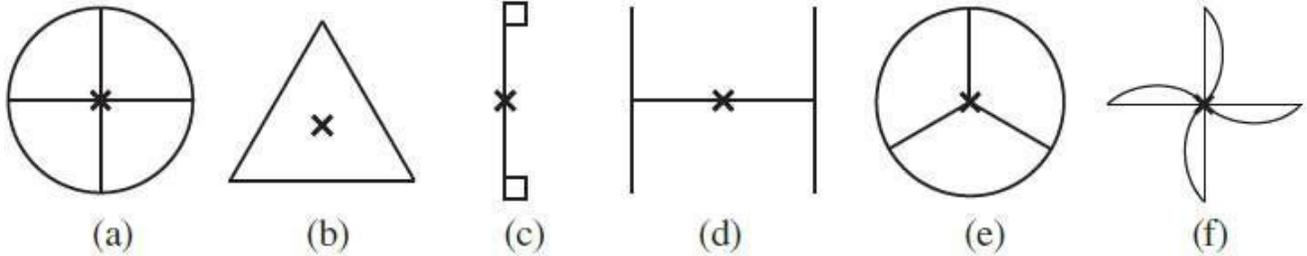
**(a) an isosceles triangle? Solution:-**

The other name to the line of symmetry of an isosceles triangle is median or altitude.

**(b) a circle?**

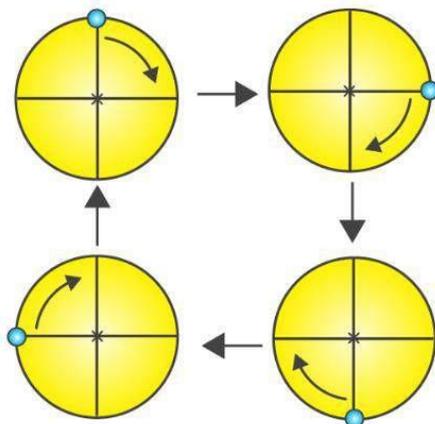
The other name to the line of symmetry of a circle is diameter.

1. Which of the following figures have rational symmetry of order more than 1:



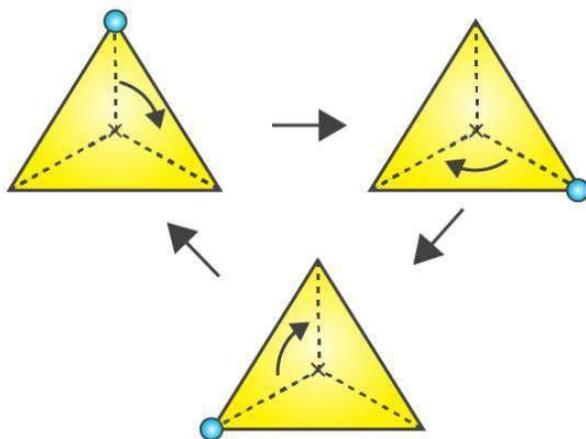
**Solution**

:- (a)



So, the above figure has its rotational symmetry as 4.

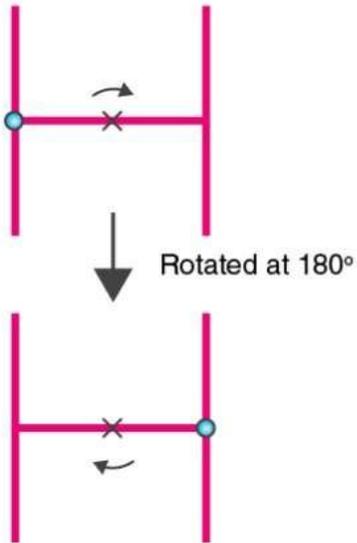
(b)



So, the above figure has its rotational symmetry as 3.

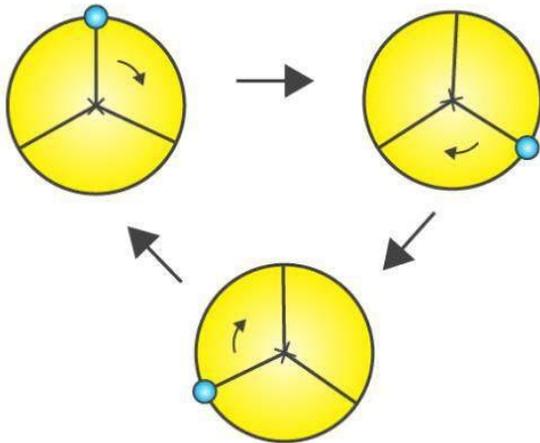
(c) So, the given figure has only one rotational symmetry.

(d)



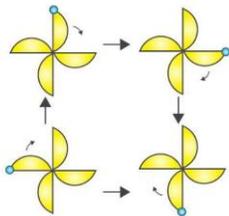
So, the above figure has its rotational symmetry as 2.

(e)



So, the above figure has its rotational symmetry as 3.

(f)



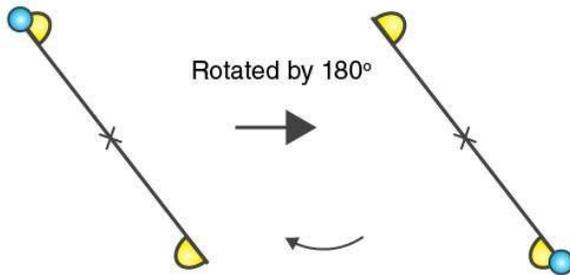
So, the above figure has its rotational symmetry as 4.

By observing all the figures (a), (b), (c), (d), (e) and (f) have rotational symmetry of order more than 1.

2. Give the order of rotational symmetry for each figure: (a)



Solution:-

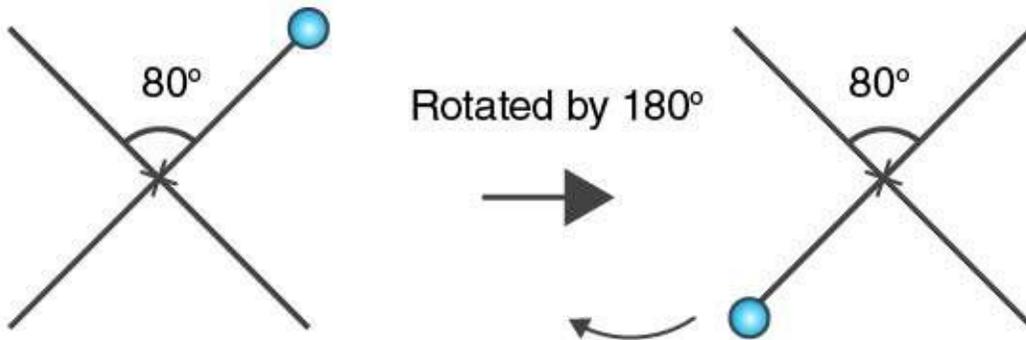


The above figure has its rotational symmetry as 2.

(b)



Solution:-



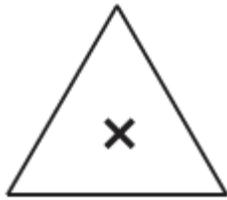
The above figure has its rotational symmetry as 2.

(c)

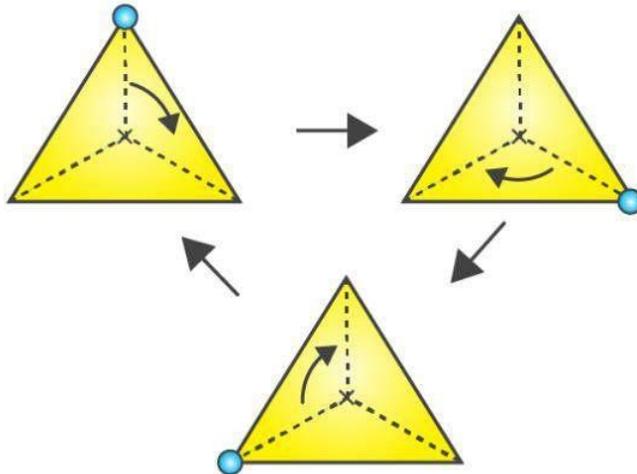
[Type text]

[Type text]

[Type text]



**Solution:-**

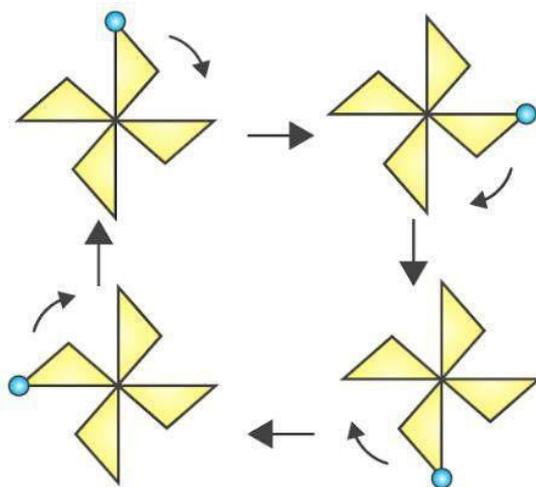


The above figure has its rotational symmetry as 3.

(d)



**Solution:-**



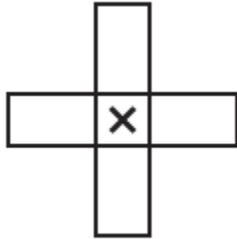
[Type text]

[Type text]

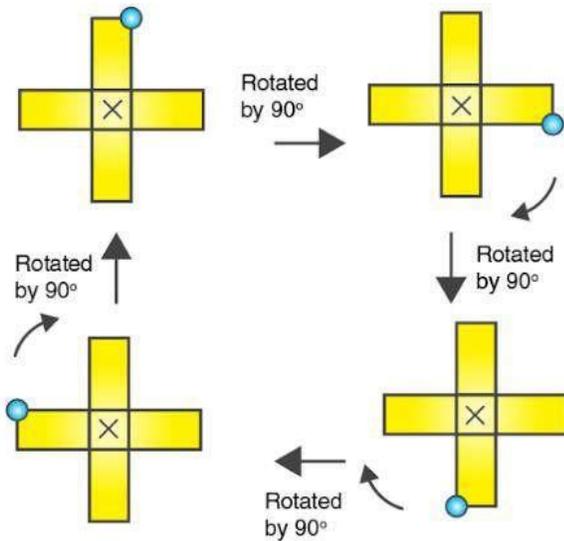
[Type text]

The above figure has its rotational symmetry as 4.

(e)

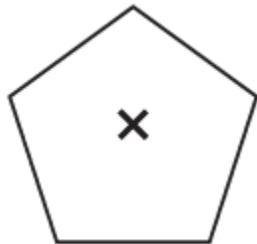


Solution:-

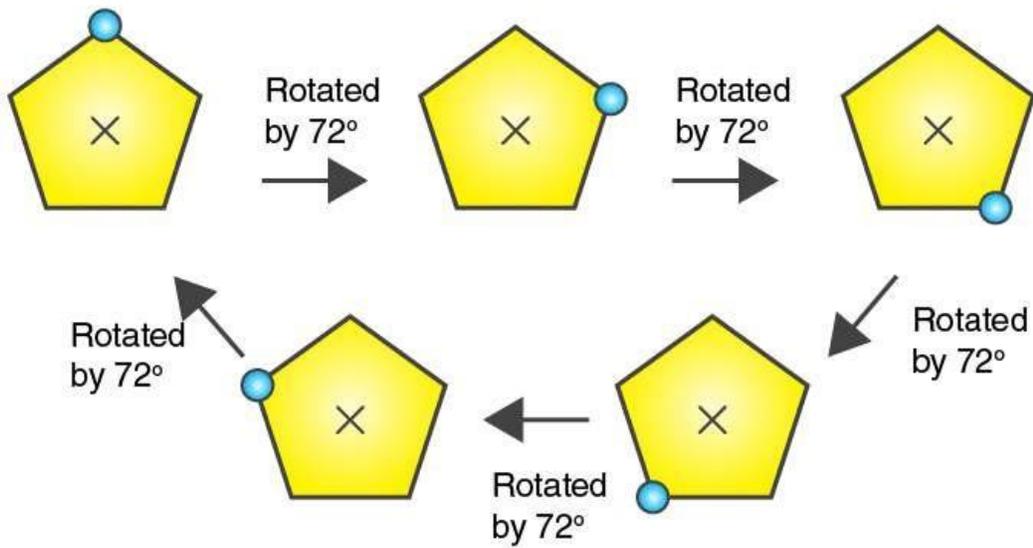


The above figure has its rotational symmetry as 4.

(f)



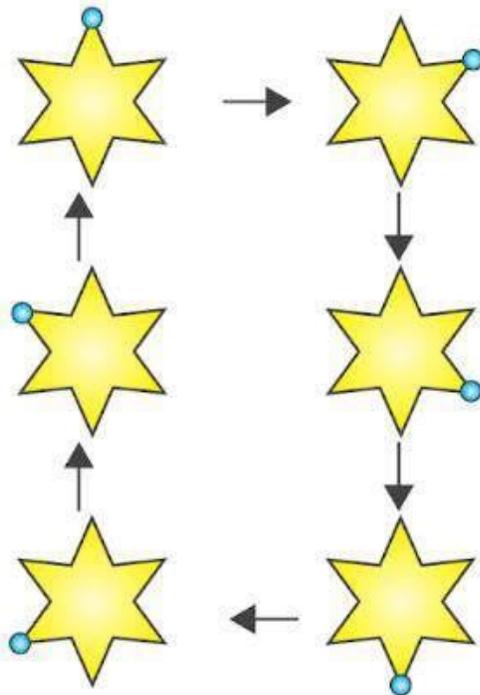
Solution:-



The above figure has its rotational symmetry as 5.



**Solution:-**



The above figure has its rotational symmetry as 6.

[Type text]

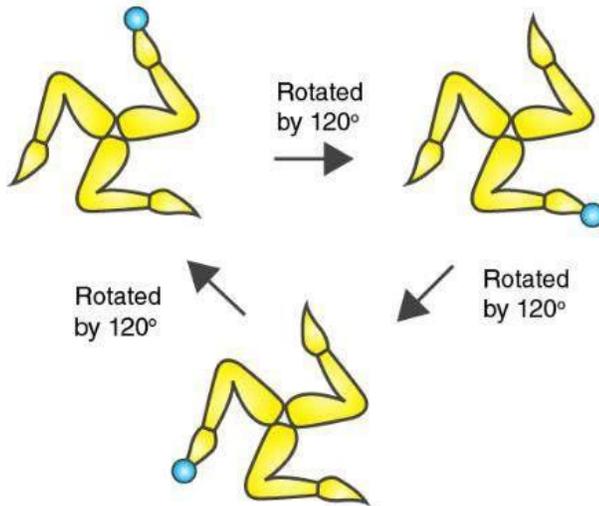
[Type text]

[Type text]

(g)



**Solution:-**



The above figure has its rotational symmetry as 3.

**Exercise 14.3 Page: 275**

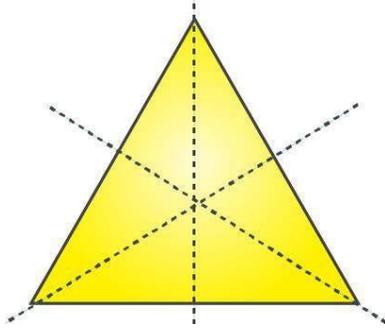
**1. Name any two figures that have both line symmetry and rotational symmetry. Solution:-**

Equilateral triangle and Circle.

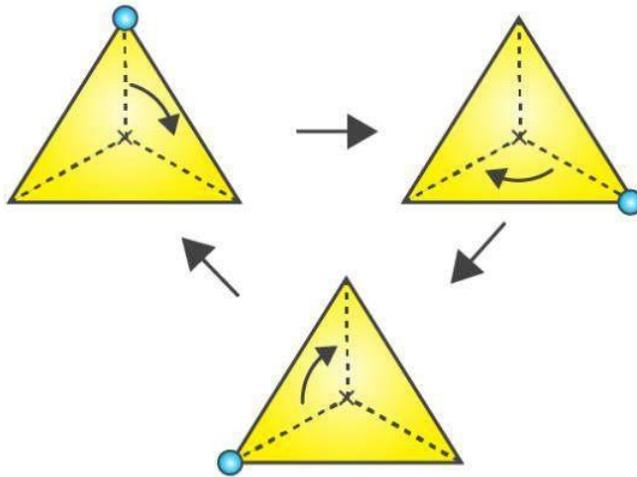
**2. Draw, wherever possible, a rough sketch of (i) a triangle with both line and rotational symmetries of order more than 1. Solution:-**

A triangle with both line and rotational symmetries of order more than 1 is an equilateral triangle.

**Line symmetry**



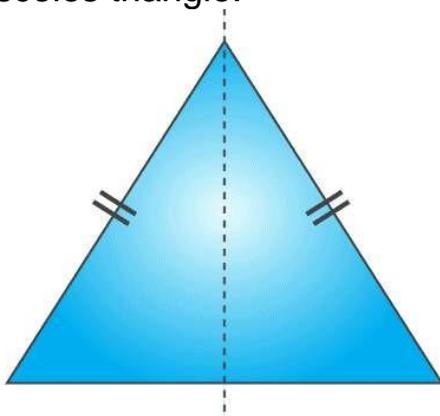
**Rotational symmetry**



**(ii) a triangle with only line symmetry and no rotational symmetry of order more than 1.**

**Solution:-**

A triangle with only line symmetry and no rotational symmetry of order more than 1 is isosceles triangle.



**(iii) a quadrilateral with a rotational symmetry of order more than 1 but**

not a line symmetry.

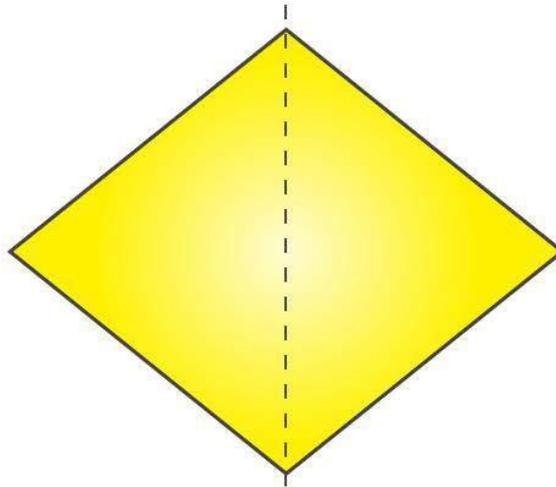
**Solution:-**

A quadrilateral with a rotational symmetry of order more than 1 but not a line symmetry is not possible to draw. Because, a quadrilateral with a line symmetry may have rotational symmetry of order one but not more than one.

**(iv) a quadrilateral with line symmetry but not a rotational symmetry of order more than 1.**

**Solution:-**

A quadrilateral with line symmetry but not a rotational symmetry of order more than 1 is rhombus.



If a figure has two or more lines of symmetry, should it have rotational symmetry of order more than 1?

**Solution:-**

Yes. If a figure has two or more lines of symmetry, then it will have rotational symmetry of order more than 1.

**3. Fill in the blanks:**

Shape	Centre of Rotation	Order of Rotation	Angle of Rotation
Square			
Rectangle			
Rhombus			
Equilateral Triangle			
Regular Hexagon			

[Type text]

[Type text]

[Type text]

<b>Circle</b>			
<b>Semi-circle</b>			

**Solution:-**

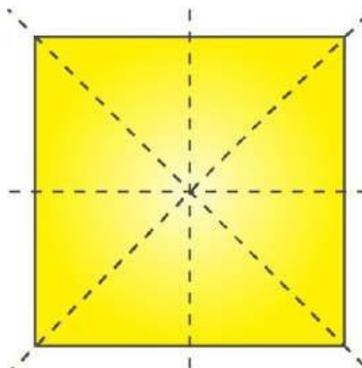
<b>Shape</b>	<b>Centre of Rotation</b>	<b>Order of Rotation</b>	<b>Angle of Rotation</b>
<b>Square</b>	Intersecting point of diagonals	4	$90^\circ$
<b>Rectangle</b>	Intersecting point of diagonals	2	$180^\circ$
<b>Rhombus</b>	Intersecting point of diagonals	2	$180^\circ$
<b>Equilateral Triangle</b>	Intersecting point of medians	3	$120^\circ$
<b>Regular Hexagon</b>	Intersecting point of diagonals	6	$60^\circ$
<b>Circle</b>	Centre	Infinite	Every angle
<b>Semi-circle</b>	Mid-point of diameter	1	$360^\circ$

**4. Name the quadrilaterals which have both line and rotational symmetry of order more than 1.**

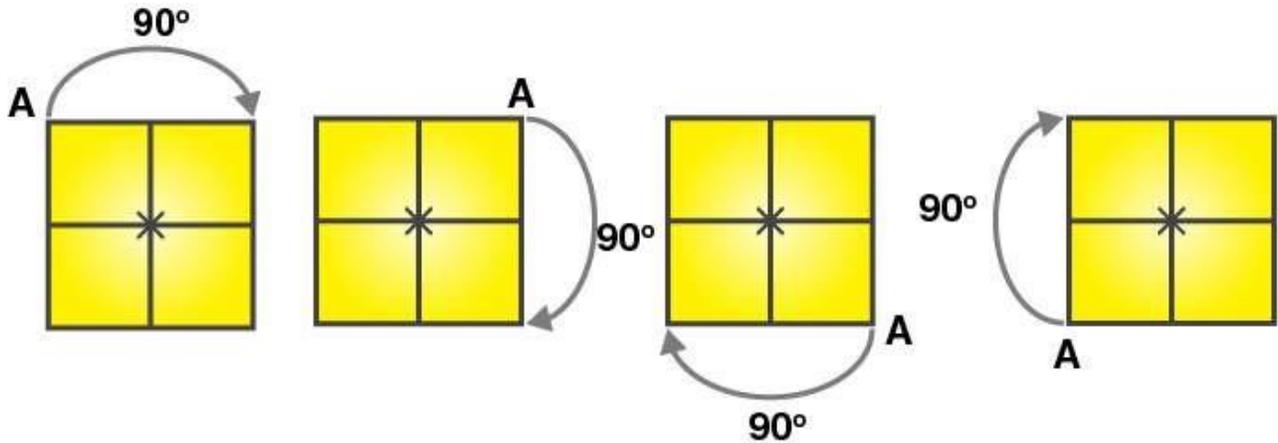
**Solution:-**

The quadrilateral which have both line and rotational symmetry of order more than 1 is square.

Line symmetry:



Rotational symmetry:



**5. After rotating by  $60^\circ$  about a centre, a figure looks exactly the same as its original position. At what other angles will this happen for the figure?**

**Solution:-**

The other angles are,  $120^\circ$ ,  $180^\circ$ ,  $240^\circ$ ,  $300^\circ$ ,  $360^\circ$

So, the figure is said to have rotational symmetry about same angle as the first one. Hence, the figure will look exactly the same when rotated by  $60^\circ$  from the last position.

**6. Can we have a rotational symmetry of order more than 1 whose angle of rotation is (i)  $45^\circ$ ?**

**Solution:-**

Yes. We can have a rotational symmetry of order more than 1 whose angle of rotation is  $45^\circ$ .

**(ii)  $17^\circ$ ?**

**Solution**

**:-**

No. We cannot have a rotational symmetry of order more than 1 whose angle of rotation is  $17^\circ$ .

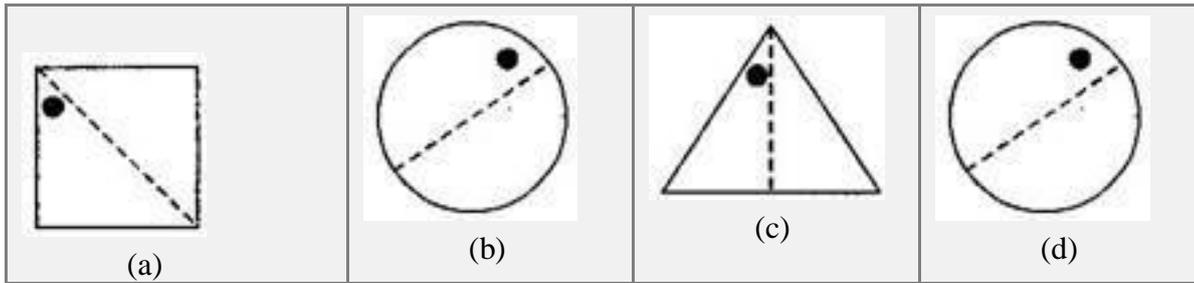
**MIND MAP**

**CH.: 14 SYMMETRY AND VISUALISING SOLIDS**

This chapter consists of three different topics. The most probable questions from examination point of view are given below.

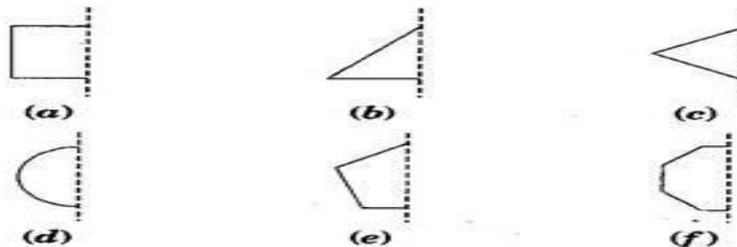
**TYPE:1 LINE OF SYMMETRY:**

Q.1 Given the line(s) of symmetry, find the other hole(s):



Q.2 In the following figures, the mirror line (i.e., the line of symmetry) is given as a dotted line. Complete each figure performing reflection in the dotted (mirror) line. (You might perhaps place a mirror along the dotted line and look into the mirror for the image).

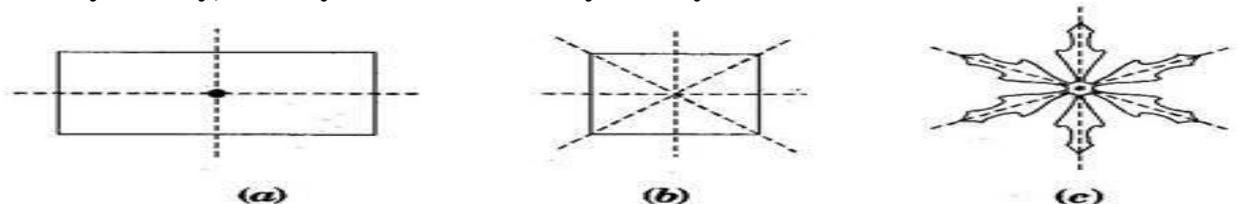
Are you able to recall the name of the figure you complete?



Q.3. State the number of lines of symmetry for the following figures:

- (a) An equilateral triangle
- (b) An isosceles triangle
- (c) A scalene triangle
- (d) A square
- (e) A rectangle
- (f) A rhombus
- (g) A parallelogram
- (h) A quadrilateral
- (i) A regular hexagon
- (j) A circle

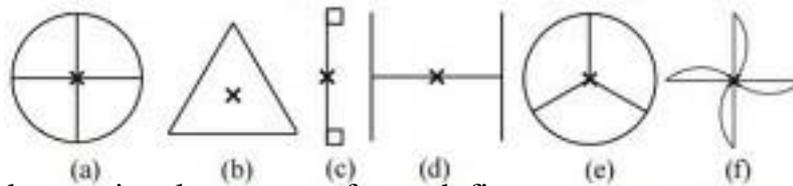
Q.4. The following figures have more than one line of symmetry. Such figures are said to have multiple lines of symmetry, identify the no. of line of symmetry:



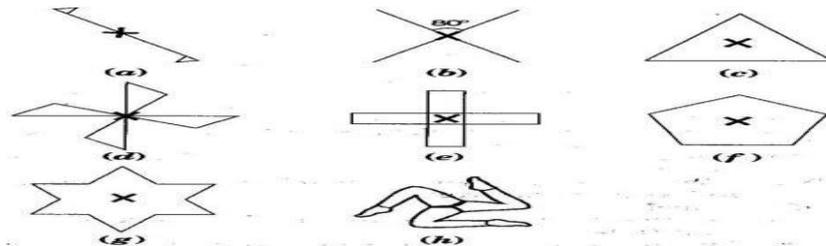
**TYPE: 2**

## ROTATIONAL SYMMETRY

Q.1. Which of the following figures have rotational symmetry of order more than 1:



Q.2. Give the order the rotational symmetry for each figure



### TYPE: 3 MISCELLANEOUS:

Q.1. . Draw, wherever possible, a rough sketch of:

- i) a triangle with both line and rotational symmetries of order more than one.
- ii) a triangle with only line symmetry and no rotational symmetry of order more than one.
- iii) .a quadrilateral with a rotational symmetry of order more than one but not a line symmetry.
- iv). a quadrilateral with line symmetry but not a rotational symmetry of order more than one.

Q.2. Fill in the blanks:

Shape	Centre of Rotation	Order of Rotation	Angle of Rotation
Square			
Rectangle			
Rhombus			
Equilateral triangle			
Regular hexagon			
Circle			
Semi-circle			

Q.3. Can we have a rotational symmetry of order more than 1 whose angle of rotation is:

- (i)  $45^\circ$  (ii)  $17^\circ$  ?

## EXERCISE 13.1

PAGE: 252

### 1. Find the value of:

(i)  $2^6$

**Solution:-**

The above value can be written as,  
$$= 2 \times 2 \times 2 \times 2 \times 2 \times 2$$
$$= 64$$

(ii)  $9^3$

**Solution:-**

The above value can be written as,  
$$= 9 \times 9 \times 9$$
$$= 729$$

(iii)  $11^2$

**Solution:-**

The above value can be written as,  
$$= 11 \times 11$$
$$= 121$$

(iv)  $5^4$

**Solution:-**

The above value can be written as,  
$$= 5 \times 5 \times 5 \times 5$$
$$= 625$$

### 2. Express the following in exponential form:

(i)  $6 \times 6 \times 6 \times 6$

**Solution:-**

The given question can be expressed in the exponential form as  $6^4$ .

(ii)  $t \times t$

**Solution:-**

The given question can be expressed in the exponential form as  $t^2$ .

(iii)  $b \times b \times b \times b$

**Solution:-**

The given question can be expressed in the exponential form as  $b^4$ .

**(iv)  $5 \times 5 \times 7 \times 7 \times 7$**

**Solution:-**

The given question can be expressed in the exponential form as  $5^2 \times 7^3$ .

**(v)  $2 \times 2 \times a \times a$**

**Solution:-**

The given question can be expressed in the exponential form as  $2^2 \times a^2$ .

**(vi)  $a \times a \times a \times c \times c \times c \times c \times d$**

**Solution:-**

The given question can be expressed in the exponential form as  $a^3 \times c^4 \times d$ .

**3. Express each of the following numbers using exponential notation:**

**(i) 512**

**Solution:-**

The factors of  $512 = 2 \times 2$

So it can be expressed in the exponential form as  $2^9$ .

**(ii) 343**

**Solution:-**

The factors of  $343 = 7 \times 7 \times 7$

So it can be expressed in the exponential form as  $7^3$ .

**(iii) 729**

**Solution:-**

The factors of  $729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3$

So it can be expressed in the exponential form as  $3^6$ .

**(iv) 3125**

**Solution:-**

The factors of  $3125 = 5 \times 5 \times 5 \times 5 \times 5$

So it can be expressed in the exponential form as  $5^5$ .

**4. Identify the greater number, wherever possible, in each of the following?**

**(i)  $4^3$  or  $3^4$**

**Solution:-**

The expansion of  $4^3 = 4 \times 4 \times 4 = 64$

The expansion of  $3^4 = 3 \times 3 \times 3 \times 3 = 81$

Clearly,

$$64 < 81$$

So,  $4^3 < 3^4$

Hence  $3^4$  is the greater number.

**(ii)  $5^3$  or  $3^5$**

**Solution:-**

The expansion of  $5^3 = 5 \times 5 \times 5 = 125$

The expansion of  $3^5 = 3 \times 3 \times 3 \times 3 \times 3 = 243$

Clearly,

$$125 < 243$$

So,  $5^3 < 3^5$

Hence  $3^5$  is the greater number.

**(iii)  $2^8$  or  $8^2$**

**Solution:-**

The expansion of  $2^8 = 2 \times 2 = 256$

The expansion of  $8^2 = 8 \times 8 = 64$

Clearly,

$$256 > 64$$

So,  $2^8 > 8^2$

Hence  $2^8$  is the greater number.

**(iv)  $100^2$  or  $2^{100}$**

**Solution:-**

The expansion of  $100^2 = 100 \times 100 = 10000$

The expansion of  $2^{100}$

$2^{10} = 2 \times 2 = 1024$

Then,

$2^{100} = 1024 \times 1024 =$

Clearly,

$$100^2 < 2^{100}$$

Hence  $2^{100}$  is the greater number.

**(v)  $2^{10}$  or  $10^2$**

**Solution:-**

The expansion of  $2^{10} = 2 \times 2 = 1024$

The expansion of  $10^2 = 10 \times 10 = 100$

Clearly,

$$1024 > 100$$

So,  $2^{10} > 10^2$

Hence  $2^8$  is the greater number.

**5. Express each of the following as product of powers of their prime factors:**

**(i) 648**

**Solution:-**

$$\begin{aligned}\text{Factors of } 648 &= 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \\ &= 2^3 \times 3^4\end{aligned}$$

**(ii) 405**

**Solution:-**

$$\begin{aligned}\text{Factors of } 405 &= 3 \times 3 \times 3 \times 3 \times 5 \\ &= 3^5 \times 5\end{aligned}$$

**(iii) 540**

**Solution:-**

$$\begin{aligned}\text{Factors of } 540 &= 2 \times 2 \times 3 \times 3 \times 3 \times 5 \\ &= 2^2 \times 3^3 \times 5\end{aligned}$$

**(iv) 3,600**

**Solution:-**

$$\begin{aligned}\text{Factors of } 3600 &= 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5 \\ &= 2^4 \times 3^2 \times 5^2\end{aligned}$$

**6. Simplify:**

**(i)  $2 \times 10^3$**

**Solution:-**

The above question can be written as,

$$= 2 \times 10 \times 10 \times 10$$

$$= 2 \times 1000$$

$$= 2000$$

**(ii)  $7^2 \times 2^2$**

**Solution:-**

The above question can be written as,

$$= 7 \times 7 \times 2 \times 2$$

$$= 49 \times 4$$

$$= 196$$

**(iii)  $2^3 \times 5$**

**Solution:-**

The above question can be written as,

$$= 2 \times 2 \times 2 \times 5$$

$$= 8 \times 5$$

$$= 40$$

**(iv)  $3 \times 4^4$**

**Solution:-**

The above question can be written as,

$$= 3 \times 4 \times 4 \times 4 \times 4$$

$$= 3 \times 256$$

$$= 768$$

**(v)  $0 \times 10^2$**

**Solution:-**

The above question can be written as,

$$= 0 \times 10 \times 10$$

$$= 0 \times 100$$

$$= 0$$

**(vi)  $5^2 \times 3^3$**

**Solution:-**

The above question can be written as,

$$= 5 \times 5 \times 3 \times 3 \times 3$$

$$= 25 \times 27$$

$$= 675$$

**(vii)  $2^4 \times 3^2$**

**Solution:-**

The above question can be written as,

$$\begin{aligned} &= 2 \times 2 \times 2 \times 2 \times 3 \times 3 \\ &= 16 \times 9 \\ &= 144 \end{aligned}$$

**(viii)  $3^2 \times 10^4$**

**Solution:-**

The above question can be written as,

$$\begin{aligned} &= 3 \times 3 \times 10 \times 10 \times 10 \times 10 \\ &= 9 \times 10000 \\ &= 90000 \end{aligned}$$

**7. Simplify:**

**(i)  $(-4)^3$**

**Solution:-**

The expansion of  $-4^3$

$$\begin{aligned} &= -4 \times -4 \times -4 \\ &= -64 \end{aligned}$$

**(ii)  $(-3) \times (-2)^3$**

**Solution:-**

The expansion of  $(-3) \times (-2)^3$

$$\begin{aligned} &= -3 \times -2 \times -2 \times -2 \\ &= -3 \times -8 \\ &= 24 \end{aligned}$$

**(iii)  $(-3)^2 \times (-5)^2$**

**Solution:-**

The expansion of  $(-3)^2 \times (-5)^2$

$$\begin{aligned} &= -3 \times -3 \times -5 \times -5 \\ &= 9 \times 25 \\ &= 225 \end{aligned}$$

**(iv)  $(-2)^3 \times (-10)^3$**

**Solution:-**

The expansion of  $(-2)^3 \times (-10)^3$   
 $= -2 \times -2 \times -2 \times -10 \times -10 \times -10$   
 $= -8 \times -1000$   
 $= 8000$

**8. Compare the following numbers:**

**(i)  $2.7 \times 10^{12}$  ;  $1.5 \times 10^8$**

**Solution:-**

By observing the question

Comparing the exponents of base 10,

Clearly,

$$2.7 \times 10^{12} > 1.5 \times 10^8$$

**(ii)  $4 \times 10^{14}$  ;  $3 \times 10^{17}$**

**Solution:-**

By observing the question

Comparing the exponents of base 10,

Clearly,

$$4 \times 10^{14} < 3 \times 10^{17}$$

## EXERCISE 13.2

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**1. Using laws of exponents, simplify and write the answer in exponential form:**

**(i)  $3^2 \times 3^4 \times 3^8$**

**Solution:-**

By the rule of multiplying the powers with same base =  $a^m \times a^n = a^{m+n}$

Then,

$$\begin{aligned} &= (3)^{2+4+8} \\ &= 3^{14} \end{aligned}$$

**(ii)  $6^{15} \div 6^{10}$**

**Solution:-**

By the rule of dividing the powers with same base =  $a^m \div a^n = a^{m-n}$

Then,

$$\begin{aligned} &= (6)^{15-10} \\ &= 6^5 \end{aligned}$$

**(iii)  $a^3 \times a^2$**

**Solution:-**

By the rule of multiplying the powers with same base =  $a^m \times a^n = a^{m+n}$

Then,

$$\begin{aligned} &= (a)^{3+2} \\ &= a^5 \end{aligned}$$

**(iv)  $7^x \times 7^2$**

**Solution:-**

By the rule of multiplying the powers with same base =  $a^m \times a^n = a^{m+n}$

Then,

$$= (7)^{x+2}$$

**(v)  $(5^2)^3 \div 5^3$**

**Solution:-**

By the rule of taking power of as power =  $(a^m)^n = a^{mn}$

$$\begin{aligned} (5^2)^3 \text{ can be written as } &= (5)^{2 \times 3} \\ &= 5^6 \end{aligned}$$

Now,  $5^6 \div 5^3$

By the rule of dividing the powers with same base =  $a^m \div a^n = a^{m-n}$

Then,

$$\begin{aligned} &= (5)^{6-3} \\ &= 5^3 \end{aligned}$$

**(vi)  $2^5 \times 5^5$**

**Solution:-**

By the rule of multiplying the powers with same exponents =  $a^m \times b^m = ab^m$

Then,

$$\begin{aligned} &= (2 \times 5)^5 \\ &= 10^5 \end{aligned}$$

**(vii)  $a^4 \times b^4$**

**Solution:-**

By the rule of multiplying the powers with same exponents =  $a^m \times b^m = ab^m$

Then,

$$\begin{aligned} &= (a \times b)^4 \\ &= ab^4 \end{aligned}$$

**(viii)  $(3^4)^3$**

**Solution:-**

By the rule of taking power of as power =  $(a^m)^n = a^{mn}$

$$\begin{aligned} (3^4)^3 \text{ can be written as } &= (3)^{4 \times 3} \\ &= 3^{12} \end{aligned}$$

**(ix)  $(2^{20} \div 2^{15}) \times 2^3$**

**Solution:-**

By the rule of dividing the powers with same base =  $a^m \div a^n = a^{m-n}$

$$\begin{aligned} (2^{20} \div 2^{15}) \text{ can be simplified as,} \\ &= (2)^{20-15} \\ &= 2^5 \end{aligned}$$

Then,

By the rule of multiplying the powers with same base =  $a^m \times a^n = a^{m+n}$

$$\begin{aligned} 2^5 \times 2^3 \text{ can be simplified as,} \\ &= (2)^{5+3} \\ &= 2^8 \end{aligned}$$

**(x)  $8^t \div 8^2$**

**Solution:-**

By the rule of dividing the powers with same base =  $a^m \div a^n = a^{m-n}$

Then,

$$= (8)^{t-2}$$

**2. Simplify and express each of the following in exponential form:**

**(i)  $(2^3 \times 3^4 \times 4) / (3 \times 32)$**

**Solution:-**

Factors of 32 =  $2 \times 2 \times 2 \times 2 \times 2$

$$= 2^5$$

Factors of 4 =  $2 \times 2$

$$= 2^2$$

Then,

$$= (2^3 \times 3^4 \times 2^2) / (3 \times 2^5)$$

$$= (2^{3+2} \times 3^4) / (3 \times 2^5)$$

... [ $\because a^m \times a^n = a^{m+n}$ ]

$$= (2^5 \times 3^4) / (3 \times 2^5)$$

$$= 2^{5-5} \times 3^{4-1}$$

... [ $\because a^m \div a^n = a^{m-n}$ ]

$$= 2^0 \times 3^3$$

$$= 1 \times 3^3$$

$$= 3^3$$

**(ii)  $((5^2)^3 \times 5^4) \div 5^7$**

**Solution:-**

$(5^2)^3$  can be written as =  $(5)^{2 \times 3}$

... [ $\because (a^m)^n = a^{mn}$ ]

$$= 5^6$$

Then,

$$= (5^6 \times 5^4) \div 5^7$$

$$= (5^{6+4}) \div 5^7$$

... [ $\because a^m \times a^n = a^{m+n}$ ]

$$= 5^{10} \div 5^7$$

$$= 5^{10-7}$$

... [ $\because a^m \div a^n = a^{m-n}$ ]

$$= 5^3$$

**(iii)  $25^4 \div 5^3$**

**Solution:-**

$(25)^4$  can be written as =  $(5 \times 5)^4$

$$= (5^2)^4$$

$(5^2)^4$  can be written as =  $(5)^{2 \times 4}$

... [ $\because (a^m)^n = a^{mn}$ ]

$$= 5^8$$

Then,

$$\begin{aligned} &= 5^8 \div 5^3 \\ &= 5^{8-3} \\ &= 5^5 \end{aligned}$$

$$\dots [\because a^m \div a^n = a^{m-n}]$$

**(iv)  $(3 \times 7^2 \times 11^8) / (21 \times 11^3)$**

**Solution:-**

Factors of 21 =  $7 \times 3$

Then,

$$\begin{aligned} &= (3 \times 7^2 \times 11^8) / (7 \times 3 \times 11^3) \\ &= 3^{1-1} \times 7^{2-1} \times 11^{8-3} \\ &= 3^0 \times 7 \times 11^5 \\ &= 1 \times 7 \times 11^5 \\ &= 7 \times 11^5 \end{aligned}$$

**(v)  $3^7 / (3^4 \times 3^3)$**

**Solution:-**

$$\begin{aligned} &= 3^7 / (3^{4+3}) \\ &= 3^7 / 3^7 \\ &= 3^{7-7} \\ &= 3^0 \\ &= 1 \end{aligned}$$

$$\dots [\because a^m \times a^n = a^{m+n}]$$

$$\dots [\because a^m \div a^n = a^{m-n}]$$

**(vi)  $2^0 + 3^0 + 4^0$**

**Solution:-**

$$\begin{aligned} &= 1 + 1 + 1 \\ &= 3 \end{aligned}$$

**(vii)  $2^0 \times 3^0 \times 4^0$**

**Solution:-**

$$\begin{aligned} &= 1 \times 1 \times 1 \\ &= 1 \end{aligned}$$

**(viii)  $(3^0 + 2^0) \times 5^0$**

**Solution:-**

$$\begin{aligned}
 &= (1 + 1) \times 1 \\
 &= (2) \times 1 \\
 &= 2
 \end{aligned}$$

**(ix)  $(2^8 \times a^5) / (4^3 \times a^3)$**

**Solution:-**

$$(4)^3 \text{ can be written as } = (2 \times 2)^3$$

$$= (2^2)^3$$

$$(5^2)^4 \text{ can be written as } = (2)^{2 \times 3}$$

$$= 2^6$$

$$\dots [\because (a^m)^n = a^{mn}]$$

Then,

$$\begin{aligned}
 &= (2^8 \times a^5) / (2^6 \times a^3) \\
 &= 2^{8-6} \times a^{5-3} \\
 &= 2^2 \times a^2 \\
 &= 2a^2
 \end{aligned}$$

$$\dots [\because a^m \div a^n = a^{m-n}]$$

$$\dots [\because (a^m)^n = a^{mn}]$$

**(x)  $(a^5/a^3) \times a^8$**

**Solution:-**

$$\begin{aligned}
 &= (a^{5-3}) \times a^8 \\
 &= a^2 \times a^8 \\
 &= a^{2+8} \\
 &= a^{10}
 \end{aligned}$$

$$\dots [\because a^m \div a^n = a^{m-n}]$$

$$\dots [\because a^m \times a^n = a^{m+n}]$$

**(xi)  $(4^5 \times a^8 b^3) / (4^5 \times a^5 b^2)$**

**Solution:-**

$$\begin{aligned}
 &= 4^{5-5} \times (a^{8-5} \times b^{3-2}) \\
 &= 4^0 \times (a^3 b) \\
 &= 1 \times a^3 b \\
 &= a^3 b
 \end{aligned}$$

$$\dots [\because a^m \div a^n = a^{m-n}]$$

**(xii)  $(2^3 \times 2)^2$**

**Solution:-**

$$\begin{aligned}
 &= (2^{3+1})^2 \\
 &= (2^4)^2
 \end{aligned}$$

$$\dots [\because a^m \times a^n = a^{m+n}]$$

$$(2^4)^2 \text{ can be written as } = (2)^{4 \times 2}$$

$$= 2^8$$

$$\dots [\because (a^m)^n = a^{mn}]$$

**3. Say true or false and justify your answer:**

**(i)  $10 \times 10^{11} = 100^{11}$**

**Solution:-**

Let us consider Left Hand Side (LHS) =  $10 \times 10^{11}$   
=  $10^{1+11}$  ... [ $\because a^m \times a^n = a^{m+n}$ ]  
=  $10^{12}$

Now, consider Right Hand Side (RHS) =  $100^{11}$   
=  $(10 \times 10)^{11}$   
=  $(10^1 \times 10^1)^{11}$   
=  $(10^2)^{11}$  ... [ $\because (a^m)^n = a^{mn}$ ]  
=  $(10)^{2 \times 11}$   
=  $10^{22}$

By comparing LHS and RHS,  
LHS  $\neq$  RHS

Hence, the given statement is false.

**(ii)  $2^3 > 5^2$**

**Solution:-**

Let us consider LHS =  $2^3$   
Expansion of  $2^3 = 2 \times 2 \times 2$   
= 8

Now, consider RHS =  $5^2$   
Expansion of  $5^2 = 5 \times 5$   
= 25

By comparing LHS and RHS,  
LHS < RHS  
 $2^3 < 5^2$

Hence, the given statement is false.

**(iii)  $2^3 \times 3^2 = 6^5$**

**Solution:-**

Let us consider LHS =  $2^3 \times 3^2$   
Expansion of  $2^3 \times 3^2 = 2 \times 2 \times 2 \times 3 \times 3$   
= 72

Now, consider RHS =  $6^5$   
Expansion of  $6^5 = 6 \times 6 \times 6 \times 6 \times 6$   
= 7776

By comparing LHS and RHS,

$$\text{LHS} < \text{RHS}$$

$$2^3 < 5^2$$

Hence, the given statement is false.

**(iv)  $3^0 = (1000)^0$**

**Solution:-**

Let us consider LHS =  $3^0$

$$= 1$$

Now, consider RHS =  $1000^0$

$$= 1$$

By comparing LHS and RHS,

$$\text{LHS} = \text{RHS}$$

$$3^0 = 1000^0$$

Hence, the given statement is true.

**4. Express each of the following as a product of prime factors only in exponential form:**

**(i)  $108 \times 192$**

**Solution:-**

The factors of 108 =  $2 \times 2 \times 3 \times 3 \times 3$

$$= 2^2 \times 3^3$$

The factors of 192 =  $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3$

$$= 2^6 \times 3$$

Then,

$$= (2^2 \times 3^3) \times (2^6 \times 3)$$

$$= 2^{2+6} \times 3^{3+3}$$

$$= 2^8 \times 3^6$$

$$\dots [\because a^m \times a^n = a^{m+n}]$$

**(ii) 270**

**Solution:-**

The factors of 270 =  $2 \times 3 \times 3 \times 3 \times 5$

$$= 2 \times 3^3 \times 5$$

**(iii)  $729 \times 64$**

The factors of 729 =  $3 \times 3 \times 3 \times 3 \times 3 \times 3$

$$= 3^6$$

$$\begin{aligned} \text{The factors of } 64 &= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \\ &= 2^6 \end{aligned}$$

Then,

$$\begin{aligned} &= (3^6 \times 2^6) \\ &= 3^6 \times 2^6 \end{aligned}$$

**(iv) 768**

**Solution:-**

$$\begin{aligned} \text{The factors of } 768 &= 2 \times 3 \\ &= 2^8 \times 3 \end{aligned}$$

**5. Simplify:**

**(i)  $((2^5)^2 \times 7^3) / (8^3 \times 7)$**

**Solution:-**

$$\begin{aligned} 8^3 \text{ can be written as } &= (2 \times 2 \times 2)^3 \\ &= (2^3)^3 \end{aligned}$$

We have,

$$\begin{aligned} &= ((2^5)^2 \times 7^3) / ((2^3)^3 \times 7) \\ &= (2^{5 \times 2} \times 7^3) / ((2^3 \times 3 \times 7) \\ &= (2^{10} \times 7^3) / (2^9 \times 7) \\ &= (2^{10-9} \times 7^{3-1}) \\ &= 2 \times 7^2 \\ &= 2 \times 7 \times 7 \\ &= 98 \end{aligned}$$

$$\dots [\because (a^m)^n = a^{mn}]$$

$$\dots [\because a^m \div a^n = a^{m-n}]$$

**(ii)  $(25 \times 5^2 \times t^8) / (10^3 \times t^4)$**

**Solution:-**

$$\begin{aligned} 25 \text{ can be written as } &= 5 \times 5 \\ &= 5^2 \end{aligned}$$

$$\begin{aligned} 10^3 \text{ can be written as } &= 10^3 \\ &= (5 \times 2)^3 \\ &= 5^3 \times 2^3 \end{aligned}$$

We have,

$$\begin{aligned} &= (5^2 \times 5^2 \times t^8) / (5^3 \times 2^3 \times t^4) \\ &= (5^{2+2} \times t^8) / (5^3 \times 2^3 \times t^4) \\ &= (5^4 \times t^8) / (5^3 \times 2^3 \times t^4) \\ &= (5^{4-3} \times t^{8-4}) / 2^3 \end{aligned}$$

$$\dots [\because a^m \times a^n = a^{m+n}]$$

$$\dots [\because a^m \div a^n = a^{m-n}]$$

$$= (5 \times t^4) / (2 \times 2 \times 2)$$
$$= (5t^4) / 8$$

**(iii)  $(3^5 \times 10^5 \times 25) / (5^7 \times 6^5)$**

**Solution:-**

$$10^5 \text{ can be written as } = (5 \times 2)^5$$
$$= 5^5 \times 2^5$$

$$25 \text{ can be written as } = 5 \times 5$$
$$= 5^2$$

$$6^5 \text{ can be written as } = (2 \times 3)^5$$
$$= 2^5 \times 3^5$$

Then we have,

$$= (3^5 \times 5^5 \times 2^5 \times 5^2) / (5^7 \times 2^5 \times 3^5)$$

$$= (3^5 \times 5^{5+2} \times 2^5) / (5^7 \times 2^5 \times 3^5)$$

$$= (3^5 \times 5^7 \times 2^5) / (5^7 \times 2^5 \times 3^5)$$

$$= (3^{5-5} \times 5^{7-7} \times 2^{5-5})$$

$$= (3^0 \times 5^0 \times 2^0)$$

$$= 1 \times 1 \times 1$$

$$= 1$$

$$\dots [\because a^m \times a^n = a^{m+n}]$$

$$\dots [\because a^m \div a^n = a^{m-n}]$$

### EXERCISE 13.3

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**1. Write the following numbers in the expanded forms:**

**279404**

**Solution:-**

The expanded form of the number 279404 is,

$$= (2 \times 100000) + (7 \times 10000) + (9 \times 1000) + (4 \times 100) + (0 \times 10) + (4 \times 1)$$

Now we can express it using powers of 10 in the exponent form,

$$= (2 \times 10^5) + (7 \times 10^4) + (9 \times 10^3) + (4 \times 10^2) + (0 \times 10^1) + (4 \times 10^0)$$

**3006194**

**Solution:-**

The expanded form of the number 3006194 is,

$$= (3 \times 1000000) + (0 \times 100000) + (0 \times 10000) + (6 \times 1000) + (1 \times 100) + (9 \times 10) + 4$$

Now we can express it using powers of 10 in the exponent form,

$$= (3 \times 10^6) + (0 \times 10^5) + (0 \times 10^4) + (6 \times 10^3) + (1 \times 10^2) + (9 \times 10^1) + (4 \times 10^0)$$

**2806196**

**Solution:-**

The expanded form of the number 2806196 is,

$$= (2 \times 1000000) + (8 \times 100000) + (0 \times 10000) + (6 \times 1000) + (1 \times 100) + (9 \times 10) + 6$$

Now we can express it using powers of 10 in the exponent form,

$$= (2 \times 10^6) + (8 \times 10^5) + (0 \times 10^4) + (6 \times 10^3) + (1 \times 10^2) + (9 \times 10^1) + (6 \times 10^0)$$

**120719**

**Solution:-**

The expanded form of the number 120719 is,

$$= (1 \times 100000) + (2 \times 10000) + (0 \times 1000) + (7 \times 100) + (1 \times 10) + (9 \times 1)$$

Now we can express it using powers of 10 in the exponent form,

$$= (1 \times 10^5) + (2 \times 10^4) + (0 \times 10^3) + (7 \times 10^2) + (1 \times 10^1) + (9 \times 10^0)$$

**20068**

**Solution:-**

The expanded form of the number 20068 is,

$$= (2 \times 10000) + (0 \times 1000) + (0 \times 100) + (6 \times 10) + (8 \times 1)$$

Now we can express it using powers of 10 in the exponent form,

$$= (2 \times 10^4) + (0 \times 10^3) + (0 \times 10^2) + (6 \times 10^1) + (8 \times 10^0)$$

**2. Find the number from each of the following expanded forms:**

**(a)  $(8 \times 10)^4 + (6 \times 10)^3 + (0 \times 10)^2 + (4 \times 10)^1 + (5 \times 10)^0$**

**Solution:-**

The expanded form is,

$$\begin{aligned} &= (8 \times 10000) + (6 \times 1000) + (0 \times 100) + (4 \times 10) + (5 \times 1) \\ &= 80000 + 6000 + 0 + 40 + 5 \\ &= 86045 \end{aligned}$$

**(b)  $(4 \times 10)^5 + (5 \times 10)^3 + (3 \times 10)^2 + (2 \times 10)^0$**

**Solution:-**

The expanded form is,

$$\begin{aligned} &= (4 \times 100000) + (0 \times 10000) + (5 \times 1000) + (3 \times 100) + (0 \times 10) + (2 \times 1) \\ &= 400000 + 0 + 5000 + 300 + 0 + 2 \\ &= 405302 \end{aligned}$$

**(c)  $(3 \times 10)^4 + (7 \times 10)^2 + (5 \times 10)^0$**

**Solution:-**

The expanded form is,

$$\begin{aligned} &= (3 \times 10000) + (0 \times 1000) + (7 \times 100) + (0 \times 10) + (5 \times 1) \\ &= 30000 + 0 + 700 + 0 + 5 \\ &= 30705 \end{aligned}$$

**(d)  $(9 \times 10)^5 + (2 \times 10)^2 + (3 \times 10)^1$**

**Solution:-**

The expanded form is,

$$\begin{aligned} &= (9 \times 100000) + (0 \times 10000) + (0 \times 1000) + (2 \times 100) + (3 \times 10) + (0 \times 1) \\ &= 900000 + 0 + 0 + 200 + 30 + 0 \\ &= 900230 \end{aligned}$$

**3. Express the following numbers in standard form:**

**(i) 5,00,00,000**

**Solution:-**

The standard form of the given number is  $5 \times 10^7$

**(ii) 70,00,000**

**Solution:-**

The standard form of the given number is  $7 \times 10^6$

**(iii) 3,18,65,00,000**

**Solution:-**

The standard form of the given number is  $3.1865 \times 10^9$

**(iv) 3,90,878**

**Solution:-**

The standard form of the given number is  $3.90878 \times 10^5$

**(v) 39087.8**

**Solution:-**

The standard form of the given number is  $3.90878 \times 10^4$

**(vi) 3908.78**

**Solution:-**

The standard form of the given number is  $3.90878 \times 10^3$

**4. Express the number appearing in the following statements in standard form.**

**(a) The distance between Earth and Moon is 384,000,000 m.**

**Solution:-**

The standard form of the number appearing in the given statement is  $3.84 \times 10^8$ m.

**(b) Speed of light in vacuum is 300,000,000 m/s.**

**Solution:-**

The standard form of the number appearing in the given statement is  $3 \times 10^8$ m/s.

**(c) Diameter of the Earth is 1,27,56,000 m.**

**Solution:-**

The standard form of the number appearing in the given statement is  $1.2756 \times 10^7$ m.

**(d) Diameter of the Sun is 1,400,000,000 m.**

**Solution:-**

The standard form of the number appearing in the given statement is  $1.4 \times 10^9$ m.

**(e) In a galaxy there are on an average 100,000,000,000 stars.**

**Solution:-**

The standard form of the number appearing in the given statement is  $1 \times 10^{11}$  stars.

**(f) The universe is estimated to be about 12,000,000,000 years old.**

**Solution:-**

The standard form of the number appearing in the given statement is  $1.2 \times 10^{10}$  years old.

**(g) The distance of the Sun from the centre of the Milky Way Galaxy is estimated to be 300,000,000,000,000,000 m.**

**Solution:-**

The standard form of the number appearing in the given statement is  $3 \times 10^{20}$ m.

**(h) 60,230,000,000,000,000,000 molecules are contained in a drop of water weighing 1.8 gm.**

**Solution:-**

The standard form of the number appearing in the given statement is  $6.023 \times 10^{22}$  molecules.

**(i) The earth has 1,353,000,000 cubic km of sea water.**

**Solution:-**

The standard form of the number appearing in the given statement is  $1.353 \times 10^9$  cubic km.

**(j) The population of India was about 1,027,000,000 in March, 2001.**

**Solution:-**

The standard form of the number appearing in the given statement is  $1.027 \times 10^9$ .

## MIND MAP

### CH.: 13 EXPONENTS AND POWER

This chapter consists of eight different topics. The most probable questions from examination point of view are given below.

#### TYPE:1 FIND THE VALUE OF :

Q.1.  $2^6$

Q.2.  $9^3$

Q.3.  $5^{-2}$

#### TYPE: 2 EXPRESS THE FOLLOWING IN EXPONENTIAL FORM

Q.1.  $6 \times 6 \times 6 \times 6$

Q.2. 512

Q.3. 3125

#### TYPE: 3 COMPARE THE FOLLOWING NUMBERS

Q.1.  $4^3 ; 3^4$

Q.2.  $100^2 ; 2^{100}$

Q.3.  $2.7 \times 10^2 ; 1.5 \times 10^8$

Q.4.  $3^0 ; (1000)^0$

#### TYPE: 4 EXPRESS THE FOLLOWING IN EXPONENTIAL FORM

Q.1. 540

Q.2.  $108 \times 192$

#### TYPE: 5 SIMPLIFY AND EXPRESS THE FOLLOWING IN EXPONENTIAL FORM

Q.1.  $(5^2)^3 \times 5^4 \div 5^7$

Q.2.  $(5^0 + 2^0) \times 5^4$

#### TYPE: 6 WRITE THE FOLLOWING NUMBERS IN THE EXPANDED FORM

Q.1. 279404

Q.2. 3006175

Q.3. 8682370094

#### TYPE: 7 FIND THE NUMBER FROM EACH OF THE FOLLOWING EXPANDED FORM

Q.1.  $8 \times 10^4 + 6 \times 10^3 + 0 \times 10^2 + 4 \times 10^1 + 5 \times 10^0$

Q.2.  $9 \times 10^5 + 2 \times 10^2 + 3 \times 10^1$

#### TYPE: 8 EXPRESS THE FOLLOWING NUMBERS IN THE STANDARD FORM

Q.1. 3,18,56,00,000

Q.2. 39078.864

Q.3. 5732660.094

# NCERT Solutions for Class 7 Maths Chapter 12

## Algebraic Expressions Class 7

Chapter 12 Algebraic Expressions Exercise 12.1, 12.2, 12.3, 12.4 Solutions

**Exercise 12.1 :** Solutions of Questions on Page Number : 234

**Q1 :**

Get the algebraic expressions in the following cases using variables, constants and arithmetic operations.

- (i) Subtraction of  $z$  from  $y$ .
- (ii) One-half of the sum of numbers  $x$  and  $y$ .
- (iii) The number  $z$  multiplied by itself.
- (iv) One-fourth of the product of numbers  $p$  and  $q$ .
- (v) Numbers  $x$  and  $y$  both squared and added.
- (vi) Number 5 added to three times the product of number  $m$  and  $n$ .
- (vii) Product of numbers  $y$  and  $z$  subtracted from 10.
- (viii) Sum of numbers  $a$  and  $b$  subtracted from their product.

**Answer :**

(i)  $y - z$

(ii)  $\frac{1}{2}(x + y)$

(iii)  $z^2$

(iv)  $\frac{1}{4}(pq)$

(v)  $x^2 + y^2$

(vi)  $5 + 3(mn)$

(vii)  $10 - yz$  (viii)  $ab - (a + b)$

Q2 :

(i) Identify the terms and their factors in the following expressions Show the terms and factors by tree diagrams.

(a)  $x - 3$  (b)  $1 + x + x^2$  (c)  $y - y^3$

(d)  $5xy^2 + 7x^2y$  (e)  $-ab + 2b^2 - 3a^2$

(ii) Identify terms and factors in the expressions given below:

(a)  $-4x + 5$  (b)  $-4x + 5y$  (c)  $5y + 3y^2$

(d)  $xy + 2x^2y^2$  (e)  $pq + q$

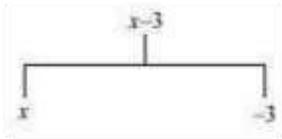
(f)  $1.2ab - 2.4b + 3.6a$  (g)  $\frac{3}{4}x + \frac{1}{4}$

(h)  $0.1p^2 + 0.2q^2$

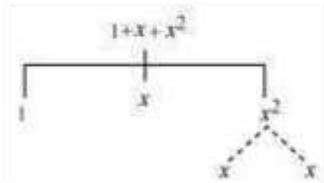
Answer :

(i)

(a)



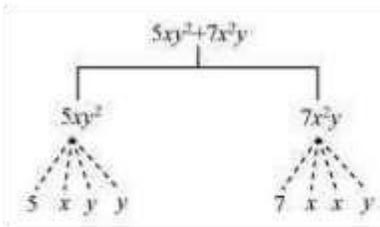
(b)



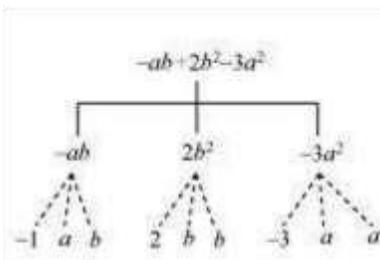
(c)



(d)



(e)



(ii)

(a)	$-4x + 5$	$-4x$ $5$	$-4, x$ $5$
(b)	$-4x + 5y$	$-4x$ $5y$	$-4, x$ $5, y$
(c)	$5y + 3y^2$	$5y$ $3y^2$	$5, y$ $3, y, y$
(d)	$xy + 2xy^2$	$xy$ $2xy^2$	$x, y$ $2, x, x, y, y$
(e)	$pq + q$	$pq$ $q$	$p, q$ $q$
(f)	$1.2ab - 2.4b + 3.6a$	$1.2ab$ $-2.4b$ $3.6a$	$1.2, a, b$ $-2.4, b$ $3.6, a$
(g)	$\frac{3}{4}x + \frac{1}{4}$	$\frac{3}{4}x$ $\frac{1}{4}$	$\frac{3}{4}, x$ $\frac{1}{4}$
(h)	$0.1p^2 + 0.2q^2$	$0.1p^2$ $0.2q^2$	$0.1, p, p$ $0.2, q, q$

Row	Expression	Terms	Factors
-----	------------	-------	---------

Q3 :

Identify the numerical coefficients of terms (other than constants) in the following e (i)  $5 - 3t$  (ii)  $1 + t + t^2 + t^3$  (iii)  $x + 2xy + 3y$

(iv)  $100m + 1000n$  (v)  $-p^2q^2 + 7pq$  (vi)  $1.2a + 0.8b$

(vii)  $3.14r^2$  (viii)  $2(l + b)$  (ix)  $0.1y + 0.01y^2$

Answer :

Row	Expression	Terms	Coefficients
(i)	$5 - 3t$	$-3t$	$-3$

xpressions:

(iii)	$x + 2xy + 3y$	$x$ $2xy$ $3y$	1 2 3
(iv)	$100m + 1000n$	$100m$ $1000n$	100 1000
(v)	$-p^2q + 7pq$	$-p^2q$ $7pq$	-1 7
(vi)	$1.2a + 0.8b$	$1.2a$ $0.8b$	1.2 0.8
(vii)	$3.14r^2$	$3.14r^2$	3.14
(viii)	$2(l + b)$	$2l$ $2b$	2 2
(ix)	$0.1y + 0.01y^2$	$0.1y$ $0.01y^2$	0.1 0.01

(ii)	$1 + t + t^2 + t^3$	$t$ $t^2$ $t^3$	1 1 1
------	---------------------	-----------------------	-------------

Q4 :

(a) Identify terms which contain  $x$  and give the coefficient of  $x$ .

(i)  $y^2x + y$  (ii)  $13y^2 - 8yx$  (iii)  $x + y + 2$

(iv)  $5 + z + zx$  (v)  $1 + x + xy$  (vi)  $12xy^2 + 25$

(vii)  $7x + xy^2$

(b) Identify terms which contain  $y^2$  and give the coefficient of  $y^2$ .

(i)  $8 - xy^2$  (ii)  $5y^2 + 7x$  (iii)  $2x^2y - 15xy^2 + 7y^2$

Answer :

(a)

Row	Expression	Terms with $x$	Coefficient of $x$
(i)	$y^2x + y$	$y^2x$	$y^2$
(ii)	$13y^2 - 8yx$	$-8yx$	$-8y$
(iii)	$x + y + 2$	$x$	1
(iv)	$5 + z + zx$	$zx$	$z$

Row	Expression	Terms with $y^n$	Coefficient of $y^n$
(i)	$8 - xy^n$	$-xy^n$	$-x$
(ii)	$5y^n + 7x$	$5y^n$	$5$
(iii)	$2x^2y + 7y^n$ $- 15xy^n$	$7y^n$ $- 15xy^n$	$7$ $- 15x$
(v)	$1 + x + xy$	$xxy$	$1y$
(vi)	$12xy^2 + 25$	$12xy^2$	$12y^2$
(vii)	$7x + xy^2$	$7xxy^2$	$7y^2$

(b)

**Q5 :**

**Classify into monomials, binomials and trinomials.**

(i)  $4y - 7z$  (ii)  $y^2$  (iii)  $x + y - xy$

(iv)  $100$  (v)  $ab - a - b$  (vi)  $5 - 3t$

(vii)  $4p^2q - 4pq^2$  (viii)  $7mn$  (ix)  $z^2 - 3z + 8$

(x)  $a^2 + b^2$  (xi)  $z^2 + z$  (xii)  $1 + x + x^2$

**Answer :**

The monomials, binomials, and trinomials have 1, 2, and 3 unlike terms in it respectively.

(i)  $4y - 7z$

Binomial

(ii)  $y^2$

Monomial

(iii)  $x + y - xy$

Trinomial

(iv)  $100$

Monomial

(v)  $ab - a - b$

Trinomial

(vi)  $5 - 3t$

Binomial

(vii)  $4p^2q - 4pq^2$

Binomial

(viii)  $7mn$

Monomial

(ix)  $z^2 - 3z + 8$

Trinomial

(x)  $a^2 + b^2$

Binomial

(xi)  $z^2 + z$

Binomial

(xii)  $1 + x + x^2$

Trinomial

**Q6 :**

**State whether a given pair of terms is of like or unlike terms.**

(i) 1, 100 (ii)  $-7x, \frac{5}{2}x$  (iii)  $-29x, -29y$

(iv)  $14xy, 42yx$  (v)  $4m^2p, 4mp^2$  (vi)  $12xz, 12x^2z^2$

**Answer :**

The terms which have the same algebraic factors are called like terms. However, when the terms have different algebraic factors, these are called unlike terms.

(i) 1, 100

Like

(ii)  $-7x, \frac{5}{2}x$

Like

(iii)  $-29x, -29y$

Unlike

(iv)  $14xy, 42yx$

Like

(v)  $4m^2p, 4mp^2$

Unlike

(vi)  $12xz, 12x^2z^2$

Unlike

**Q7 :**

**Identify like terms in the following:**

(a)  $-xy^2, -4yx^2, 8x^2, 2xy^2, 7y, -11x^2, -100x, -11yx, 20x^2y, -6x^2, y, 2xy, 3x$

(b)  $10pq, 7p, 8q, -p^2q^2, -7qp, -100q, -23, 12q^2p^2, -5p^2, 41, 2405p, 78qp, 13p^2q, qp^2, 701p^2$

**Answer :**

(a)  $-xy^2, 2xy^2$

$-4yx^2, 20x^2y$

$8x^2, -11x^2, -6x^2$

$7y, y$

$-100x, 3x$

$-11xy, 2xy$

(b)  $10pq, -7qp, 78qp$

$7p, 2405p$

$8q, -100q$

$-p^2q^2, 12p^2q^2$

$-23, 41$

$-5p^2, 701p^2$

$13p^2q, qp^2$

**Exercise 12.2 : Solutions of Questions on Page Number : 239**

**Q1 :**

**Simplify combining like terms:**

(i)  $21b - 32 + 7b - 20b$

(ii)  $-z^2 + 13z^2 - 5z + 7z^2 - 15z$

(iii)  $p - (p - q) - q - (q - p)$

(iv)  $3a - 2b - ab - (a - b + ab) + 3ab + b - a$

(v)  $5x^2y - 5x^2 + 3yx^2 - 3y^2 + x^2 - y^2 + 8xy^2 - 3y^2$

(vi)  $(3y^2 + 5y - 4) - (8y - y^2 - 4)$

**Answer :**

$$(i) 21b - 32 + 7b - 20b = 21b + 7b - 20b - 32$$

$$= b(21 + 7 - 20) - 32$$

$$= 8b - 32$$

$$(ii) -z^2 + 13z^2 - 5z + 7z^2 - 15z = 7z^2 - z^2 + 13z^2 - 5z - 15z$$

$$= 7z^2 + z^2(-1 + 13) + z(-5 - 15)$$

$$= 7z^2 + 12z^2 - 20z$$

$$(iii) p - (p - q) - q - (q - p) = p - p + q - q - q + p$$

$$= p - q$$

$$(iv) 3a - 2b - ab - (a - b + ab) + 3ab + b - a$$

$$= 3a - 2b - ab - a + b - ab + 3ab + b - a$$

$$= 3a - a - a - 2b + b + b - ab - ab + 3ab$$

$$= a(3 - 1 - 1) + b(-2 + 1 + 1) + ab(-1 - 1 + 3)$$

$$= a + ab$$

$$(v) 5x^2y - 5x^2 + 3yx^2 - 3y^2 + x^2 - y^2 + 8xy^2 - 3y^2$$

$$= 5x^2y + 3yx^2 - 5x^2 + x^2 - 3y^2 - y^2 - 3y^2 + 8xy^2$$

$$= x^2y(5 + 3) + x^2(-5 + 1) + y^2(-3 - 1 - 3) + 8xy^2$$

$$\begin{aligned}
&= 8x^2y - 4x^2 - 7y^2 + 8xy^2 \\
&\text{(vi) } (3y^2 + 5y - 4) - (8y - y^2 - 4) \\
&= 3y^2 + 5y - 4 - 8y + y^2 + 4 \\
&= 3y^2 + y^2 + 5y - 8y - 4 + 4 \\
&= y^2(3 + 1) + y(5 - 8) + 4(1 - 1) \\
&= 4y^2 - 3y
\end{aligned}$$

**Q2 :**

**Add:**

**(i)  $3mn, -5mn, 8mn, -4mn$**

**(ii)  $t - 8tz, 3tz - z, z - t$**

**(iii)  $-7mn + 5, 12mn + 2, 9mn - 8, -2mn - 3$**

**(iv)  $a + b - 3, b - a + 3, a - b + 3$**

**(v)  $14x + 10y - 12xy - 13, 18 - 7x - 10y + 8xy, 4xy$**

**(vi)  $5m - 7n, 3n - 4m + 2, 2m - 3mn - 5$**

**(vii)  $4x^2y, -3xy^2, -5xy^2, 5x^2y$**

**(viii)  $3p^2q^2 - 4pq + 5, -10p^2q^2, 15 + 9pq + 7p^2q^2$**

**(ix)  $ab - 4a, 4b - ab, 4a - 4b$**

**(x)  $x^2 - y^2 - 1, y^2 - 1 - x^2, 1 - x^2 - y^2$**

**Answer :**

(i)  $3mn + (-5mn) + 8mn + (-4mn) = mn(3 - 5 + 8 - 4)$   
 $= 2mn$

(ii)  $(t - 8tz) + (3tz - z) + (z - t) = t - 8tz + 3tz - z + z - t$   
 $= t - t - 8tz + 3tz - z + z$   
 $= t(1 - 1) + tz(-8 + 3) + z(-1 + 1)$   
 $= -5tz$

(iii)  $(-7mn + 5) + (12mn + 2) + (9mn - 8) + (-2mn - 3)$   
 $= -7mn + 5 + 12mn + 2 + 9mn - 8 - 2mn - 3 =$   
 $-7mn + 12mn + 9mn - 2mn + 5 + 2 - 8 - 3$   
 $= mn(-7 + 12 + 9 - 2) + (5 + 2 - 8 - 3)$   
 $= 12mn - 4$

(iv)  $(a + b - 3) + (b - a + 3) + (a - b + 3)$   
 $= a + b - 3 + b - a + 3 + a - b + 3$   
 $= a - a + a + b + b - b - 3 + 3 + 3$   
 $= a(1 - 1 + 1) + b(1 + 1 - 1) + 3(-1 + 1 + 1)$   
 $= a + b + 3$

(v)  $(14x + 10y - 12xy - 13) + (18 - 7x - 10y + 8yx) + 4xy$   
 $= 14x + 10y - 12xy - 13 + 18 - 7x - 10y + 8yx + 4xy$

$$\begin{aligned}
&= 14x - 7x + 10y - 10y - 12xy + 8yx + 4xy - 13 + 18 \\
&= x(14 - 7) + y(10 - 10) + xy(-12 + 8 + 4) - 13 + 18 \\
&= 7x + 5
\end{aligned}$$

$$\begin{aligned}
\text{(vi)} \quad &(5m - 7n) + (3n - 4m + 2) + (2m - 3mn - 5) \\
&= 5m - 7n + 3n - 4m + 2 + 2m - 3mn - 5 \\
&= 5m - 4m + 2m - 7n + 3n - 3mn + 2 - 5 \\
&= m(5 - 4 + 2) + n(-7 + 3) - 3mn + 2 - 5 \\
&= 3m - 4n - 3mn - 3
\end{aligned}$$

$$\begin{aligned}
\text{(vii)} \quad &4x^2y - 3xy^2 - 5xy^2 + 5x^2y = 4x^2y + 5x^2y - 3xy^2 - 5xy^2 \\
&= x^2y(4 + 5) + xy^2(-3 - 5) \\
&= 9x^2y - 8xy^2
\end{aligned}$$

$$\begin{aligned}
\text{(viii)} \quad &(3p^2q^2 - 4pq + 5) + (-10p^2q^2) + (15 + 9pq + 7p^2q^2) \\
&= 3p^2q^2 - 4pq + 5 - 10p^2q^2 + 15 + 9pq + 7p^2q^2 \\
&= 3p^2q^2 - 10p^2q^2 + 7p^2q^2 - 4pq + 9pq + 5 + 15 \\
&= p^2q^2(3 - 10 + 7) + pq(-4 + 9) + 5 + 15 \\
&= 5pq + 20
\end{aligned}$$

$$\begin{aligned}
\text{(ix)} \quad &(ab - 4a) + (4b - ab) + (4a - 4b) \\
&= ab - 4a + 4b - ab + 4a - 4b \\
&= ab - ab - 4a + 4a + 4b - 4b \\
&= ab(1 - 1) + a(-4 + 4) + b(4 - 4) \\
&= 0
\end{aligned}$$

$$\begin{aligned}
\text{(x)} \quad &(x^2 - y^2 - 1) + (y^2 - 1 - x^2) + (1 - x^2 - y^2) \\
&= x^2 - y^2 - 1 + y^2 - 1 - x^2 + 1 - x^2 - y^2 \\
&= x^2 - x^2 - x^2 - y^2 + y^2 - y^2 - 1 - 1 + 1 \\
&= x^2(1 - 1 - 1) + y^2(-1 + 1 - 1) + (-1 - 1 + 1) \\
&= -x^2 - y^2 - 1
\end{aligned}$$

**Q3 :**

**Subtract:**

(i)  $-5y^2$  from  $y^2$

(ii)  $6xy$  from  $-12xy$

(iii)  $(a - b)$  from  $(a + b)$

(iv)  $a(b - 5)$  from  $b(5 - a)$

(v)  $-m^2 + 5mn$  from  $4m^2 - 3mn + 8$

(vi)  $-x^2 + 10x - 5$  from  $5x - 10$

(vii)  $5a^2 - 7ab + 5b^2$  from  $3ab - 2a^2 - 2b^2$  (viii)

$4pq - 5q^2 - 3p^2$  from  $5p^2 + 3q^2 - pq$

**Answer :**

$$(i) \quad y^2 - (-5y^2) = y^2 + 5y^2 = 6y^2$$

$$(ii) \quad -12xy - (6xy) = -18xy$$

$$(iii) \quad (a + b) - (a - b) = a + b - a + b = 2b$$

$$(iv) \quad b(5 - a) - a(b - 5) = 5b - ab - ab + 5a \\ = 5a + 5b - 2ab$$

$$(v) \quad (4m^2 - 3mn + 8) - (-m^2 + 5mn) = 4m^2 - 3mn + 8 + m^2 - 5mn \\ = 4m^2 + m^2 - 3mn - 5mn + 8 \\ = 5m^2 - 8mn + 8$$

$$(vi) \quad (5x - 10) - (-x^2 + 10x - 5) = 5x - 10 + x^2 - 10x + 5 \\ = x^2 + 5x - 10x - 10 + 5 \\ = x^2 - 5x - 5$$

$$(vii) \quad (3ab - 2a^2 - 2b^2) - (5a^2 - 7ab + 5b^2) \\ = 3ab - 2a^2 - 2b^2 - 5a^2 + 7ab - 5b^2 \\ = 3ab + 7ab - 2a^2 - 5a^2 - 2b^2 - 5b^2 \\ = 10ab - 7a^2 - 7b^2$$

$$(viii) \quad 4pq - 5q^2 - 3p^2 \text{ from } 5p^2 + 3q^2 - pq \\ (5p^2 + 3q^2 - pq) - (4pq - 5q^2 - 3p^2) \\ = 5p^2 + 3q^2 - pq - 4pq + 5q^2 + 3p^2 \\ = 5p^2 + 3p^2 + 3q^2 + 5q^2 - pq - 4pq \\ = 8p^2 + 8q^2 - 5pq$$

**Q4 :**

**(a) What should be added to  $x^2 + xy + y^2$  to obtain  $2x^2 + 3xy$ ?**

**(b) What should be subtracted from  $2a + 8b + 10$  to get  $-3a + 7b + 16$ ?**

**Answer :**

(a) Let  $a$  be the required term.  $a + (x^2 + y^2 + xy) = 2x^2 + 3xy$   
 $a = 2x^2 + 3xy - (x^2 + y^2 + xy)$   
 $a = 2x^2 + 3xy - x^2 - y^2 - xy$   
 $= 2x^2 - x^2 - y^2 + 3xy - xy$

$$= x^2 - y^2 + 2xy$$

(b) Let  $p$  be the required term.  $(2a + 8b + 10) - p = -3a + 7b + 16$   
 $p = 2a + 8b + 10 - (-3a + 7b + 16)$

$$= 2a + 8b + 10 + 3a - 7b - 16$$

$$= 2a + 3a + 8b - 7b + 10 - 16$$

$$= 5a + b - 6$$

**Q5 :**

What should be taken away from  $3x^2 - 4y^2 + 5xy + 20$  to obtain  $x^2 - y^2 + 6xy + 20$ ?

**Answer :**

Let  $p$  be the required term.

$$\begin{aligned}(3x^2 - 4y^2 + 5xy + 20) - p &= x^2 - y^2 + 6xy + 20 \\ p &= (3x^2 - 4y^2 + 5xy + 20) - (x^2 - y^2 + 6xy + 20) \\ &= 3x^2 - 4y^2 + 5xy + 20 + x^2 + y^2 - 6xy - 20 \\ &= 4x^2 - 3y^2 - xy\end{aligned}$$

**Q6 :**

(a) From the sum of  $3x - y + 11$  and  $-y - 11$ , subtract  $3x - y - 11$ .

(b) From the sum of  $4 + 3x$  and  $5 - 4x + 2x^2$ , subtract the sum of  $3x^2 - 5x$  and  $-x^2 + 2x + 5$ .

**Answer :**

$$(a) (3x - y + 11) + (-y - 11)$$

$$= 3x - y + 11 - y - 11$$

$$= 3x - y - y + 11 - 11$$

$$= 3x - 2y$$

$$(3x - 2y) - (3x - y - 11)$$

$$= 3x - 2y - 3x + y + 11$$

$$= 3x - 3x - 2y + y + 11$$

$$= -y + 11$$

$$(b) (4 + 3x) + (5 - 4x + 2x^2) = 4 + 3x + 5 - 4x + 2x^2$$

$$= 3x - 4x + 2x^2 + 4 + 5$$

$$= -x + 2x^2 + 9$$

$$(3x^2 - 5x) + (-x^2 + 2x + 5) = 3x^2 - 5x - x^2 + 2x + 5$$

$$= 3x^2 - x^2 - 5x + 2x + 5$$

$$= 2x^2 - 3x + 5$$

$$(-x + 2x^2 + 9) - (2x^2 - 3x + 5)$$

$$= -x + 2x^2 + 9 - 2x^2 + 3x - 5$$

$$= -x + 3x + 2x^2 - 2x^2 + 9 - 5$$

$$= 2x + 4$$

**Exercise 12.3 : Solutions of Questions on Page Number : 242**

**Q1 :**

**If  $m = 2$ , find the value of:**

**(i)  $m - 2$  (ii)  $3m - 5$  (iii)  $9 - 5m$**

**(iv)  $3m^2 - 2m - 7$  (v)  $\frac{5m}{2} - 4$**

**Answer :**

(i)  $m - 2 = 2 - 2 = 0$

(ii)  $3m - 5 = (3 \times 2) - 5 = 6 - 5 = 1$

(iii)  $9 - 5m = 9 - (5 \times 2) = 9 - 10 = -1$

(iv)  $3m^2 - 2m - 7 = 3 \times (2 \times 2) - (2 \times 2) - 7$   
 $= 12 - 4 - 7 = 1$

(v)  $\frac{5m}{2} - 4 = \left(\frac{5 \times 2}{2}\right) - 4 = 1$

**Q2 :**

**If  $p = -2$ , find the value of:**

**(i)  $4p + 7$**

**(ii)  $-3p^2 + 4p + 7$**

**(iii)  $-2p^3 - 3p^2 + 4p + 7$**

**Answer :**

(i)  $4p + 7 = 4 \times (-2) + 7 = -8 + 7 = -1$

(ii)  $-3p^2 + 4p + 7 = -3(-2) \times (-2) + 4 \times (-2) + 7$   
 $= -12 - 8 + 7 = -13$

(iii)  $-2p^3 - 3p^2 + 4p + 7$   
 $= -2(-2) \times (-2) \times (-2) - 3(-2) \times (-2) + 4 \times (-2) + 7$   
 $= 16 - 12 - 8 + 7 = 3$

**Q3 :**

**Find the value of the following expressions, when  $x = -1$ :**

**(i)  $2x - 7$  (ii)  $-x + 2$  (iii)  $x^2 + 2x + 1$**

**(iv)  $2x^2 - x - 2$**

**Answer :**

(i)  $2x - 7$

$= 2 \times (-1) - 7 = -9$

(ii)  $-x + 2 = -(-1) + 2 = 1 + 2 = 3$

$$\begin{aligned} \text{(iii) } x^2 + 2x + 1 &= (-1) \times (-1) + 2 \times (-1) + 1 \\ &= 1 - 2 + 1 = 0 \end{aligned}$$

$$\begin{aligned} \text{(iv) } 2x^2 - x - 2 &= 2(-1) \times (-1) - (-1) - 2 \\ &= 2 + 1 - 2 = 1 \end{aligned}$$

**Q4 :**

If  $a = 2$ ,  $b = -2$ , find the value of:

(i)  $a^2 + b^2$  (ii)  $a^2 + ab + b^2$  (iii)  $a^2 - b^2$

**Answer :**

$$\text{(i) } a^2 + b^2$$

$$= (2)^2 + (-2)^2 = 4 + 4 = 8$$

$$\text{(ii) } a^2 + ab + b^2$$

$$= (2 \times 2) + 2 \times (-2) + (-2) \times (-2)$$

$$= 4 - 4 + 4 = 4$$

$$\text{(iii) } a^2 - b^2 = (2)^2 - (-2)^2 = 4 - 4 = 0$$

**Q5 :**

When  $a = 0$ ,  $b = -1$ , find the value of the given expressions:

(i)  $2a + 2b$  (ii)  $2a^2 + b^2 + 1$

(iii)  $2a^2b + 2ab^2 + ab$  (iv)  $a^2 + ab + 2$

**Answer :**

$$\text{(i) } 2a + 2b = 2 \times (0) + 2 \times (-1) = 0 - 2 = -2$$

$$\text{(ii) } 2a^2 + b^2 + 1$$

$$= 2 \times (0)^2 + (-1) \times (-1) + 1$$

$$= 0 + 1 + 1 = 2$$

$$\text{(iii) } 2a^2b + 2ab^2 + ab$$

$$= 2 \times (0)^2 \times (-1) + 2 \times (0) \times (-1) \times (-1) + 0 \times (-1)$$

$$= 0 + 0 + 0 = 0 \quad \text{(iv)}$$

$$a^2 + ab + 2$$

$$= (0)^2 + 0 \times (-1) + 2$$

$$= 0 + 0 + 2 = 2$$

**Q6 :**

Simplify the expressions and find the value if  $x$  is equal to 2

(i)  $x + 7 + 4(x - 5)$  (ii)  $3(x + 2) + 5x - 7$

(iii)  $6x + 5(x - 2)$  (iv)  $4(2x - 1) + 3x + 11$

**Answer :**

$$\text{(i) } x + 7 + 4(x - 5) = x + 7 + 4x - 20$$

$$= x + 4x + 7 - 20$$

$$= 5x - 13$$

$$= (5 \times 2) - 13$$

$$= 10 - 13 = -3$$

$$(ii) 3(x + 2) + 5x - 7 = 3x + 6 + 5x - 7$$

$$= 3x + 5x + 6 - 7 = 8x - 1$$

$$= (8 \times 2) - 1 = 16 - 1 = 15$$

$$(iii) 6x + 5(x - 2) = 6x + 5x - 10$$

$$= 11x - 10$$

$$= (11 \times 2) - 10 = 22 - 10 = 12$$

$$(iv) 4(2x - 1) + 3x + 11 = 8x - 4 + 3x + 11$$

$$= 11x + 7$$

$$= (11 \times 2) + 7 =$$

$$22 + 7 = 29$$

**Q7 :**

**Simplify these expressions and find their values if  $x = 3$ ,  $a = -1$ ,  $b = -2$ .**

$$(i) 3x - 5 - x + 9 \quad (ii) 2 - 8x + 4x + 4$$

$$(iii) 3a + 5 - 8a + 1 \quad (iv) 10 - 3b - 4 - 5b$$

$$(v) 2a - 2b - 4 - 5 + a$$

**Answer :**

$$(i) 3x - 5 - x + 9 = 3x - x - 5 + 9$$

$$= 2x + 4 = (2 \times 3) + 4 = 10$$

$$(ii) 2 - 8x + 4x + 4 = 2 + 4 - 8x + 4x$$

$$= 6 - 4x = 6 - (4 \times 3) = 6 - 12 = -6$$

$$(iii) 3a + 5 - 8a + 1 = 3a - 8a + 5 + 1$$

$$= -5a + 6 = -5 \times (-1) + 6$$

$$= 5 + 6 = 11$$

$$(iv) 10 - 3b - 4 - 5b = 10 - 4 - 3b - 5b$$

$$= 6 - 8b = 6 - 8 \times (-2)$$

$$= 6 + 16 = 22$$

$$(v) 2a - 2b - 4 - 5 + a = 2a + a - 2b - 4 - 5$$

$$= 3a - 2b - 9$$

$$= 3 \times (-1) - 2 \times (-2) - 9$$

$$= -3 + 4 - 9 = -8$$

**Q8 :**

**(i) If  $z = 10$ , find the value of  $z^2 - 3(z - 10)$ .**

**(ii) If  $p = -10$ , find the value of  $p^2 - 2p - 100$**

**Answer :**

$$(i) z^3 - 3(z - 10) = z^3 - 3z + 30$$
$$= (10 \times 10 \times 10) - (3 \times 10) + 30$$

$$= 1000 - 30 + 30 = 1000$$

$$(ii) p^2 - 2p - 100$$

$$= (-10) \times (-10) - 2(-10) - 100$$

$$= 100 + 20 - 100 = 20$$

**Q9 :**

What should be the value of  $a$  if the value of  $2x^2 + x - a$  equals to 5, when  $x = 0$ ?

**Answer :**

$$2x^2 + x - a = 5, \text{ when } x = 0$$

$$(2 \times 0) + 0 - a = 5$$

$$0 - a = 5 \quad a = -5$$

**Q10 :**

Simplify the expression and find its value when  $a = 5$  and  $b = -3$ . 2

$$(a^2 + ab) + 3 - ab$$

**Answer :**

$$2(a^2 + ab) + 3 - ab = 2a^2 + 2ab + 3 - ab$$

$$= 2a^2 + 2ab - ab + 3$$

$$= 2a^2 + ab + 3$$

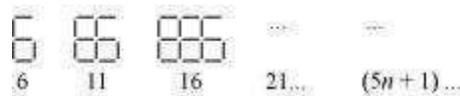
$$= 2 \times (5 \times 5) + 5 \times (-3) + 3$$

$$= 50 - 15 + 3 = 38$$

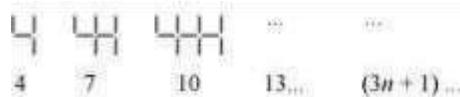
**Exercise 12.4 :** Solutions of Questions on Page Number : 246

**Q1 :**

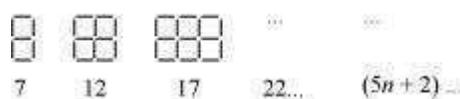
Observe the patterns of digits made from line segments of equal length. You will find such segmented digits on the display of electronic watches or calculators. (a)



(b)



(c)



If the number of digits formed is taken to be  $n$ , the number of segments required to form  $n$  digits is given by the algebraic expression appearing on the right of each pattern.

How many segments are required to form 5, 10, 100 digits of the kind -



**Answer :**

(a) It is given that the number of segments required to form  $n$  digits of the kind

 is  $(5n + 1)$ .

Number of segments required to form 5 digits =  $(5 \times 5 + 1)$

$$= 25 + 1 = 26$$

Number of segments required to form 10 digits =  $(5 \times 10 + 1)$

$$= 50 + 1 = 51$$

Number of segments required to form 100 digits =  $(5 \times 100 + 1)$

$$= 500 + 1 = 501$$

(b) It is given that the number of segments required to form  $n$  digits of the kind  is  $(3n + 1)$ .

Number of segments required to form 5 digits =  $(3 \times 5 + 1)$

$$= 15 + 1 = 16$$

Number of segments required to form 10 digits =  $(3 \times 10 + 1)$

$$= 30 + 1 = 31$$

Number of segments required to form 100 digits =  $(3 \times 100 + 1)$

$$= 300 + 1 = 301$$

(c) It is given that the number of segments required to form  $n$  digits of the kind  is  $(5n + 2)$ .

Number of segments required to form 5 digits =  $(5 \times 5 + 2)$

$$= 25 + 2 = 27$$

Number of segments required to form 10 digits =  $(5 \times 10 + 2)$

$$= 50 + 2 = 52$$

Number of segments required to form 100 digits =  $(5 \times 100 + 2)$

$$= 500 + 2 = 502$$

S. No	Expression	Terms									
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	...	10 <sup>th</sup>	...	100 <sup>th</sup>	...
(i)	$2n - 1$	1	3	5	7	9	-	19	-	-	-
(ii)	$3n + 2$	2	5	8	11	-	-	-	-	-	-
(iii)	$4n + 1$	5	9	13	17	-	-	-	-	-	-
(iv)	$7n + 20$	27	34	41	48	-	-	-	-	-	-
(v)	$n + 1$	2	5	10	17	-	-	-	-	10,001	-

Answer :

Q2 :

Use the given algebraic expression to complete the table of number patterns. The given table can be completed as follows.

S.No.	Expression	Terms									
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	...	10 <sup>th</sup>	...	100 <sup>th</sup>	...
(i)	$2n - 1$	1	3	5	7	9	-	19	-	199	-
(ii)	$3n + 2$	2	5	8	11	17	-	32	-	302	-
(iii)	$4n + 1$	5	9	13	17	21	-	41	-	401	-
(iv)	$7n + 20$	27	34	41	48	55	-	90	-	720	-
(v)	$n + 1$	2	5	10	17	26	-	101	-	10,001	-

**DELHI PUBLIC SCHOOL, GANDHINAGAR**

**CHAPTER 12 ALGEBRAIC EXPRESSIONS**

**MIND MAP**

This chapter consists of six different topics. The most probable questions from examination point of view are given below.

**TYPE: 1 LIST THE FACTORS OF THE GIVEN TERMS.**

Q.1  $4p^2q$

Q.2  $-15xy^2$

**TYPE: 2 FIND THE TERMS CONTAINING (x) AND WRITE THE COEFFICIENT OF (x).**

Q.1  $76x + 67y^2xz^5$

Q.2  $32yx + 6$

Q.3  $2px - 7nm$

**TYPE: 3 CLASSIFY THE FOLLOWING AS MONOMIALS, BINOMIALS, AND TRINOMIALS.**

Q.1.  $70x$

Q.2.  $\frac{4}{6}q + 16$

Q.3.  $3n - 22x + 7$

**TYPE: PICK OUT THE LIKE TERMS FROM THE FOLLOWING GROUPS.**

Q.1.  $10pq, 7p, 8q, -p^2q^2, -7pq, -23, ab, 3q, 5b.$

Q.2.  $7xy, 5yz, -3zx, 4yz, 9zx, -4y, -3xz, 5x, -2xy.$

**TYPE: 5 ADD THE FOLLOWING EXPRESSIONS.**

Q.1.  $7mn + 5, 12mn + 2, 9mn - 8, -2mn - 3$

Q.2.  $14x + 10y - 12xy - 13, 18 - 7x - 10y + 8xy, 4xy$

**TYPE: 6 SUBTRACT THE FOLLOWING EXPRESSIONS.**

Q.1.  $7mn - 5, 12mn + 42, 9mn - 18, -2mn - 3$

Q.2.  $4x + 10y - 2xy - 13, 18 - 7x - 10y + 18xy, 14xy$

**1. The Length and the breadth of a rectangular piece of land are 500 m and 300 m respectively. Find**

**(i) Its area (ii) the cost of the land, if 1 m<sup>2</sup> of the land costs ₹10,000.**

**Solution:-**

From the question it is given that,

Length of the rectangular piece of land = 500 m

Breadth of the rectangular piece of land = 300 m

Then,

(i) Area of rectangle = Length × Breadth

$$= 500 \times 300$$

$$= 150000 \text{ m}^2$$

(ii) Cost of the land for 1 m<sup>2</sup> = ₹ 10000

Cost of the land for 150000 m<sup>2</sup> = 10000 × 150000

$$= ₹ 1500000000$$

**2. Find the area of a square park whose perimeter is 320m.**

**Solution:-**

From the question it is given that,

Perimeter of the square park = 320 m

4 × Length of the side of park = 320 m

Then,

Length of the side of park = 320/4

$$= 80 \text{ m}$$

So, Area of the square park = (length of the side of park)<sup>2</sup>

$$= 80^2$$

$$= 6400 \text{ m}^2$$

**3. Find the breadth of a rectangular plot of land, if its area is 440 m<sup>2</sup> and the length is 22 m. Also find its perimeter.**

**Solution:-**

From the question it is given that,

Area of the rectangular plot = 440 m<sup>2</sup>

Length of the rectangular plot = 22 m

We know that,

Area of the rectangle = Length × Breadth

$$440 = 22 \times \text{Breadth}$$
$$\text{Breadth} = 440/22$$
$$\text{Breadth} = 20 \text{ m}$$

Then,

$$\begin{aligned}\text{Perimeter of the rectangle} &= 2(\text{Length} + \text{Breadth}) \\ &= 2(22 + 20) \\ &= 2(42) \\ &= 84 \text{ m}\end{aligned}$$

∴ Perimeter of the rectangular plot is 84 m.

**4. The perimeter of a rectangular sheet is 100 cm. If the length is 35 cm, find its breadth.**

**Also find the area.**

**Solution:-**

From the question it is given that,

Perimeter of the a rectangular sheet = 100 cm

Length of the rectangular sheet = 35 cm

We know that,

$$\begin{aligned}\text{Perimeter of the rectangle} &= 2(\text{Length} + \text{Breadth}) \\ 100 &= 2(35 + \text{Breadth}) \\ (100/2) &= 35 + \text{Breadth} \\ 50 - 35 &= \text{Breadth} \\ \text{Breadth} &= 15 \text{ cm}\end{aligned}$$

Then,

$$\begin{aligned}\text{Area of the rectangle} &= \text{Length} \times \text{Breadth} \\ &= 35 \times 15 \\ &= 525 \text{ cm}^2\end{aligned}$$

∴ Area of the rectangular sheet is 525 cm<sup>2</sup>

**5. The area of a square park is the same as of a rectangular park. If the side of the square park is 60 m and the length of the rectangular park is 90 m, find the breadth of the rectangular park.**

**Solution:-**

From the question it is given that,

Area of a square park is the same as of a rectangular park.

Side of the square park = 60 m

Length of the rectangular park = 90 m

We know that,

$$\begin{aligned}\text{Area of the square park} &= (\text{one of the side of square})^2 \\ &= 60^2 \\ &= 3600 \text{ m}^2\end{aligned}$$

$$\text{Area of the rectangular park} = 3600 \text{ m}^2 \quad \dots[\because \text{given}]$$

$$\text{Length} \times \text{Breadth} = 3600$$

$$90 \times \text{Breadth} = 3600$$

$$\text{Breadth} = 3600/90$$

$$\text{Breadth} = 40 \text{ m}$$

**6. A wire is in the shape of a rectangle. Its length is 40 cm and breadth is 22 cm. If the same wire is rebent in the shape of a square, what will be the measure of each side. Also find which shape encloses more area?**

**Solution:-**

By reading the question we can conclude that, perimeter of the square is same as perimeter of rectangle.

From the question it is given that,

$$\text{Length of the rectangle} = 40 \text{ cm}$$

$$\text{Breadth of the square} = 22 \text{ cm}$$

Then,

$$\text{Perimeter of the rectangle} = \text{Perimeter of the Square}$$

$$2 (\text{Length} + \text{Breadth}) = 4 \times \text{side}$$

$$2 (40 + 22) = 4 \times \text{side}$$

$$2 (62) = 4 \times \text{side}$$

$$124 = 4 \times \text{side}$$

$$\text{Side} = 124/4$$

$$\text{Side} = 31 \text{ cm}$$

$$\begin{aligned}\text{So, Area of the rectangle} &= (\text{Length} \times \text{Breadth}) \\ &= 40 \times 22 \\ &= 880 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of square} &= \text{side}^2 \\ &= 31^2 \\ &= 31 \times 31 \\ &= 961 \text{ cm}^2\end{aligned}$$

$\therefore$  Square shaped wire encloses more area.

**7. The perimeter of a rectangle is 130 cm. If the breadth of the rectangle is**

**30 cm, find its length. Also find the area of the rectangle.**

**Solution:-**

From the question it is given that.

Perimeter of the rectangle = 130 cm

Breadth of the rectangle = 30

We know that,

Perimeter of rectangle = 2 (Length + Breadth)

$$130 = 2 (\text{length} + 30)$$

$$130/2 = \text{length} + 30$$

$$\text{Length} + 30 = 65$$

$$\text{Length} = 65 - 30$$

$$\text{Length} = 35 \text{ cm}$$

Then,

Area of the rectangle = Length  $\times$  Breadth

$$= 35 \times 30$$

$$= 1050 \text{ cm}^2$$

**8. A door of length 2 m and breadth 1 m is fitted in a wall. The length of the wall is 4.5 m and the breadth is 3.6 m (Fig). Find the cost of white washing the wall, if the rate of white washing the wall is ₹ 20 per m<sup>2</sup>.**



**Solution:-**

From the question it is given that,

Length of the door = 2 m

Breadth of the door = 1 m

Length of the wall = 4.5 m

Breadth of the wall = 3.6 m

Then,

Area of the door = Length  $\times$  Breadth

$$= 2 \times 1$$

$$= 2 \text{ m}^2$$

$$\begin{aligned}\text{Area of the wall} &= \text{Length} \times \text{Breadth} \\ &= 4.5 \times 3.6 \\ &= 16.2 \text{ m}^2\end{aligned}$$

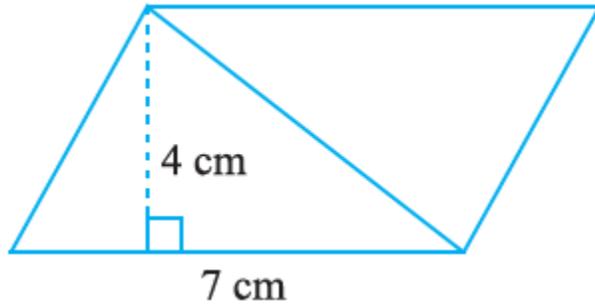
$$\text{So, Area to be white washed} = 16.2 - 2 = 14.2 \text{ m}^2$$

$$\text{Cost of white washing } 1 \text{ m}^2 \text{ area} = ₹ 20$$

$$\begin{aligned}\text{Hence cost of whit washing } 14.2 \text{ m}^2 \text{ area} &= 14.2 \times 20 \\ &= ₹ 284\end{aligned}$$

1. Find the area of each of the following parallelograms:

(a)



**Solution:-**

From the figure,

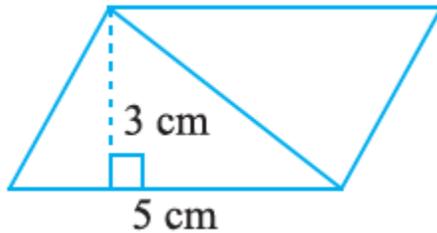
Height of parallelogram = 4 cm

Base of parallelogram = 7 cm

Then,

$$\begin{aligned} \text{Area of parallelogram} &= \text{base} \times \text{height} \\ &= 7 \times 4 \\ &= 28 \text{ cm}^2 \end{aligned}$$

(b)



**Solution:-**

From the figure,

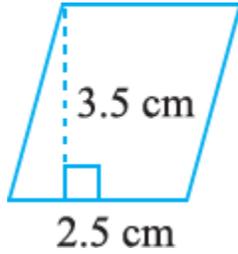
Height of parallelogram = 3 cm

Base of parallelogram = 5 cm

Then,

$$\begin{aligned} \text{Area of parallelogram} &= \text{base} \times \text{height} \\ &= 5 \times 3 \\ &= 15 \text{ cm}^2 \end{aligned}$$

(c)



**Solution:-**

From the figure,

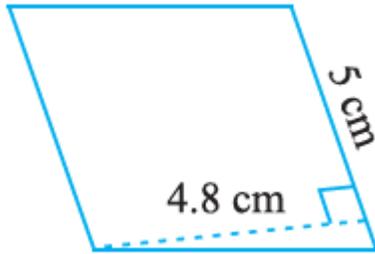
Height of parallelogram = 3.5 cm

Base of parallelogram = 2.5 cm

Then,

$$\begin{aligned}\text{Area of parallelogram} &= \text{base} \times \text{height} \\ &= 2.5 \times 3.5 \\ &= 8.75 \text{ cm}^2\end{aligned}$$

(d)



**Solution:-**

From the figure,

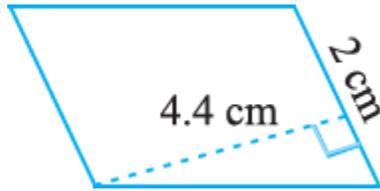
Height of parallelogram = 4.8 cm

Base of parallelogram = 5 cm

Then,

$$\begin{aligned}\text{Area of parallelogram} &= \text{base} \times \text{height} \\ &= 5 \times 4.8 \\ &= 24 \text{ cm}^2\end{aligned}$$

(e)



**Solution:-**

From the figure,

Height of parallelogram = 4.4 cm

Base of parallelogram = 2 cm

Then,

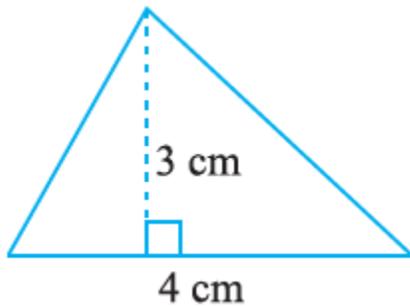
Area of parallelogram = base  $\times$  height

$$= 2 \times 4.4$$

$$= 8.8 \text{ cm}^2$$

**2. Find the area of each of the following triangles:**

(a)



**Solution:-**

From the figure,

Base of triangle = 4 cm

Height of triangle = 3 cm

Then,

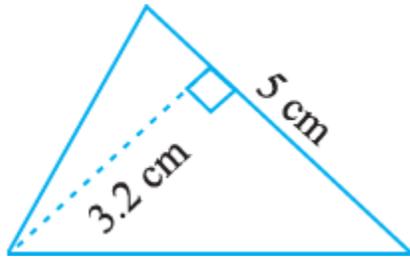
Area of triangle =  $\frac{1}{2} \times$  base  $\times$  height

$$= \frac{1}{2} \times 4 \times 3$$

$$= 1 \times 2 \times 3$$

$$= 6 \text{ cm}^2$$

(b)



**Solution:-**

From the figure,

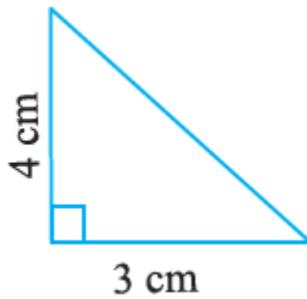
Base of triangle = 3.2 cm

Height of height = 5 cm

Then,

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} \times \text{base} \times \text{height} \\ &= \frac{1}{2} \times 3.2 \times 5 \\ &= 1 \times 1.6 \times 5 \\ &= 8 \text{ cm}^2\end{aligned}$$

(c)



**Solution:-**

From the figure,

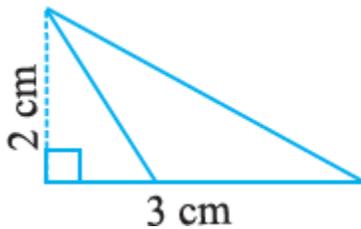
Base of triangle = 3 cm

Height of height = 4 cm

Then,

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} \times \text{base} \times \text{height} \\ &= \frac{1}{2} \times 3 \times 4 \\ &= 1 \times 3 \times 2 \\ &= 6 \text{ cm}^2\end{aligned}$$

(d)



**Solution:-**

From the figure,

Base of triangle = 3 cm

Height of height = 2 cm

Then,

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} \times \text{base} \times \text{height} \\ &= \frac{1}{2} \times 3 \times 2 \\ &= 1 \times 3 \times 1 \\ &= 3 \text{ cm}^2\end{aligned}$$

**3. Find the missing values:**

S.No.	Base	Height	Area of the Parallelogram
a.	20 cm		246 cm <sup>2</sup>
b.		15 cm	154.5 cm <sup>2</sup>
c.		8.4 cm	48.72 cm <sup>2</sup>
d.	15.6 cm		16.38 cm <sup>2</sup>

**Solution:-**

(a)

From the table,

Base of parallelogram = 20 cm

Height of parallelogram = ?

Area of the parallelogram = 246 cm<sup>2</sup>

Then,

$$\begin{aligned}\text{Area of parallelogram} &= \text{base} \times \text{height} \\ 246 &= 20 \times \text{height} \\ \text{Height} &= 246/20 \\ \text{Height} &= 12.3 \text{ cm}\end{aligned}$$

∴ Height of the parallelogram is 12.3 cm.

**(b)**

From the table,

Base of parallelogram =?

Height of parallelogram = 15 cm

Area of the parallelogram =  $154.5 \text{ cm}^2$

Then,

Area of parallelogram = base  $\times$  height

$$154.5 = \text{base} \times 15$$

$$\text{Base} = 154.5/15$$

$$\text{Height} = 10.3 \text{ cm}$$

$\therefore$  Base of the parallelogram is 10.3 cm.

**(c)**

From the table,

Base of parallelogram =?

Height of parallelogram = 8.4 cm

Area of the parallelogram =  $48.72 \text{ cm}^2$

Then,

Area of parallelogram = base  $\times$  height

$$48.72 = \text{base} \times 8.4$$

$$\text{Base} = 48.72/8.4$$

$$\text{Height} = 5.8 \text{ cm}$$

$\therefore$  Base of the parallelogram is 5.8 cm.

**(d)**

From the table,

Base of parallelogram = 15.6 cm

Height of parallelogram =?

Area of the parallelogram =  $16.38 \text{ cm}^2$

Then,

Area of parallelogram = base  $\times$  height

$$16.38 = 15.6 \times \text{height}$$

$$\text{Height} = 16.38/15.6$$

$$\text{Height} = 1.05 \text{ cm}$$

$\therefore$  Height of the parallelogram is 1.05 cm.

S.No.	Base	Height	Area of the Parallelogram
a.	20 cm	12.3 cm	246 cm <sup>2</sup>
b.	10.3 cm	15 cm	154.5 cm <sup>2</sup>
c.	5.8 cm	8.4 cm	48.72 cm <sup>2</sup>
d.	15.6 cm	1.05	16.38 cm <sup>2</sup>

#### 4. Find the missing values:

Base	Height	Area of Triangle
15 cm		87 cm <sup>2</sup>
	31.4 mm	1256 mm <sup>2</sup>
22 cm		170.5 cm <sup>2</sup>

**Solution:-**

**(a)**

From the table,

Height of triangle =?

Base of triangle = 15 cm

Area of the triangle = 16.38 cm<sup>2</sup>

Then,

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$87 = \frac{1}{2} \times 15 \times \text{height}$$

$$\text{Height} = (87 \times 2)/15$$

$$\text{Height} = 174/15$$

$$\text{Height} = 11.6 \text{ cm}$$

∴ Height of the triangle is 11.6 cm.

**(b)**

From the table,

Height of triangle = 31.4 mm

Base of triangle =?

Area of the triangle = 1256 mm<sup>2</sup>

Then,

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$1256 = \frac{1}{2} \times \text{base} \times 31.4$$

$$\text{Base} = (1256 \times 2)/31.4$$

$$\text{Base} = 2512/31.4$$

$$\text{Base} = 80 \text{ mm} = 8 \text{ cm}$$

∴ Base of the triangle is 80 mm or 8 cm.

(c)

From the table,

Height of triangle = ?

Base of triangle = 22 cm

Area of the triangle =  $170.5 \text{ cm}^2$

Then,

Area of triangle =  $\frac{1}{2} \times \text{base} \times \text{height}$

$$170.5 = \frac{1}{2} \times 22 \times \text{height}$$

$$170.5 = 1 \times 11 \times \text{height}$$

$$\text{Height} = 170.5/11$$

$$\text{Height} = 15.5 \text{ cm}$$

$\therefore$  Height of the triangle is 15.5 cm.

5. PQRS is a parallelogram (Fig 11.23). QM is the height from Q to SR and QN is the height from Q to PS. If SR = 12 cm and QM = 7.6 cm. Find:

(a) The area of the parallelogram PQRS      (b) QN, if PS = 8 cm

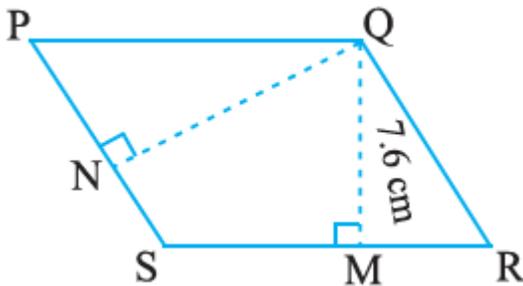


Fig 11.23

**Solution:-**

From the question it is given that,

SR = 12 cm, QM = 7.6 cm

(a) We know that,

Area of the parallelogram = base  $\times$  height

$$= \text{SR} \times \text{QM}$$

$$= 12 \times 7.6$$

$$= 91.2 \text{ cm}^2$$

(b) Area of the parallelogram = base  $\times$  height

$$91.2 = \text{PS} \times \text{QN}$$

$$91.2 = 8 \times \text{QN}$$

$$\text{QN} = 91.2/8$$

$$QN = 11.4 \text{ cm}$$

6. DL and BM are the heights on sides AB and AD respectively of parallelogram ABCD (Fig 11.24). If the area of the parallelogram is  $1470 \text{ cm}^2$ ,  $AB = 35 \text{ cm}$  and  $AD = 49 \text{ cm}$ , find the length of BM and DL.

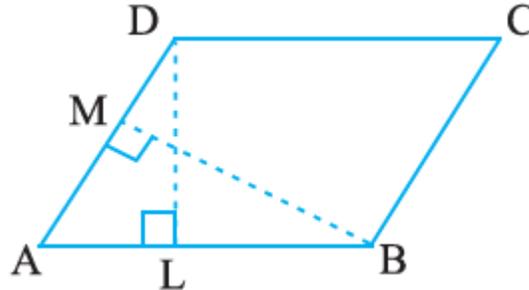


Fig 11.24

**Solution:-**

From the question it is given that,

Area of the parallelogram =  $1470 \text{ cm}^2$

$AB = 35 \text{ cm}$

$AD = 49 \text{ cm}$

Then,

We know that,

Area of the parallelogram = base  $\times$  height

$$1470 = AB \times BM$$

$$1470 = 35 \times DL$$

$$DL = 1470/35$$

$$DL = 42 \text{ cm}$$

And,

Area of the parallelogram = base  $\times$  height

$$1470 = AD \times BM$$

$$1470 = 49 \times BM$$

$$BM = 1470/49$$

$$BM = 30 \text{ cm}$$

7.  $\Delta ABC$  is right angled at A (Fig 11.25). AD is perpendicular to BC. If  $AB = 5 \text{ cm}$ ,  $BC = 13 \text{ cm}$  and  $AC = 12 \text{ cm}$ , Find the area of  $\Delta ABC$ . Also find the length of AD.

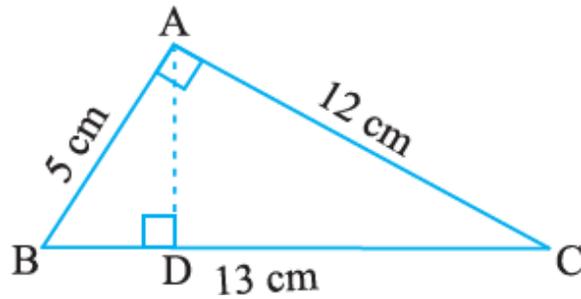


Fig 11.25

**Solution:-**

From the question it is given that,

$AB = 5 \text{ cm}$ ,  $BC = 13 \text{ cm}$ ,  $AC = 12 \text{ cm}$

Then,

We know that,

$$\begin{aligned}
 \text{Area of the } \Delta ABC &= \frac{1}{2} \times \text{base} \times \text{height} \\
 &= \frac{1}{2} \times AB \times AC \\
 &= \frac{1}{2} \times 5 \times 12 \\
 &= 1 \times 5 \times 6 \\
 &= 30 \text{ cm}^2
 \end{aligned}$$

Now,

Area of  $\Delta ABC = \frac{1}{2} \times \text{base} \times \text{height}$

$$30 = \frac{1}{2} \times AD \times BC$$

$$30 = \frac{1}{2} \times AD \times 13$$

$$(30 \times 2)/13 = AD$$

$$AD = 60/13$$

$$AD = 4.6 \text{ cm}$$

8.  $\Delta ABC$  is isosceles with  $AB = AC = 7.5 \text{ cm}$  and  $BC = 9 \text{ cm}$  (Fig 11.26). The height  $AD$  from  $A$  to  $BC$ , is  $6 \text{ cm}$ . Find the area of  $\Delta ABC$ . What will be the height from  $C$  to  $AB$  i.e.,  $CE$ ?

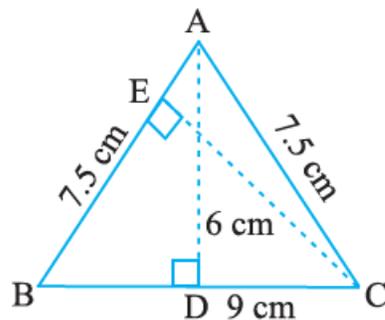


Fig 11.26

**Solution:-**

From the question it is given that,

$AB = AC = 7.5 \text{ cm}$ ,  $BC = 9 \text{ cm}$ ,  $AD = 6 \text{ cm}$

Then,

Area of  $\Delta ABC = \frac{1}{2} \times \text{base} \times \text{height}$

$$= \frac{1}{2} \times BC \times AD$$

$$= \frac{1}{2} \times 9 \times 6$$

$$= 1 \times 9 \times 3$$

$$= 27 \text{ cm}^2$$

Now,

Area of  $\Delta ABC = \frac{1}{2} \times \text{base} \times \text{height}$

$$27 = \frac{1}{2} \times AB \times CE$$

$$27 = \frac{1}{2} \times 7.5 \times CE$$

$$(27 \times 2)/7.5 = CE$$

$$CE = 54/7.5$$

$$CE = 7.2 \text{ cm}$$

1. Find the circumference of the circle with the following radius: (Take  $\pi = 22/7$ )

(a) 14 cm

**Solution:-**

Given, radius of circle = 14 cm

$$\begin{aligned}\text{Circumference of the circle} &= 2\pi r \\ &= 2 \times (22/7) \times 14 \\ &= 2 \times 22 \times 2 \\ &= 88 \text{ cm}\end{aligned}$$

(b) 28 cm

**Solution:-**

Given, radius of circle = 28 cm

$$\begin{aligned}\text{Circumference of the circle} &= 2\pi r \\ &= 2 \times (22/7) \times 28 \\ &= 2 \times 22 \times 4 \\ &= 176 \text{ cm}\end{aligned}$$

(c) 21 cm

**Solution:-**

Given, radius of circle = 21 cm

$$\begin{aligned}\text{Circumference of the circle} &= 2\pi r \\ &= 2 \times (22/7) \times 21 \\ &= 2 \times 22 \times 3 \\ &= 132 \text{ cm}\end{aligned}$$

2. Find the area of the following circles, given that:

(a) Radius = 14 mm (Take  $\pi = 22/7$ )

**Solution:**

Given, radius of circle = 14 mm

Then,

$$\begin{aligned}\text{Area of the circle} &= \pi r^2 \\ &= 22/7 \times 14^2 \\ &= 22/7 \times 196 \\ &= 22 \times 28 \\ &= 616 \text{ mm}^2\end{aligned}$$

**(b) Diameter = 49 m**

**Solution:**

Given, diameter of circle (d) = 49 m

$$\begin{aligned}\text{We know that, radius (r)} &= d/2 \\ &= 49/2 \\ &= 24.5 \text{ m}\end{aligned}$$

Then,

$$\begin{aligned}\text{Area of the circle} &= \pi r^2 \\ &= 22/7 \times (24.5)^2 \\ &= 22/7 \times 600.25 \\ &= 22 \times 85.75 \\ &= 1886.5 \text{ m}^2\end{aligned}$$

**(c) Radius = 5 cm**

**Solution:**

Given, radius of circle = 5 cm

Then,

$$\begin{aligned}\text{Area of the circle} &= \pi r^2 \\ &= 22/7 \times 5^2 \\ &= 22/7 \times 25 \\ &= 550/7 \\ &= 78.57 \text{ cm}^2\end{aligned}$$

**3. If the circumference of a circular sheet is 154 m, find its radius. Also find the area of the sheet. (Take  $\pi = 22/7$ )**

**Solution:-**

From the question it is given that,

Circumference of the circle = 154 m

Then,

We know that, Circumference of the circle =  $2\pi r$

$$154 = 2 \times (22/7) \times r$$

$$154 = 44/7 \times r$$

$$r = (154 \times 7)/44$$

$$r = (14 \times 7)/4$$

$$r = (7 \times 7)/2$$

$$r = 49/2$$

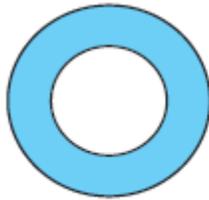
$$r = 24.5 \text{ m}$$

Now,

$$\begin{aligned}\text{Area of the circle} &= \pi r^2 \\ &= \frac{22}{7} \times (24.5)^2 \\ &= \frac{22}{7} \times 600.25 \\ &= 22 \times 85.75 \\ &= 1886.5 \text{ m}^2\end{aligned}$$

So, the radius of circle is 24.5 and area of circle is 1886.5.

**4. A gardener wants to fence a circular garden of diameter 21m. Find the length of the rope he needs to purchase, if he makes 2 rounds of fence. Also find the cost of the rope, if it costs ₹ 4 per meter. (Take  $\pi = \frac{22}{7}$ )**



**Solution:-**

From the question it is given that,

Diameter of the circular garden = 21 m

$$\begin{aligned}\text{We know that, radius (r)} &= \frac{d}{2} \\ &= \frac{21}{2} \\ &= 10.5 \text{ m}\end{aligned}$$

Then,

$$\begin{aligned}\text{Circumference of the circle} &= 2\pi r \\ &= 2 \times \left(\frac{22}{7}\right) \times 10.5 \\ &= \frac{462}{7} \\ &= 66 \text{ m}\end{aligned}$$

So, the length of rope required =  $2 \times 66 = 132$  m

Cost of 1 m rope = ₹ 4 [given]

$$\begin{aligned}\text{Cost of 132 m rope} &= ₹ 4 \times 132 \\ &= ₹ 528\end{aligned}$$

**5. From a circular sheet of radius 4 cm, a circle of radius 3 cm is removed. Find the area of the remaining sheet. (Take  $\pi = 3.14$ )**

**Solution:-**

From the question it is give that,

Radius of circular sheet R = 4 cm

A circle of radius to be removed  $r = 3$  cm

Then,

$$\begin{aligned}\text{The area of the remaining sheet} &= \pi R^2 - \pi r^2 \\ &= \pi (R^2 - r^2) \\ &= 3.14 (4^2 - 3^2) \\ &= 3.14 (16 - 9) \\ &= 3.14 \times 7 \\ &= 21.98 \text{ cm}^2\end{aligned}$$

So, the area of the remaining sheet is  $21.98 \text{ cm}^2$ .

**6. Saima wants to put a lace on the edge of a circular table cover of diameter 1.5 m. Find the length of the lace required and also find its cost if one meter of the lace costs ₹ 15. (Take  $\pi = 3.14$ )**

**Solution:-**

From the question it is given that,

Diameter of the circular table = 1.5 m

We know that, radius ( $r$ ) =  $d/2$

$$= 1.5/2$$

$$= 0.75 \text{ m}$$

Then,

Circumference of the circle =  $2\pi r$

$$= 2 \times 3.14 \times 0.75$$

$$= 4.71 \text{ m}$$

So, the length of lace = 4.71 m

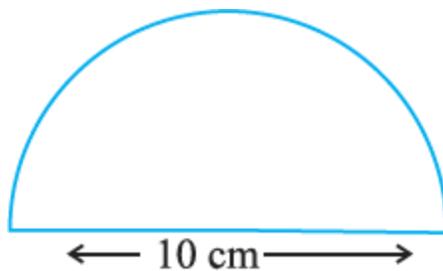
Cost of 1 m lace = ₹ 15

[given]

Cost of 4.71 m lace = ₹  $15 \times 4.71$

$$= ₹ 70.65$$

**7. Find the perimeter of the adjoining figure, which is a semicircle including its diameter.**



**Solution:-**

From the question it is given that,

Diameter of semi-circle = 10 cm

$$\begin{aligned}\text{We know that, radius (r)} &= d/2 \\ &= 10/2 \\ &= 5 \text{ cm}\end{aligned}$$

Then,

$$\begin{aligned}\text{Circumference of the semi-circle} &= \pi r \\ &= (22/7) \times 5 \\ &= 110/7 \\ &= 15.71 \text{ cm}\end{aligned}$$

Now,

$$\begin{aligned}\text{Perimeter of the given figure} &= \text{Circumference of the semi-circle} + \text{semi-circle diameter} \\ &= 15.71 + 10 \\ &= 25.71 \text{ cm}\end{aligned}$$

**8. Find the cost of polishing a circular table-top of diameter 1.6 m, if the rate of polishing is ₹15/m<sup>2</sup>. (Take  $\pi = 3.14$ )**

**Solution:-**

From the question it is given that,

Diameter of the circular table-top = 1.6 m

$$\begin{aligned}\text{We know that, radius (r)} &= d/2 \\ &= 1.6/2 \\ &= 0.8 \text{ m}\end{aligned}$$

Then,

$$\begin{aligned}\text{Area of the circular table-top} &= \pi r^2 \\ &= 3.14 \times 0.8^2 \\ &= 3.14 \times 0.8 \times 0.8 \\ &= 2.0096 \text{ m}^2\end{aligned}$$

Cost for polishing 1 m<sup>2</sup> area = ₹ 15 [given]

$$\begin{aligned}\text{Cost for polishing } 2.0096 \text{ m}^2 \text{ area} &= ₹ 15 \times 2.0096 \\ &= ₹ 30.144\end{aligned}$$

Hence, the Cost for polishing 2.0096 m<sup>2</sup> area is ₹ 30.144.

**9. Shazli took a wire of length 44 cm and bent it into the shape of a circle. Find the radius of that circle. Also find its area. If the same wire is bent into the shape of a square, what will be the length of each of its sides? Which figure encloses more area, the circle or the square? (Take  $\pi = 22/7$ )**

**Solution:-**

From the question it is given that,  
Length of wire that Shazli took = 44 cm

Then,

If the wire is bent into a circle,

We know that, circumference of the circle =  $2\pi r$

$$44 = 2 \times (22/7) \times r$$

$$44 = 44/7 \times r$$

$$(44 \times 7)/44 = r$$

$$r = 7 \text{ cm}$$

Area of the circle =  $\pi r^2$

$$= 22/7 \times 7^2$$

$$= 22/7 \times 7 \times 7$$

$$= 22 \times 7$$

$$= 154 \text{ cm}^2$$

Now,

If the wire is bent into a square,

The length of the each side of square =  $44/4$

$$= 11 \text{ cm}$$

Area of the square = length of the side of square<sup>2</sup>

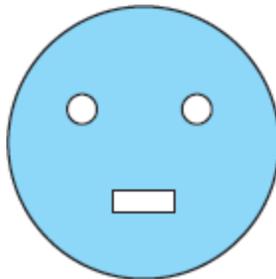
$$= 11^2$$

$$= 121 \text{ cm}^2$$

By comparing the two areas of the square and circle,

Clearly, circle encloses more area.

**10. From a circular card sheet of radius 14 cm, two circles of radius 3.5 cm and a rectangle of length 3 cm and breadth 1cm are removed. (as shown in the adjoining figure). Find the area of the remaining sheet. (Take  $\pi = 22/7$ )**



**Solution:-**

From the question it is given that,

Radius of the circular card sheet = 14 cm

Radius of the two small circle = 3.5 cm

Length of the rectangle = 3 cm

Breadth of the rectangle = 1 cm

First we have to find out the area of circular card sheet, two circles and rectangle to find out the remaining area.

Now,

$$\begin{aligned}\text{Area of the circular card sheet} &= \pi r^2 \\ &= \frac{22}{7} \times 14^2 \\ &= \frac{22}{7} \times 14 \times 14 \\ &= 22 \times 2 \times 14 \\ &= 616 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of the 2 small circles} &= 2 \times \pi r^2 \\ &= 2 \times \left(\frac{22}{7} \times 3.5^2\right) \\ &= 2 \times \left(\frac{22}{7} \times 3.5 \times 3.5\right) \\ &= 2 \times \left(\left(\frac{22}{7}\right) \times 12.25\right) \\ &= 2 \times 38.5 \\ &= 77 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of the rectangle} &= \text{Length} \times \text{Breadth} \\ &= 3 \times 1 \\ &= 3 \text{ cm}^2\end{aligned}$$

Now,

The area of the remaining part = Card sheet area – (area of two small circles + rectangle area)

$$\begin{aligned}&= 616 - (77 + 3) \\ &= 616 - 80 \\ &= 536 \text{ cm}^2\end{aligned}$$

**11. A circle of radius 2 cm is cut out from a square piece of an aluminium sheet of side 6 cm. What is the area of the left over aluminium sheet? (Take  $\pi = 3.14$ )**

**Solution:-**

From the question it is given that,

Radius of circle = 2 cm

Square sheet side = 6 cm

First we have to find out the area of square aluminium sheet and circle to find out the remaining area.

Now,

$$\begin{aligned}\text{Area of the square} &= \text{side}^2 \\ &= 6^2 \\ &= 36 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of the circle} &= \pi r^2 \\ &= 3.14 \times 2^2 \\ &= 3.14 \times 2 \times 2 \\ &= 3.14 \times 4 \\ &= 12.56 \text{ cm}^2\end{aligned}$$

Now,

$$\begin{aligned}\text{The area of the remaining part} &= \text{Area of aluminum square sheet} - \text{area of circle} \\ &= 36 - 12.56 \\ &= 23.44 \text{ cm}^2\end{aligned}$$

**12. The circumference of a circle is 31.4 cm. Find the radius and the area of the circle? (Take  $\pi = 3.14$ )**

**Solution:-**

From the question it is given that,  
Circumference of a circle = 31.4 cm

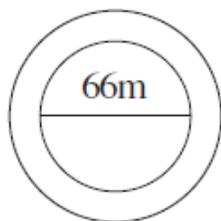
We know that,

$$\begin{aligned}\text{Circumference of a circle} &= 2\pi r \\ 31.4 &= 2 \times 3.14 \times r \\ 31.4 &= 6.28 \times r \\ 31.4/6.28 &= r \\ r &= 5 \text{ cm}\end{aligned}$$

Then,

$$\begin{aligned}\text{Area of the circle} &= \pi r^2 \\ &= 3.14 \times 5^2 \\ &= 3.14 \times 25 \\ &= 78.5 \text{ cm}\end{aligned}$$

**13. A circular flower bed is surrounded by a path 4 m wide. The diameter of the flower bed is 66 m. What is the area of this path? ( $\pi = 3.14$ )**



**Solution:-**

From the question it is given that,

Diameter of the flower bed = 66 m

Then,

$$\begin{aligned}\text{Radius of the flower bed} &= d/2 \\ &= 66/2 \\ &= 33 \text{ m}\end{aligned}$$

$$\begin{aligned}\text{Area of flower bed} &= \pi r^2 \\ &= 3.14 \times 33^2 \\ &= 3.14 \times 1089 \\ &= 3419.46 \text{ m}\end{aligned}$$

Now we have to find area of the flower bed and path together

So, radius of flower bed and path together = 33 + 4 = 37 m

$$\begin{aligned}\text{Area of the flower bed and path together} &= \pi r^2 \\ &= 3.14 \times 37^2 \\ &= 3.14 \times 1369 \\ &= 4298.66 \text{ m}\end{aligned}$$

Finally,

$$\begin{aligned}\text{Area of the path} &= \text{Area of the flower bed and path together} - \text{Area of flower bed} \\ &= 4298.66 - 3419.46 \\ &= 879.20 \text{ m}^2\end{aligned}$$

**14. A circular flower garden has an area of 314 m<sup>2</sup>. A sprinkler at the centre of the garden can cover an area that has a radius of 12 m. Will the sprinkler water the entire garden? (Take  $\pi = 3.14$ )**

**Solution:-**

From the question it is given that,

Area of the circular flower garden = 314 m<sup>2</sup>

Sprinkler at the centre of the garden can cover an area that has a radius = 12 m

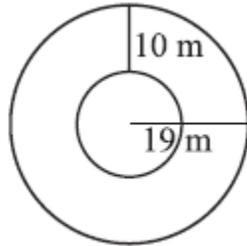
$$\begin{aligned}\text{Area of the circular flower garden} &= \pi r^2 \\ 314 &= 3.14 \times r^2 \\ 314/3.14 &= r^2 \\ r^2 &= 100 \\ r &= \sqrt{100} \\ r &= 10 \text{ m}\end{aligned}$$

∴ Radius of the circular flower garden is 10 m.

Since, the sprinkler can cover an area of radius 12 m

Hence, the sprinkler will water the whole garden.

**15. Find the circumference of the inner and the outer circles, shown in the adjoining figure? (Take  $\pi = 3.14$ )**



**Solution:-**

From the figure,

$$\begin{aligned}\text{Radius of inner circle} &= \text{outer circle radius} - 10 \\ &= 19 - 10 \\ &= 9 \text{ m}\end{aligned}$$

$$\begin{aligned}\text{Circumference of the inner circle} &= 2\pi r \\ &= 2 \times 3.14 \times 9 \\ &= 56.52 \text{ m}\end{aligned}$$

Then,

Radius of outer circle = 19 m

$$\begin{aligned}\text{Circumference of the inner circle} &= 2\pi r \\ &= 2 \times 3.14 \times 19 \\ &= 119.32 \text{ m}\end{aligned}$$

**16. How many times a wheel of radius 28 cm must rotate to go 352 m? (Take  $\pi = 22/7$ )**

**Solution:-**

From the question it is given that,

Radius of the wheel = 28 cm

$$\begin{aligned}\text{Circumference of the wheel} &= 2\pi r \\ &= 2 \times 22/7 \times 28 \\ &= 2 \times 22 \times 4 \\ &= 176 \text{ cm}\end{aligned}$$

Now we have to find the number of rotation of the wheel,

$$\begin{aligned}&= \text{Total distance to be covered} / \text{circumference of wheel} \\ &= 352 \text{ m} / 176 \text{ cm} \\ &= 35200 \text{ cm} / 176 \text{ cm} \\ &= 200\end{aligned}$$

**17. The minute hand of a circular clock is 15 cm long. How far does the tip of the minute hand move in 1 hour. (Take  $\pi = 3.14$ )**

**Solution:-**

From the question it is given that,

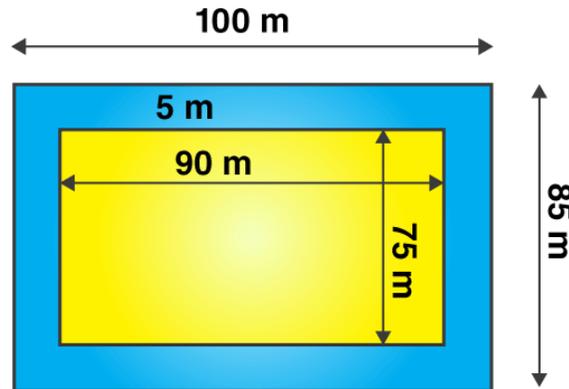
Length of the minute hand of the circular clock = 15 cm

Then,

$$\begin{aligned} \text{Distance travelled by the tip of minute hand in 1 hour} &= \text{circumference of the clock} \\ &= 2\pi r \\ &= 2 \times 3.14 \times 15 \\ &= 94.2 \text{ cm} \end{aligned}$$

**garden is 90 m long and 75 m broad. A path 5 m wide is to be built outside and around it. Find the area of the path. Also find the area of the garden in hectare.**

**Solution:-**



From the question it is given that,

Length of the garden (L) = 90 m

Breadth of the garden (B) = 75 m

Then,

Area of the garden = length  $\times$  breadth

$$= 90 \times 75$$

$$= 6750 \text{ m}^2$$

From the figure,

The new length and breadth of the garden when path is included is 100 m and 85 m respectively.

New area of the garden =  $100 \times 85$

$$= 8500 \text{ m}^2$$

The area of path = New area of the garden including path – Area of garden

$$= 8500 - 6750$$

$$= 1750 \text{ m}^2$$

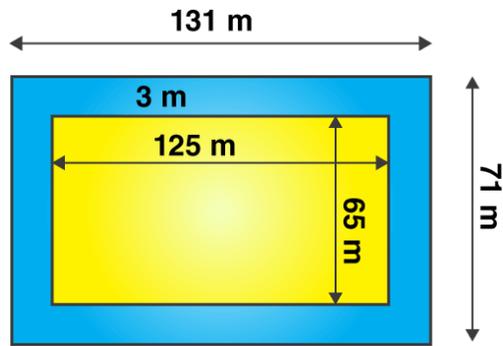
For 1 hectare =  $10000 \text{ m}^2$

Hence, area of garden in hectare =  $6750/10000$

$$= 0.675 \text{ hectare}$$

**1. A 3 m wide path runs outside and around a rectangular park of length 125 m and breadth 65 m. Find the area of the path.**

**Solution:-**



From the question it is given that,

Length of the park (L) = 125 m

Breadth of the park (B) = 65 m

Then,

$$\begin{aligned} \text{Area of the park} &= \text{length} \times \text{breadth} \\ &= 125 \times 65 \\ &= 8125 \text{ m}^2 \end{aligned}$$

From the figure,

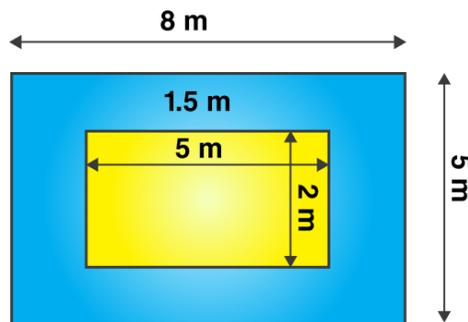
The new length and breadth of the park when path is included is 131 m and 71 m respectively.

$$\begin{aligned} \text{New area of the park} &= 131 \times 71 \\ &= 9301 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{The area of path} &= \text{New area of the park including path} - \text{Area of park} \\ &= 9301 - 8125 \\ &= 1176 \text{ m}^2 \end{aligned}$$

**2. A picture is painted on a cardboard 8 cm long and 5 cm wide such that there is a margin of 1.5 cm along each of its sides. Find the total area of the margin.**

**Solution:-**



From the question it is given that,  
Length of the cardboard (L) = 8 cm  
Breadth of the cardboard (B) = 5 cm

Then,

$$\begin{aligned}\text{Area of the cardboard} &= \text{length} \times \text{breadth} \\ &= 8 \times 5 \\ &= 40 \text{ cm}^2\end{aligned}$$

From the figure,

The new length and breadth of the cardboard when margin is not included is 5 cm and 2 cm respectively.

$$\begin{aligned}\text{New area of the cardboard} &= 5 \times 2 \\ &= 10 \text{ cm}^2\end{aligned}$$

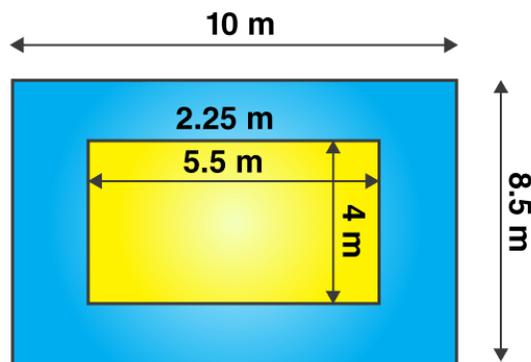
$$\begin{aligned}\text{The area of margin} &= \text{Area of the cardboard when margin is including} - \text{Area of the} \\ &\quad \text{cardboard when margin is not including} \\ &= 40 - 10 \\ &= 30 \text{ cm}^2\end{aligned}$$

**3. A verandah of width 2.25 m is constructed all along outside a room which is 5.5 m long and 4 m wide. Find:**

**(i) the area of the verandah.**

**(ii) the cost of cementing the floor of the verandah at the rate of ₹200 per m<sup>2</sup>.**

**Solution:-**



**(i)**

From the question it is given that,  
Length of the room (L) = 5.5 m  
Breadth of the room (B) = 4 m

$$\begin{aligned}\text{Area of the room} &= \text{length} \times \text{breadth} \\ &= 5.5 \times 4 \\ &= 22 \text{ m}^2\end{aligned}$$

From the figure,

The new length and breadth of the room when verandah is included is 10 m and 8.5 m respectively.

$$\begin{aligned}\text{New area of the room when verandah is included} &= 10 \times 8.5 \\ &= 85 \text{ m}^2\end{aligned}$$

$$\begin{aligned}\text{The area of verandah} &= \text{Area of the room when verandah is included} - \text{Area of the room} \\ &= 85 - 22 \\ &= 63 \text{ m}^2\end{aligned}$$

(ii)

Given, the cost of cementing the floor of the verandah at the rate of ₹200 per  $\text{m}^2$

$$\begin{aligned}\text{Then the cost of cementing the } 63 \text{ m}^2 \text{ area of floor of the verandah} &= 200 \times 63 \\ &= ₹12600\end{aligned}$$

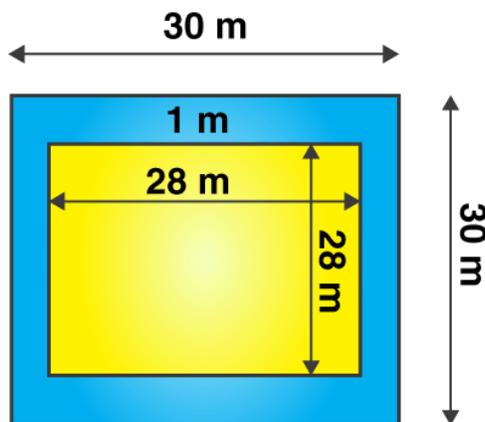
**4. A path 1 m wide is built along the border and inside a square garden of side 30 m.**

**Find:**

**(i) the area of the path**

**(ii) the cost of planting grass in the remaining portion of the garden at the rate of ₹40 per  $\text{m}^2$ .**

**Solution:-**



(i)

From the question it is given that,

Side of square garden (s) = 30 m

$$\begin{aligned}
 \text{Area of the square garden} &= S^2 \\
 &= 30^2 \\
 &= 30 \times 30 \\
 &= 900 \text{ m}^2
 \end{aligned}$$

From the figure,

The new side of the square garden when path is not included is 28 m.

$$\begin{aligned}
 \text{New area of the room when verandah is included} &= 28^2 \\
 &= 28 \times 28 \\
 &= 784 \text{ m}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{The area of path} &= \text{Area of the square garden when path is included} - \text{Area of the square} \\
 &\quad \text{Garden when path is not included} \\
 &= 900 - 784 \\
 &= 116 \text{ m}^2
 \end{aligned}$$

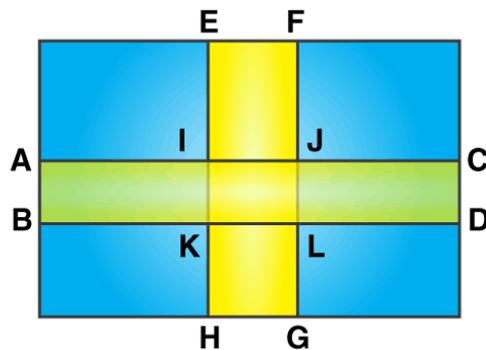
(ii)

Given, the cost of planting the grass in the remaining portion of the garden at the rate of ₹ 40 per m<sup>2</sup>

$$\begin{aligned}
 \text{Then the cost of planting the grass in } 784 \text{ m}^2 \text{ area of the garden} &= 784 \times 40 \\
 &= ₹31360
 \end{aligned}$$

**5. Two cross roads, each of width 10 m, cut at right angles through the centre of a rectangular park of length 700 m and breadth 300 m and parallel to its sides. Find the area of the roads. Also find the area of the park excluding cross roads. Give the answer in hectares.**

**Solution:-**



From the question it is given that,

Length of the park (L) = 700 m

Breadth of the park (B) = 300 m

$$\begin{aligned} \text{Area of the park} &= \text{length} \times \text{breadth} \\ &= 700 \times 300 \\ &= 210000 \text{ m}^2 \end{aligned}$$

Let us assume that ABCD is the one cross road and EFGH is another cross road in the park.

The length of ABCD cross road = 700 m

The length of EFGH cross road = 300 m

Both cross road have the same width = 10 m

Then,

$$\begin{aligned} \text{Area of the ABCD cross road} &= \text{length} \times \text{breadth} \\ &= 700 \times 10 \\ &= 7000 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of the EFGH cross road} &= \text{length} \times \text{breadth} \\ &= 300 \times 10 \\ &= 3000 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of the IJKL at center} &= \text{length} \times \text{breadth} \\ &= 10 \times 10 \\ &= 100 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of the roads} &= \text{Area of ABCD} + \text{Area of EFGH} - \text{Area of IJKL} \\ &= 7000 + 3000 - 100 \\ &= 10000 - 100 \\ &= 9900 \text{ m}^2 \end{aligned}$$

We know that, for 1 hectare = 10000 m<sup>2</sup>

$$\begin{aligned} \text{Hence, area of roads in hectare} &= 9900/10000 \\ &= 0.99 \text{ hectare} \end{aligned}$$

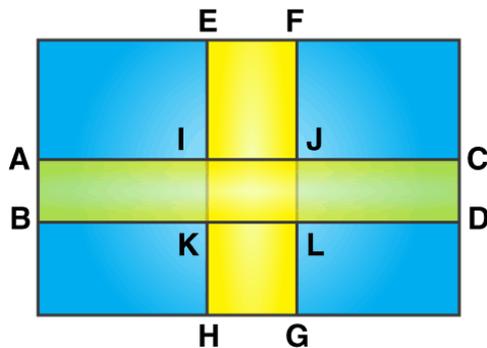
$$\begin{aligned} \text{Finally, Area of the park excluding roads} &= \text{Area of park} - \text{Area of the roads} \\ &= 210000 - 9900 \\ &= 200100 \text{ m}^2 \\ &= 200100/10000 \\ &= 20.01 \text{ hectare} \end{aligned}$$

**6. Through a rectangular field of length 90 m and breadth 60 m, two roads are constructed which are parallel to the sides and cut each other at right angles through the centre of the fields. If the width of each road is 3 m, find**

**(i) the area covered by the roads.**

**(ii) the cost of constructing the roads at the rate of ₹110 per m<sup>2</sup>.**

**Solution:-**



**(i)**

From the question it is given that,

Length of the field (L) = 90 m

Breadth of the field (B) = 60 m

Then,

$$\begin{aligned} \text{Area of the field} &= \text{length} \times \text{breadth} \\ &= 90 \times 60 \\ &= 5400 \text{ m}^2 \end{aligned}$$

Let us assume that ABCD is the one cross road and EFGH is another cross road in the park.

The length of ABCD cross road = 90 m

The length of EFGH cross road = 60 m

Both cross road have the same width = 3 m

Then,

$$\begin{aligned} \text{Area of the ABCD cross road} &= \text{length} \times \text{breadth} \\ &= 90 \times 3 \\ &= 270 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of the EFGH cross road} &= \text{length} \times \text{breadth} \\ &= 60 \times 3 \\ &= 180 \text{ m}^2 \end{aligned}$$

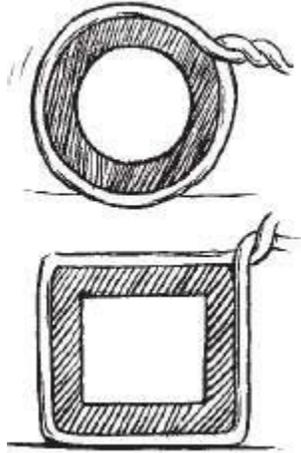
$$\begin{aligned} \text{Area of the IJKL at center} &= \text{length} \times \text{breadth} \\ &= 3 \times 3 \\ &= 9 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of the roads} &= \text{Area of ABCD} + \text{Area of EFGH} - \text{Area of IJKL} \\ &= 270 + 180 - 9 \\ &= 450 - 9 \\ &= 441 \text{ m}^2 \end{aligned}$$

**(ii)**

Given, the cost of constructing the roads at the rate of ₹ 110 per m<sup>2</sup>.  
 Then the cost of constructing the 441 m<sup>2</sup> roads = 441 × 110  
 = ₹48510

7. Pragma wrapped a cord around a circular pipe of radius 4 cm (adjoining figure) and cut off the length required of the cord. Then she wrapped it around a square box of side 4 cm (also shown). Did she have any cord left? ( $\pi = 3.14$ )



**Solution:-**

From the question it is given that,

Radius of a circular pipe = 4 cm

Side of a square = 4 cm

Then,

$$\begin{aligned} \text{Perimeter of the circular pipe} &= 2\pi r \\ &= 2 \times 3.14 \times 4 \\ &= 25.12 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Perimeter of the square} &= 4 \times \text{side of the square} \\ &= 4 \times 4 \\ &= 16 \text{ cm} \end{aligned}$$

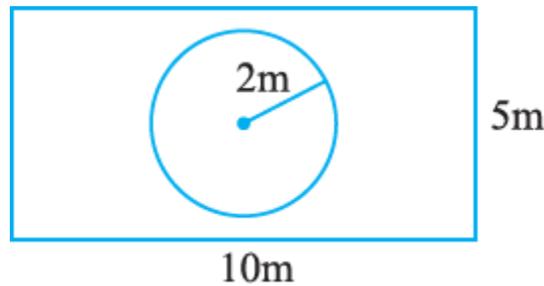
$$\begin{aligned} \text{So, the length of cord left with Pragma} &= \text{Perimeter of circular pipe} - \text{Perimeter of square} \\ &= 25.12 - 16 \\ &= 9.12 \text{ cm} \end{aligned}$$

Yes, 9.12 cm cord is left.

8. The adjoining figure represents a rectangular lawn with a circular flower bed in the middle. Find:

- (i) the area of the whole land
- (ii) the area of the flower bed
- (iii) the area of the lawn excluding the area of the flower bed

**(iv) the circumference of the flower bed.**



**Solution:-**

**(i)**

From the figure,

Length of rectangular lawn = 10 m

Breadth of rectangular lawn = 5 m

$$\begin{aligned}\text{Area of the rectangular lawn} &= \text{Length} \times \text{Breadth} \\ &= 10 \times 5 \\ &= 50 \text{ m}^2\end{aligned}$$

**(ii)**

From the figure,

Radius of the flower bed = 2 m

$$\begin{aligned}\text{Area of the flower bed} &= \pi r^2 \\ &= 3.14 \times 2^2 \\ &= 3.14 \times 4 \\ &= 12.56 \text{ m}^2\end{aligned}$$

**(iii)**

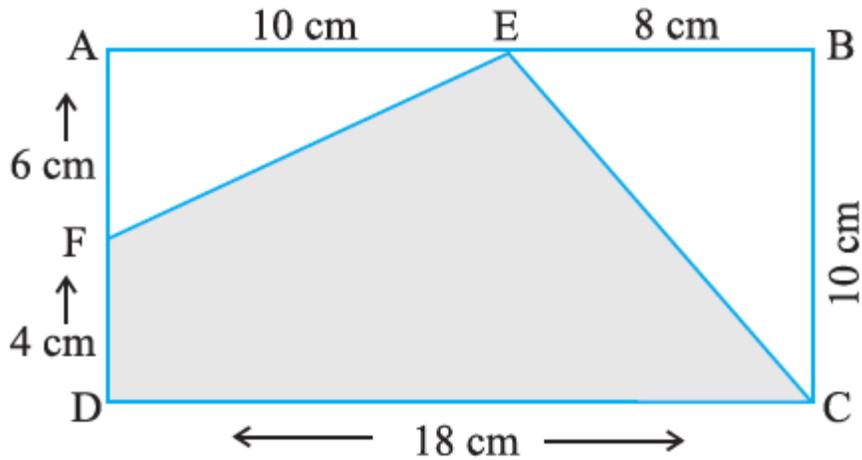
$$\begin{aligned}\text{The area of the lawn excluding the area of the flower bed} &= \text{Area of rectangular lawn} - \\ &\quad \text{Area of flower bed} \\ &= 50 - 12.56 \\ &= 37.44 \text{ m}^2\end{aligned}$$

**(iv)**

$$\begin{aligned}\text{The circumference of the flower bed} &= 2\pi r \\ &= 2 \times 3.14 \times 2 \\ &= 12.56 \text{ m}\end{aligned}$$

**9. In the following figures, find the area of the shaded portions:**

(i)



**Solution:-**

To find the area of EFDC, first we have to find the area of  $\triangle AEF$ ,  $\triangle EBC$  and rectangle ABCD

$$\begin{aligned}\text{Area of } \triangle AEF &= \frac{1}{2} \times \text{Base} \times \text{Height} \\ &= \frac{1}{2} \times 6 \times 10 \\ &= 1 \times 3 \times 10 \\ &= 30 \text{ cm}^2\end{aligned}$$

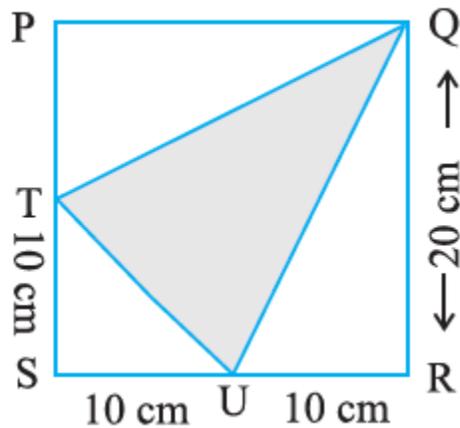
$$\begin{aligned}\text{Area of } \triangle EBC &= \frac{1}{2} \times \text{Base} \times \text{Height} \\ &= \frac{1}{2} \times 8 \times 10 \\ &= 1 \times 4 \times 10 \\ &= 40 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of rectangle ABCD} &= \text{length} \times \text{breadth} \\ &= 18 \times 10 \\ &= 180 \text{ cm}^2\end{aligned}$$

Then,

$$\begin{aligned}\text{Area of EFDC} &= \text{ABCD area} - (\triangle AEF + \triangle EBC) \\ &= 180 - (30 + 40) \\ &= 180 - 70 \\ &= 110 \text{ cm}^2\end{aligned}$$

(ii)



**Solution:-**

To find the area of  $\Delta QTU$ , first we have to find the area of  $\Delta STU$ ,  $\Delta TPQ$ ,  $\Delta QRU$  and square PQRS

$$\begin{aligned}\text{Area of } \Delta STU &= \frac{1}{2} \times \text{Base} \times \text{Height} \\ &= \frac{1}{2} \times 10 \times 10 \\ &= 1 \times 5 \times 10 \\ &= 50 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of } \Delta TPQ &= \frac{1}{2} \times \text{Base} \times \text{Height} \\ &= \frac{1}{2} \times 10 \times 20 \\ &= 1 \times 5 \times 20 \\ &= 100 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of } \Delta QRU &= \frac{1}{2} \times \text{Base} \times \text{Height} \\ &= \frac{1}{2} \times 10 \times 20 \\ &= 1 \times 5 \times 20 \\ &= 100 \text{ cm}^2\end{aligned}$$

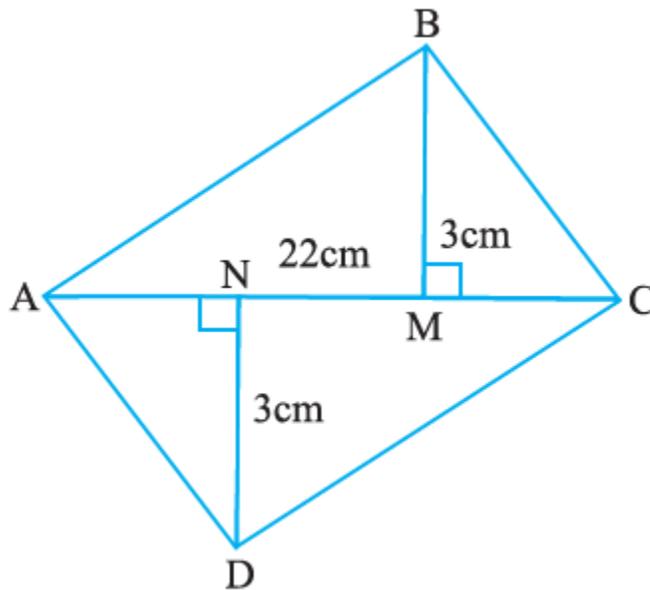
$$\begin{aligned}\text{Area of square PQRS} &= \text{Side}^2 \\ &= 20 \times 20 \\ &= 400 \text{ cm}^2\end{aligned}$$

Then,

$$\begin{aligned}\text{Area of } \Delta QTU &= \text{PQRS area} - (\Delta STU + \Delta TPQ + \Delta QRU) \\ &= 400 - (50 + 100 + 100) \\ &= 400 - 250 \\ &= 150 \text{ cm}^2\end{aligned}$$

**11. Find the area of the quadrilateral ABCD.**

Here,  $AC = 22 \text{ cm}$ ,  $BM = 3 \text{ cm}$ ,  
 $DN = 3 \text{ cm}$ , and  $BM \perp AC$ ,  $DN \perp AC$



**Solution:-**

From the it is given that,

$AC = 22 \text{ cm}$ ,  $BM = 3 \text{ cm}$   $DN = 3 \text{ cm}$  and  $BM \perp AC$ ,  $DN \perp AC$

To find the area of quadrilateral ABCD, first we have to find the area of  $\Delta ABC$ , and  $\Delta ADC$

Area of  $\Delta ABC = \frac{1}{2} \times \text{Base} \times \text{Height}$

$$= \frac{1}{2} \times 22 \times 3$$

$$= 1 \times 11 \times 3$$

$$= 33 \text{ cm}^2$$

Area of  $\Delta ADC = \frac{1}{2} \times \text{Base} \times \text{Height}$

$$= \frac{1}{2} \times 22 \times 3$$

$$= 1 \times 11 \times 3$$

$$= 33 \text{ cm}^2$$

Then,

Area of quadrilateral ABCD = Area of  $\Delta ABC$  + Area of  $\Delta ADC$

$$= 33 + 33$$

$$= 66 \text{ cm}^2$$

### Mind Map

#### TYPE: 1 PERIMETER AND AREA OF SQUARES AND RECTANGLES:

Q.1 The length and breadth of a rectangular piece of land are 500 m and 300 m respectively. Find:

a) It's area.

b) It's Perimeter.

Q.2 Find the breadth of a rectangular plot of land, if its area is 660 and the length is 33 m. Also find its perimeter.

Q.3. The area of a square park is the same as of a rectangular park. If the side of the square park is 60 m and the length of the rectangular park is 90 cm, find the breadth of the rectangular park.

#### TYPE: 2 PERIMETER AND AREA OF PARALLELOGRAM

1. Find the missing values:

Base	Height	Area of triangle
15 cm	---	87 cm <sup>2</sup>
---	31.4 mm	1256 mm <sup>2</sup>
22 cm	---	170.5 cm <sup>2</sup>

3. DL and BM are the heights on sides AB and AD respectively of parallelogram ABCD. If the area of the parallelogram is 1470 cm<sup>2</sup>, AB = 35 cm and AD = 49 cm, find the length of BM and DL.

4.  $\Delta ABC$  is right angled at A. AD is perpendicular to BC. If AB = 5 cm and AC = 12cm, find the area of  $\Delta ABC$ . Also, find the length of AD.

#### TYPE: 3 CIRCUMFERENCE AND AREA OF A CIRCLE:

1. Find the circumference and area of the circles with radius 7m.

2. A wire of 5024 m length is in the form of a square. It is cut and made a circle. Find the ratio of the area of the square to that of the circle.

#### TYPE: 4 AREA OF CROSS ROADS

1. A rectangular shaped swimming pool with dimensions 30 m  $\times$  20 m has 5 m wide cemented path along its length and 8 m wide path along its width. Find the cost of cementing the path at the rate of ` 200 per m<sup>2</sup>.

#### ACHEIVER'S SECTION

1. Rectangle ABCD is formed in a circle as shown in the adjoining figure. If AE = 8 cm and AD = 5 cm, find the perimeter of the rectangle.

2. People of Khejadli village take good care of plants, trees and animals. They say that plants and animals can survive without us, but we cannot survive without them. Inspired by her elders Amrita marked some land for her pets (camel and ox) and plants. Find the ratio of the areas kept for animals and plants to the living area.

3. Rani bought a new field that is next to one she already owns. This field is in the shape of a square of side 70 m. She makes a semi-circular lawn of maximum area in this field.

a. Find the perimeter of the lawn.

b. Find the area of the square field excluding the lawn.

EXERCISE 4.1

1. Complete the last column of the table.

S. No.	Equation	Value	Say, whether the equation is satisfied. (Yes/No)
(i)	$x + 3 = 0$	$x = 3$	
(ii)	$x + 3 = 0$	$x = 0$	
(iii)	$x + 3 = 0$	$x = -3$	
(iv)	$x - 7 = 1$	$x = 7$	
(v)	$x - 7 = 1$	$x = 8$	
(vi)	$5x = 25$	$x = 0$	
(vii)	$5x = 25$	$x = 5$	
(viii)	$5x = 25$	$x = -5$	
(ix)	$(m/3) = 2$	$m = -6$	
(x)	$(m/3) = 2$	$m = 0$	
(xi)	$(m/3) = 2$	$m = 6$	

**Solution:-**

(i)  $x + 3 = 0$

LHS =  $x + 3$

By substituting the value of  $x = 3$

Then,

LHS =  $3 + 3 = 6$

By comparing LHS and RHS

LHS  $\neq$  RHS

$\therefore$  No, the equation is not satisfied.

(ii)  $x + 3 = 0$

LHS =  $x + 3$

By substituting the value of  $x = 0$

Then,

LHS =  $0 + 3 = 3$

By comparing LHS and RHS

LHS  $\neq$  RHS

$\therefore$  No, the equation is not satisfied.

NCERT Solutions for Class 7 Maths Chapter 4  
Simple Equations

(iii)  $x + 3 = 0$

LHS =  $x + 3$

By substituting the value of  $x = -3$

Then,

LHS =  $-3 + 3 = 0$

By comparing LHS and RHS

LHS = RHS

∴ Yes, the equation is satisfied

(iv)  $x - 7 = 1$

LHS =  $x - 7$

By substituting the value of  $x = 7$

Then,

LHS =  $7 - 7 = 0$

By comparing LHS and RHS

LHS  $\neq$  RHS

∴ No, the equation is not satisfied

(v)  $x - 7 = 1$

LHS =  $x - 7$

By substituting the value of  $x = 8$

Then,

LHS =  $8 - 7 = 1$

By comparing LHS and RHS

LHS = RHS

∴ Yes, the equation is satisfied.

(vi)  $5x = 25$

LHS =  $5x$

By substituting the value of  $x = 0$

Then,

LHS =  $5 \times 0 = 0$

By comparing LHS and RHS

LHS  $\neq$  RHS

∴ No, the equation is not satisfied.

(vii)  $5x = 25$

$$\text{LHS} = 5x$$

By substituting the value of  $x = 5$

Then,

$$\text{LHS} = 5 \times 5 = 25$$

By comparing LHS and RHS

$$\text{LHS} = \text{RHS}$$

∴ Yes, the equation is satisfied.

$$\text{(viii) } 5x = 25$$

$$\text{LHS} = 5x$$

By substituting the value of  $x = -5$

Then,

$$\text{LHS} = 5 \times (-5) = -25$$

By comparing LHS and RHS

$$\text{LHS} \neq \text{RHS}$$

∴ No, the equation is not satisfied.

$$\text{(ix) } m/3 = 2$$

$$\text{LHS} = m/3$$

By substituting the value of  $m = -6$

Then,

$$\text{LHS} = -6/3 = -2$$

By comparing LHS and RHS

$$\text{LHS} \neq \text{RHS}$$

∴ No, the equation is not satisfied.

$$\text{(x) } m/3 = 2$$

$$\text{LHS} = m/3$$

By substituting the value of  $m = 0$

Then,

$$\text{LHS} = 0/3 = 0$$

By comparing LHS and RHS

$$\text{LHS} \neq \text{RHS}$$

∴ No, the equation is not satisfied.

$$\text{(xi) } m/3 = 2$$

$$\text{LHS} = m/3$$

By substituting the value of  $m = 6$

Then,

$$\text{LHS} = 6/3 = 2$$

By comparing LHS and RHS

$$\text{LHS} = \text{RHS}$$

∴ Yes, the equation is satisfied.

S. No.	Equation	Value	Say, whether the equation is satisfied. (Yes/No)
(i)	$x + 3 = 0$	$x = 3$	No
(ii)	$x + 3 = 0$	$x = 0$	No
(iii)	$x + 3 = 0$	$x = -3$	Yes
(iv)	$x - 7 = 1$	$x = 7$	No
(v)	$x - 7 = 1$	$x = 8$	Yes
(vi)	$5x = 25$	$x = 0$	No
(vii)	$5x = 25$	$x = 5$	Yes
(viii)	$5x = 25$	$x = -5$	No
(ix)	$(m/3) = 2$	$m = -6$	No
(x)	$(m/3) = 2$	$m = 0$	No
(xi)	$(m/3) = 2$	$m = 6$	Yes

**2. Check whether the value given in the brackets is a solution to the given equation or not:**

**(a)  $n + 5 = 19$  ( $n = 1$ )**

**Solution:-**

$$\text{LHS} = n + 5$$

By substituting the value of  $n = 1$

Then,

$$\text{LHS} = n + 5$$

$$= 1 + 5$$

$$= 6$$

By comparing LHS and RHS

$$6 \neq 19$$

$$\text{LHS} \neq \text{RHS}$$

Hence, the value of  $n = 1$  is not a solution to the given equation  $n + 5 = 19$ .

**(b)  $7n + 5 = 19$  ( $n = -2$ )**

**Solution:-**

$$\text{LHS} = 7n + 5$$

By substituting the value of  $n = -2$

Then,

$$\begin{aligned}\text{LHS} &= 7n + 5 \\ &= (7 \times (-2)) + 5 \\ &= -14 + 5 \\ &= -9\end{aligned}$$

By comparing LHS and RHS

$$-9 \neq 19$$

$$\text{LHS} \neq \text{RHS}$$

Hence, the value of  $n = -2$  is not a solution to the given equation  $7n + 5 = 19$ .

**(c)  $7n + 5 = 19$  ( $n = 2$ )**

**Solution:-**

$$\text{LHS} = 7n + 5$$

By substituting the value of  $n = 2$

Then,

$$\begin{aligned}\text{LHS} &= 7n + 5 \\ &= (7 \times (2)) + 5 \\ &= 14 + 5 \\ &= 19\end{aligned}$$

By comparing LHS and RHS

$$19 = 19$$

$$\text{LHS} = \text{RHS}$$

Hence, the value of  $n = 2$  is a solution to the given equation  $7n + 5 = 19$ .

**(d)  $4p - 3 = 13$  ( $p = 1$ )**

**Solution:-**

$$\text{LHS} = 4p - 3$$

By substituting the value of  $p = 1$

Then,

$$\begin{aligned}\text{LHS} &= 4p - 3 \\ &= (4 \times 1) - 3 \\ &= 4 - 3 \\ &= 1\end{aligned}$$

By comparing LHS and RHS

$$1 \neq 13$$

LHS  $\neq$  RHS

Hence, the value of  $p = 1$  is not a solution to the given equation  $4p - 3 = 13$ .

**(e)  $4p - 3 = 13$  ( $p = -4$ )**

**Solution:-**

$$\text{LHS} = 4p - 3$$

By substituting the value of  $p = -4$

Then,

$$\begin{aligned}\text{LHS} &= 4p - 3 \\ &= (4 \times (-4)) - 3 \\ &= -16 - 3 \\ &= -19\end{aligned}$$

By comparing LHS and RHS

$$-19 \neq 13$$

LHS  $\neq$  RHS

Hence, the value of  $p = -4$  is not a solution to the given equation  $4p - 3 = 13$ .

**(f)  $4p - 3 = 13$  ( $p = 0$ )**

**Solution:-**

$$\text{LHS} = 4p - 3$$

By substituting the value of  $p = 0$

Then,

$$\begin{aligned}\text{LHS} &= 4p - 3 \\ &= (4 \times 0) - 3 \\ &= 0 - 3 \\ &= -3\end{aligned}$$

By comparing LHS and RHS

$$-3 \neq 13$$

LHS  $\neq$  RHS

Hence, the value of  $p = 0$  is not a solution to the given equation  $4p - 3 = 13$ .

**3. Solve the following equations by trial and error method:**

**(i)  $5p + 2 = 17$**

**Solution:-**

$$\text{LHS} = 5p + 2$$

By substituting the value of  $p = 0$

Then,

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$$\begin{aligned}\text{LHS} &= 5p + 2 \\ &= (5 \times 0) + 2 \\ &= 0 + 2 \\ &= 2\end{aligned}$$

By comparing LHS and RHS

$$2 \neq 17$$

$$\text{LHS} \neq \text{RHS}$$

Hence, the value of  $p = 0$  is not a solution to the given equation.

$$\text{Let, } p = 1$$

$$\begin{aligned}\text{LHS} &= 5p + 2 \\ &= (5 \times 1) + 2 \\ &= 5 + 2 \\ &= 7\end{aligned}$$

By comparing LHS and RHS

$$7 \neq 17$$

$$\text{LHS} \neq \text{RHS}$$

Hence, the value of  $p = 1$  is not a solution to the given equation.

$$\text{Let, } p = 2$$

$$\begin{aligned}\text{LHS} &= 5p + 2 \\ &= (5 \times 2) + 2 \\ &= 10 + 2 \\ &= 12\end{aligned}$$

By comparing LHS and RHS

$$12 \neq 17$$

$$\text{LHS} \neq \text{RHS}$$

Hence, the value of  $p = 2$  is not a solution to the given equation.

$$\text{Let, } p = 3$$

$$\begin{aligned}\text{LHS} &= 5p + 2 \\ &= (5 \times 3) + 2 \\ &= 15 + 2 \\ &= 17\end{aligned}$$

By comparing LHS and RHS

$$17 = 17$$

$$\text{LHS} = \text{RHS}$$

Hence, the value of  $p = 3$  is a solution to the given equation.

**(ii)  $3m - 14 = 4$**

**Solution:-**

$$\text{LHS} = 3m - 14$$

By substituting the value of  $m = 3$

Then,

$$\begin{aligned}\text{LHS} &= 3m - 14 \\ &= (3 \times 3) - 14 \\ &= 9 - 14 \\ &= -5\end{aligned}$$

By comparing LHS and RHS

$$-5 \neq 4$$

$$\text{LHS} \neq \text{RHS}$$

Hence, the value of  $m = 3$  is not a solution to the given equation.

Let,  $m = 4$

$$\begin{aligned}\text{LHS} &= 3m - 14 \\ &= (3 \times 4) - 14 \\ &= 12 - 14 \\ &= -2\end{aligned}$$

By comparing LHS and RHS

$$-2 \neq 4$$

$$\text{LHS} \neq \text{RHS}$$

Hence, the value of  $m = 4$  is not a solution to the given equation.

Let,  $m = 5$

$$\begin{aligned}\text{LHS} &= 3m - 14 \\ &= (3 \times 5) - 14 \\ &= 15 - 14 \\ &= 1\end{aligned}$$

By comparing LHS and RHS

$$1 \neq 4$$

$$\text{LHS} \neq \text{RHS}$$

Hence, the value of  $m = 5$  is not a solution to the given equation.

Let,  $m = 6$

$$\begin{aligned}\text{LHS} &= 3m - 14 \\ &= (3 \times 6) - 14 \\ &= 18 - 14 \\ &= 4\end{aligned}$$

By comparing LHS and RHS

$$4 = 4$$

$$\text{LHS} = \text{RHS}$$

Hence, the value of  $m = 6$  is a solution to the given equation.

#### **4. Write equations for the following statements:**

**(i) The sum of numbers  $x$  and 4 is 9.**

**Solution:-**

The above statement can be written in the equation form as,

$$= x + 4 = 9$$

**(ii) 2 subtracted from  $y$  is 8.**

**Solution:-**

The above statement can be written in the equation form as,

$$= y - 2 = 8$$

**(iii) Ten times  $a$  is 70.**

**Solution:-**

The above statement can be written in the equation form as,

$$= 10a = 70$$

**(iv) The number  $b$  divided by 5 gives 6.**

**Solution:-**

The above statement can be written in the equation form as,

$$= (b/5) = 6$$

**(v) Three-fourth of  $t$  is 15.**

**Solution:-**

The above statement can be written in the equation form as,

$$= \frac{3}{4}t = 15$$

**(vi) Seven times  $m$  plus 7 gets you 77.**

The above statement can be written in the equation form as,

Seven times m is  $7m$

$$= 7m + 7 = 77$$

**(vii) One-fourth of a number x minus 4 gives 4.**

**Solution:-**

The above statement can be written in the equation form as,

One-fourth of a number x is  $x/4$

$$= x/4 - 4 = 4$$

**(viii) If you take away 6 from 6 times y, you get 60.**

**Solution:-**

The above statement can be written in the equation form as,

6 times of y is  $6y$

$$= 6y - 6 = 60$$

**(ix) If you add 3 to one-third of z, you get 30.**

**Solution:-**

The above statement can be written in the equation form as,

One-third of z is  $z/3$

$$= 3 + z/3 = 30$$

**5. Write the following equations in statement forms:**

**(i)  $p + 4 = 15$**

**Solution:-**

The sum of numbers p and 4 is 15.

**(ii)  $m - 7 = 3$**

**Solution:-**

7 subtracted from m is 3.

**(iii)  $2m = 7$**

**Solution:-**

Twice of number m is 7.

**(iv)  $m/5 = 3$**

The number  $m$  divided by 5 gives 3.

**(v)  $(3m)/5 = 6$**

**Solution:-**

Three-fifth of  $m$  is 6.

**(vi)  $3p + 4 = 25$**

**Solution:-**

Three times  $p$  plus 4 gives you 25.

**(vii)  $4p - 2 = 18$**

**Solution:-**

Four times  $p$  minus 2 gives you 18.

**(viii)  $p/2 + 2 = 8$**

**Solution-**

If you add half of a number  $p$  to 2, you get 8.

**6. Set up an equation in the following cases:**

**(i) Irfan says that he has 7 marbles more than five times the marbles Parmit has. Irfan has 37 marbles. (Take  $m$  to be the number of Parmit's marbles.)**

**Solution:-**

From the question it is given that,

Number of Parmit's marbles =  $m$

Then,

Irfan has 7 marbles more than five times the marbles Parmit has

$$= 5 \times \text{Number of Parmit's marbles} + 7 = \text{Total number of marbles Irfan having}$$

$$= (5 \times m) + 7 = 37$$

$$= 5m + 7 = 37$$

**(ii) Laxmi's father is 49 years old. He is 4 years older than three times Laxmi's age. (Take Laxmi's age to be  $y$  years.)**

**Solution:-**

From the question it is given that,

Let Laxmi's age to be =  $y$  years old

Then,

Lakshmi's father is 4 years older than three times of her age

$$\begin{aligned} &= 3 \times \text{Laxmi's age} + 4 = \text{Age of Lakshmi's father} \\ &= (3 \times y) + 4 = 49 \\ &= 3y + 4 = 49 \end{aligned}$$

**(iii) The teacher tells the class that the highest marks obtained by a student in her class is twice the lowest marks plus 7. The highest score is 87. (Take the lowest score to be l.)**

**Solution:-**

From the question it is given that,

Highest score in the class = 87

Let lowest score be l

$$\begin{aligned} &= 2 \times \text{Lowest score} + 7 = \text{Highest score in the class} \\ &= (2 \times l) + 7 = 87 \\ &= 2l + 7 = 87 \end{aligned}$$

**(iv) In an isosceles triangle, the vertex angle is twice either base angle. (Let the base angle be b in degrees. Remember that the sum of angles of a triangle is 180 degrees).**

**Solution:-**

From the question it is given that,

We know that, the sum of angles of a triangle is  $180^\circ$

Let base angle be b

Then,

Vertex angle =  $2 \times$  base angle =  $2b$

$$\begin{aligned} &= b + b + 2b = 180^\circ \\ &= 4b = 180^\circ \end{aligned}$$

1. Give first the step you will use to separate the variable and then solve the equation:

(a)  $x - 1 = 0$

**Solution:-**

We have to add 1 to both the side of given equation,

Then we get,

$$= x - 1 + 1 = 0 + 1$$

$$= x = 1$$

(b)  $x + 1 = 0$

**Solution:-**

We have to subtract 1 to both the side of given equation,

Then we get,

$$= x + 1 - 1 = 0 - 1$$

$$= x = - 1$$

(c)  $x - 1 = 5$

**Solution:-**

We have to add 1 to both the side of given equation,

Then we get,

$$= x - 1 + 1 = 5 + 1$$

$$= x = 6$$

(d)  $x + 6 = 2$

**Solution:-**

We have to subtract 6 to both the side of given equation,

Then we get,

$$= x + 6 - 6 = 2 - 6$$

$$= x = - 4$$

(e)  $y - 4 = - 7$

**Solution:-**

We have to add 4 to both the side of given equation,

Then we get,

$$= y - 4 + 4 = - 7 + 4$$

$$= y = - 3$$

**(f)  $y - 4 = 4$**

**Solution:-**

We have to add 4 to both the side of given equation,

Then we get,

$$= y - 4 + 4 = 4 + 4$$

$$= y = 8$$

**(g)  $y + 4 = 4$**

**Solution:-**

We have to subtract 4 to both the side of given equation,

Then we get,

$$= y + 4 - 4 = 4 - 4$$

$$= y = 0$$

**(h)  $y + 4 = - 4$**

**Solution:-**

We have to subtract 4 to both the side of given equation,

Then we get,

$$= y + 4 - 4 = - 4 - 4$$

$$= y = - 8$$

**2. Give first the step you will use to separate the variable and then solve the equation:**

**(a)  $3l = 42$**

**Solution:-**

Now we have to divide both sides of the equation by 3,

Then we get,

$$= 3l/3 = 42/3$$

$$= l = 14$$

**(b)  $b/2 = 6$**

**Solution:-**

Now we have to multiply both sides of the equation by 2,

Then we get,

$$= b/2 \times 2 = 6 \times 2$$

$$= b = 12$$

**(c)  $p/7 = 4$**

**Solution:-**

Now we have to multiply both sides of the equation by 7,

Then we get,

$$= p/7 \times 7 = 4 \times 7$$

$$= p = 28$$

**(d)  $4x = 25$** **Solution:-**

Now we have to divide both sides of the equation by 4,

Then we get,

$$= 4x/4 = 25/4$$

$$= x = 25/4$$

**(e)  $8y = 36$** **Solution:-**

Now we have to divide both sides of the equation by 8,

Then we get,

$$= 8y/8 = 36/8$$

$$= x = 9/4$$

**(f)  $(z/3) = (5/4)$** **Solution:-**

Now we have to multiply both sides of the equation by 3,

Then we get,

$$= (z/3) \times 3 = (5/4) \times 3$$

$$= x = 15/4$$

**(g)  $(a/5) = (7/15)$** **Solution:-**

Now we have to multiply both sides of the equation by 5,

Then we get,

$$= (a/5) \times 5 = (7/15) \times 5$$

$$= a = 7/3$$

**(g)  $20t = - 10$** **Solution:-**

Now we have to divide both sides of the equation by 20,

Then we get,

$$= 20t/20 = -10/20$$

$$= x = -\frac{1}{2}$$

**3. Give the steps you will use to separate the variable and then solve the equation:**

**(a)  $3n - 2 = 46$**

**Solution:-**

First we have to add 2 to the both sides of the equation,

Then, we get,

$$= 3n - 2 + 2 = 46 + 2$$

$$= 3n = 48$$

Now,

We have to divide both sides of the equation by 3,

Then, we get,

$$= 3n/3 = 48/3$$

$$= n = 16$$

**(b)  $5m + 7 = 17$**

**Solution:-**

First we have to subtract 7 to the both sides of the equation,

Then, we get,

$$= 5m + 7 - 7 = 17 - 7$$

$$= 5m = 10$$

Now,

We have to divide both sides of the equation by 5,

Then, we get,

$$= 5m/5 = 10/5$$

$$= m = 2$$

**(c)  $20p/3 = 40$**

**Solution:-**

First we have to multiply both sides of the equation by 3,

Then, we get,

$$= (20p/3) \times 3 = 40 \times 3$$

$$= 20p = 120$$

Now,

We have to divide both sides of the equation by 20,

Then, we get,  
 $= 20p/20 = 120/20$   
 $= p = 6$

**(d)  $3p/10 = 6$**

**Solution:-**

First we have to multiply both sides of the equation by 10,

Then, we get,  
 $= (3p/10) \times 10 = 6 \times 10$   
 $= 3p = 60$

Now,

We have to divide both sides of the equation by 3,

Then, we get,  
 $= 3p/3 = 60/3$   
 $= p = 20$

**4. Solve the following equations:**

**(a)  $10p = 100$**

**Solution:-**

Now,

We have to divide both sides of the equation by 10,

Then, we get,  
 $= 10p/10 = 100/10$   
 $= p = 10$

**(b)  $10p + 10 = 100$**

**Solution:-**

First we have to subtract 10 to the both sides of the equation,

Then, we get,  
 $= 10p + 10 - 10 = 100 - 10$   
 $= 10p = 90$

Now,

We have to divide both sides of the equation by 10,

Then, we get,  
 $= 10p/10 = 90/10$   
 $= p = 9$

**(c)  $p/4 = 5$**

**Solution:-**

Now,

We have to multiply both sides of the equation by 4,

Then, we get,

$$= p/4 \times 4 = 5 \times 4$$

$$= p = 20$$

**(d)  $-p/3 = 5$**

**Solution:-**

Now,

We have to multiply both sides of the equation by - 3,

Then, we get,

$$= -p/3 \times (-3) = 5 \times (-3)$$

$$= p = -15$$

**(e)  $3p/4 = 6$**

**Solution:-**

First we have to multiply both sides of the equation by 4,

Then, we get,

$$= (3p/4) \times (4) = 6 \times 4$$

$$= 3p = 24$$

Now,

We have to divide both sides of the equation by 3,

Then, we get,

$$= 3p/3 = 24/3$$

$$= p = 8$$

**(f)  $3s = -9$**

**Solution:-**

Now,

We have to divide both sides of the equation by 3,

Then, we get,

$$= 3s/3 = -9/3$$

$$= s = -3$$

**(g)  $3s + 12 = 0$**

**Solution:-**

First we have to subtract 12 to the both sides of the equation,

Then, we get,

$$= 3s + 12 - 12 = 0 - 12$$

$$= 3s = -12$$

Now,

We have to divide both sides of the equation by 3,

Then, we get,

$$= 3s/3 = -12/3$$

$$= s = -4$$

**(h)  $3s = 0$** **Solution:-**

Now,

We have to divide both sides of the equation by 3,

Then, we get,

$$= 3s/3 = 0/3$$

$$= s = 0$$

**(i)  $2q = 6$** **Solution:-**

Now,

We have to divide both sides of the equation by 2,

Then, we get,

$$= 2q/2 = 6/2$$

$$= q = 3$$

**(j)  $2q - 6 = 0$** **Solution:-**

First we have to add 6 to the both sides of the equation,

Then, we get,

$$= 2q - 6 + 6 = 0 + 6$$

$$= 2q = 6$$

Now,

We have to divide both sides of the equation by 2,

Then, we get,

$$= 2q/2 = 6/2$$

$$= q = 3$$

**(k)  $2q + 6 = 0$**

**Solution:-**

First we have to subtract 6 to the both sides of the equation,

Then, we get,

$$= 2q + 6 - 6 = 0 - 6$$

$$= 2q = - 6$$

Now,

We have to divide both sides of the equation by 2,

Then, we get,

$$= 2q/2 = - 6/2$$

$$= q = - 3$$

**(l)  $2q + 6 = 12$**

**Solution:-**

First we have to subtract 6 to the both sides of the equation,

Then, we get,

$$= 2q + 6 - 6 = 12 - 6$$

$$= 2q = 6$$

Now,

We have to divide both sides of the equation by 2,

Then, we get,

$$= 2q/2 = 6/2$$

$$= q = 3$$

**1. Solve the following equations:**

**(a)  $2y + (5/2) = (37/2)$**

**Solution:-**By transposing  $(5/2)$  from LHS to RHS it becomes  $-5/2$ 

Then,

$$= 2y = (37/2) - (5/2)$$

$$= 2y = (37-5)/2$$

$$= 2y = 32/2$$

Now,

Divide both side by 2,

$$= 2y/2 = (32/2)/2$$

$$= y = (32/2) \times (1/2)$$

$$= y = 32/4$$

$$= y = 8$$

**(b)  $5t + 28 = 10$**

**Solution:-**

By transposing 28 from LHS to RHS it becomes -28

Then,

$$= 5t = 10 - 28$$

$$= 5t = -18$$

Now,

Divide both side by 5,

$$= 5t/5 = -18/5$$

$$= t = -18/5$$

**(c)  $(a/5) + 3 = 2$**

**Solution:-**

By transposing 3 from LHS to RHS it becomes -3

Then,

$$= a/5 = 2 - 3$$

$$= a/5 = -1$$

Now,

Multiply both side by 5,

$$= (a/5) \times 5 = -1 \times 5$$

$$= a = -5$$

**(d)  $(q/4) + 7 = 5$**

**Solution:-**

By transposing 7 from LHS to RHS it becomes -7

Then,

$$= q/4 = 5 - 7$$

$$= q/4 = -2$$

Now,

Multiply both side by 4,

$$= (q/4) \times 4 = -2 \times 4$$

$$= a = -8$$

**(e)  $(5/2) x = -5$**

**Solution:-**

First we have to multiply both the side by 2,

$$= (5x/2) \times 2 = -5 \times 2$$

$$= 5x = -10$$

Now,

We have to divide both the side by 5,

Then we get,

$$= 5x/5 = -10/5$$

$$= x = -2$$

**(f)  $(5/2) x = 25/4$**

**Solution:-**

First we have to multiply both the side by 2,

$$= (5x/2) \times 2 = (25/4) \times 2$$

$$= 5x = (25/2)$$

Now,

We have to divide both the side by 5,

Then we get,

$$= 5x/5 = (25/2)/5$$

$$= x = (25/2) \times (1/5)$$

$$= x = (5/2)$$

**(g)  $7m + (19/2) = 13$**

**Solution:-**

By transposing  $(19/2)$  from LHS to RHS it becomes  $-19/2$

Then,

$$= 7m = 13 - (19/2)$$

$$= 7m = (26 - 19)/2$$

$$= 7m = 7/2$$

Now,

Divide both side by 7,

$$= 7m/7 = (7/2)/7$$

$$= m = (7/2) \times (1/7)$$

$$= m = \frac{1}{2}$$

**(h)  $6z + 10 = - 2$** **Solution:-**

By transposing 10 from LHS to RHS it becomes - 10

Then,

$$= 6z = -2 - 10$$

$$= 6z = - 12$$

Now,

Divide both side by 6,

$$= 6z/6 = -12/6$$

$$= m = - 2$$

**(i)  $(3/2) l = 2/3$** **Solution:-**

First we have to multiply both the side by 2,

$$= (3l/2) \times 2 = (2/3) \times 2$$

$$= 3l = (4/3)$$

Now,

We have to divide both the side by 3,

Then we get,

$$= 3l/3 = (4/3)/3$$

$$= l = (4/3) \times (1/3)$$

$$= x = (4/9)$$

**(j)  $(2b/3) - 5 = 3$** **Solution:-**

By transposing -5 from LHS to RHS it becomes 5

Then,

$$= 2b/3 = 3 + 5$$

$$= 2b/3 = 8$$

Now,

Multiply both side by 3,

$$= (2b/3) \times 3 = 8 \times 3$$

$$= 2b = 24$$

And,

Divide both side by 2,

$$= 2b/2 = 24/2$$

$$= b = 12$$

## 2. Solve the following equations:

**(a)  $2(x + 4) = 12$**

**Solution:-**

Let us divide both the side by 2,

$$= (2(x + 4))/2 = 12/2$$

$$= x + 4 = 6$$

By transposing 4 from LHS to RHS it becomes -4

$$= x = 6 - 4$$

$$= x = 2$$

**(b)  $3(n - 5) = 21$**

**Solution:-**

Let us divide both the side by 3,

$$= (3(n - 5))/3 = 21/3$$

$$= n - 5 = 7$$

By transposing -5 from LHS to RHS it becomes 5

$$= n = 7 + 5$$

$$= n = 12$$

**(c)  $3(n - 5) = - 21$**

**Solution:-**

Let us divide both the side by 3,

$$= (3(n - 5))/3 = - 21/3$$

$$= n - 5 = -7$$

By transposing -5 from LHS to RHS it becomes 5

$$= n = -7 + 5$$

$$= n = -2$$

$$\text{(d) } -4(2 + x) = 8$$

**Solution:-**

Let us divide both the side by -4,

$$= (-4(2 + x)) / (-4) = 8 / (-4)$$

$$= 2 + x = -2$$

By transposing 2 from LHS to RHS it becomes - 2

$$= x = -2 - 2$$

$$= x = -4$$

$$\text{(e) } 4(2 - x) = 8$$

**Solution:-**

Let us divide both the side by 4,

$$= (4(2 - x)) / 4 = 8 / 4$$

$$= 2 - x = 2$$

By transposing 2 from LHS to RHS it becomes - 2

$$= -x = 2 - 2$$

$$= -x = 0$$

$$= x = 0$$

**3. Solve the following equations:**

$$\text{(a) } 4 = 5(p - 2)$$

**Solution:-**

Let us divide both the side by 5,

$$= 4/5 = (5(p - 2))/5$$

$$= 4/5 = p - 2$$

By transposing - 2 from RHS to LHS it becomes 2

$$= (4/5) + 2 = p$$

$$= (4 + 10) / 5 = p$$

$$= p = 14/5$$

$$\text{(b) } -4 = 5(p - 2)$$

**Solution:-**

Let us divide both the side by 5,

$$= -4/5 = (5(p - 2))/5$$

$$= -4/5 = p - 2$$

By transposing - 2 from RHS to LHS it becomes 2

$$= - (4/5) + 2 = p$$

$$= (-4 + 10)/5 = p$$

$$= p = 6/5$$

**(c)  $16 = 4 + 3(t + 2)$**

**Solution:-**

By transposing 4 from RHS to LHS it becomes - 4

$$= 16 - 4 = 3(t + 2)$$

$$= 12 = 3(t + 2)$$

Let us divide both the side by 3,

$$= 12/3 = (3(t + 2))/3$$

$$= 4 = t + 2$$

By transposing 2 from RHS to LHS it becomes - 2

$$= 4 - 2 = t$$

$$= t = 2$$

**(d)  $4 + 5(p - 1) = 34$**

**Solution:-**

By transposing 4 from LHS to RHS it becomes - 4

$$= 5(p - 1) = 34 - 4$$

$$= 5(p - 1) = 30$$

Let us divide both the side by 5,

$$= (5(p - 1))/5 = 30/5$$

$$= p - 1 = 6$$

By transposing - 1 from RHS to LHS it becomes 1

$$= p = 6 + 1$$

$$= p = 7$$

**(e)  $0 = 16 + 4(m - 6)$**

**Solution:-**

By transposing 16 from RHS to LHS it becomes - 16

$$= 0 - 16 = 4(m - 6)$$

$$= -16 = 4(m - 6)$$

Let us divide both the side by 4,

$$= -16/4 = (4(m - 6))/4$$

$$= -4 = m - 6$$

By transposing - 6 from RHS to LHS it becomes 6

$$= -4 + 6 = m$$

$$= m = 2$$

#### 4. (a) Construct 3 equations starting with $x = 2$

**Solution:-**

First equation is,

Multiply both side by 6

$$= 6x = 12 \quad \dots \text{ [equation 1]}$$

Second equation is,

Subtracting 4 from both side,

$$= 6x - 4 = 12 - 4$$

$$= 6x - 4 = 8 \quad \dots \text{ [equation 2]}$$

Third equation is,

Divide both side by 6

$$= (6x/6) - (4/6) = (8/6)$$

$$= x - (4/6) = (8/6) \quad \dots \text{ [equation 3]}$$

#### (b) Construct 3 equations starting with $x = -2$

**Solution:-**

First equation is,

Multiply both side by 5

$$= 5x = -10 \quad \dots \text{ [equation 1]}$$

Second equation is,

Subtracting 3 from both side,

$$= 5x - 3 = -10 - 3$$

$$= 5x - 3 = -13 \quad \dots \text{ [equation 2]}$$

Third equation is,

Dividing both sides by 2

$$= (5x/2) - (3/2) = (-13/2) \quad \dots \text{ [equation 3]}$$

**1. Set up equations and solve them to find the unknown numbers in the following cases:**

**(a) Add 4 to eight times a number; you get 60.**

**Solution:-**

Let us assume the required number be  $x$

Eight times a number =  $8x$

The given above statement can be written in the equation form as,

$$= 8x + 4 = 60$$

By transposing 4 from LHS to RHS it becomes – 4

$$= 8x = 60 - 4$$

$$= 8x = 56$$

Divide both side by 8,

Then we get,

$$= (8x/8) = 56/8$$

$$= x = 7$$

**(b) One-fifth of a number minus 4 gives 3.**

**Solution:-**

Let us assume the required number be  $x$

One-fifth of a number =  $(1/5)x = x/5$

The given above statement can be written in the equation form as,

$$= (x/5) - 4 = 3$$

By transposing - 4 from LHS to RHS it becomes 4

$$= x/5 = 3 + 4$$

$$= x/5 = 7$$

Multiply both side by 5,

Then we get,

$$= (x/5) \times 5 = 7 \times 5$$

$$= x = 35$$

**(c) If I take three-fourths of a number and add 3 to it, I get 21.**

**Solution:-**

Let us assume the required number be  $x$

Three-fourths of a number =  $(3/4)x$

The given above statement can be written in the equation form as,

$$= (3/4)x + 3 = 21$$

By transposing 3 from LHS to RHS it becomes - 3

$$= (3/4)x = 21 - 3$$

$$= (3/4)x = 18$$

Multiply both side by 4,

Then we get,

$$= (3x/4) \times 4 = 18 \times 4$$

$$= 3x = 72$$

Then,

Divide both side by 3,

$$= (3x/3) = 72/3$$

$$= x = 24$$

**(d) When I subtracted 11 from twice a number, the result was 15.**

**Solution:-**

Let us assume the required number be x

Twice a number = 2x

The given above statement can be written in the equation form as,

$$= 2x - 11 = 15$$

By transposing -11 from LHS to RHS it becomes 11

$$= 2x = 15 + 11$$

$$= 2x = 26$$

Then,

Divide both side by 2,

$$= (2x/2) = 26/2$$

$$= x = 13$$

**(e) Munna subtracts thrice the number of notebooks he has from 50, he finds the result to be 8.**

**Solution:-**

Let us assume the required number be x

Thrice the number = 3x

The given above statement can be written in the equation form as,

$$= 50 - 3x = 8$$

By transposing 50 from LHS to RHS it becomes - 50

$$= - 3x = 8 - 50$$

$$= -3x = -42$$

Then,

Divide both side by -3,

$$= (-3x/-3) = -42/-3$$

$$= x = 14$$

**(f) Ibenhal thinks of a number. If she adds 19 to it and divides the sum by 5, she will get 8.**

**Solution:-**

Let us assume the required number be x

The given above statement can be written in the equation form as,

$$= (x + 19)/5 = 8$$

Multiply both side by 5,

$$= ((x + 19)/5) \times 5 = 8 \times 5$$

$$= x + 19 = 40$$

Then,

By transposing 19 from LHS to RHS it becomes - 19

$$= x = 40 - 19$$

$$= x = 21$$

**(g) Anwar thinks of a number. If he takes away 7 from 5/2 of the number, the result is 23.**

**Solution:-**

Let us assume the required number be x

5/2 of the number =  $(5/2) x$

The given above statement can be written in the equation form as,

$$= (5/2) x - 7 = 23$$

By transposing -7 from LHS to RHS it becomes 7

$$= (5/2) x = 23 + 7$$

$$= (5/2) x = 30$$

Multiply both side by 2,

$$= ((5/2) x) \times 2 = 30 \times 2$$

$$= 5x = 60$$

Then,

Divide both the side by 5

$$= 5x/5 = 60/5$$

$$= x = 12$$

**2. Solve the following:**

**(a) The teacher tells the class that the highest marks obtained by a student in her class is twice the lowest marks plus 7. The highest score is 87. What is the lowest score?**

**Solution:-**

Let us assume the lowest score be  $x$

From the question it is given that,

The highest score is = 87

Highest marks obtained by a student in her class is twice the lowest marks plus 7 =  $2x + 7$

$\frac{5}{2}$  of the number =  $(\frac{5}{2})x$

The given above statement can be written in the equation form as,

Then,

$$= 2x + 7 = \text{Highest score}$$

$$= 2x + 7 = 87$$

By transposing 7 from LHS to RHS it becomes -7

$$= 2x = 87 - 7$$

$$= 2x = 80$$

Now,

Divide both the side by 2

$$= \frac{2x}{2} = \frac{80}{2}$$

$$= x = 40$$

Hence, the lowest score is 40

**(b) In an isosceles triangle, the base angles are equal. The vertex angle is  $40^\circ$ .**

**What are the base angles of the triangle? (Remember, the sum of three angles of a triangle is  $180^\circ$ ).**

**Solution:-**

From the question it is given that,

We know that, the sum of angles of a triangle is  $180^\circ$

Let base angle be  $b$

Then,

$$= b + b + 40^\circ = 180^\circ$$

$$= 2b + 40 = 180^\circ$$

By transposing 40 from LHS to RHS it becomes -40

$$= 2b = 180 - 40$$

$$= 2b = 140$$

Now,

Divide both the side by 2

$$= 2b/2 = 140/2$$

$$= b = 70^\circ$$

Hence,  $70^\circ$  is the base angle of an isosceles triangle.

**(c) Sachin scored twice as many runs as Rahul. Together, their runs fell two short of a double century. How many runs did each one score?**

**Solution:-**

Let us assume Rahul's score be  $x$

Then,

Sachin scored twice as many runs as Rahul is  $2x$

Together, their runs fell two short of a double century,

$$= \text{Rahul's score} + \text{Sachin's score} = 200 - 2$$

$$= x + 2x = 198$$

$$= 3x = 198$$

Divide both the side by 3,

$$= 3x/3 = 198/3$$

$$= x = 66$$

So, Rahul's score is 66

And Sachin's score is  $2x = 2 \times 66 = 132$

**3. Solve the following:**

**(i) Irfan says that he has 7 marbles more than five times the marbles Parmit has. Irfan has 37 marbles. How many marbles does Parmit have?**

**Solution:-**

Let us assume number of Parmit's marbles =  $m$

From the question it is given that,

Then,

Irfan has 7 marbles more than five times the marbles Parmit has

$$= 5 \times \text{Number of Parmit's marbles} + 7 = \text{Total number of marbles Irfan having}$$

$$= (5 \times m) + 7 = 37$$

$$= 5m + 7 = 37$$

By transposing 7 from LHS to RHS it becomes -7

$$= 5m = 37 - 7$$

$$= 5m = 30$$

Divide both the side by 5

$$= 5m/5 = 30/5$$

$$= m = 6$$

So, Permit has 6 marbles

**(ii) Laxmi's father is 49 years old. He is 4 years older than three times Laxmi's age.**

**What is Laxmi's age?**

**Solution:-**

Let Laxmi's age to be =  $y$  years old

From the question it is given that,

Lakshmi's father is 4 years older than three times of her age

$$= 3 \times \text{Laxmi's age} + 4 = \text{Age of Lakshmi's father}$$

$$= (3 \times y) + 4 = 49$$

$$= 3y + 4 = 49$$

By transposing 4 from LHS to RHS it becomes -4

$$= 3y = 49 - 4$$

$$= 3y = 45$$

Divide both the side by 3

$$= 3y/3 = 45/3$$

$$= y = 15$$

So, Lakshmi's age is 15 years.

**(iii) People of Sundargram planted trees in the village garden. Some of the trees were fruit trees. The number of non-fruit trees were two more than three times the number of fruit trees. What was the number of fruit trees planted if the number of non-fruit trees planted was 77?**

**Solution:-**

Let the number of fruit trees be  $f$ .

From the question it is given that,

$3 \times$  number of fruit trees + 2 = number of non-fruit trees

$$= 3f + 2 = 77$$

By transposing 2 from LHS to RHS it becomes -2

$$= 3f = 77 - 2$$

$$= 3f = 75$$

Divide both the side by 3

$$= 3f/3 = 75/3$$

$$= f = 25$$

So, number of fruit tree was 25.

**4. Solve the following riddle:**

**I am a number,**

**Tell my identity!**

**Take me seven times over**

**And add a fifty!**

**To reach a triple century**

**You still need forty!**

**Solution:-**

Let us assume the number be  $x$ .

Take me seven times over and add a fifty =  $7x + 50$

To reach a triple century you still need forty =  $(7x + 50) + 40 = 300$

$$= 7x + 50 + 40 = 300$$

$$= 7x + 90 = 300$$

By transposing 90 from LHS to RHS it becomes -90

$$= 7x = 300 - 90$$

$$= 7x = 210$$

Divide both side by 7

$$= 7x/7 = 210/7$$

$$= x = 30$$

Hence the number is 30.

## MIND MAP

This chapter consists of four different topics. The most probable questions from the examination point of view are given below.

### TYPE: 1 FRAMING EQUATION FOR THE GIVEN STATEMENTS.

- Q.1 One fourth of a number minus 7 is 18.
- Q.2 If you take away 6 from 6 times y, you get 60
- Q.3 If you add 3 to one-third of a number, you get 30.

### TYPE: 2 WRITING STATEMENT FOR THE GIVEN EQUATIONS.

- Q.1  $7x + 67 = 15$
- Q.2  $32x + 6 = 15$
- Q.3  $2p - 21 = 23$

### TYPE: 3 CHECK WHETHER THE GIVEN VALUE IN THE BRACKETS IS THE SOLUTION TO THE GIVEN EQUATION OR NOT.

- Q.1.  $2x + 7 = 15$  ( $x = -4$ )
- Q.2  $\frac{4}{6}q + 16 = 12$  ( $q = 3$ )
- Q.3  $3n - 2 = 46$  ( $n = 14$ )

### TYPE: 4 SETUP AN EQUATION FOR THE GIVEN CASES.

Q.1. Raju's father's age is 5 years more than three times Raju's age. Find Raju's age, if his father is 44 years old. (Assume Raju's age to be  $y$  years old).

Q.2. The length of a rectangular garden is six times the breadth. Find the length and breadth of the garden if perimeter of the garden is 28 m. (Assume breadth to be  $b$  metres.)

### TYPE: 5 SOLVE THE GIVEN EQUATION USING EITHER BALANCING METHOD OR TRANSPOSING METHOD.

- Q.1  $3n + 8 = 25$
- Q.2  $4n - 7 = 25$

Q.3  $4(m + 3) = 18$

Q.4  $3(t + 2) + 4 = 12$

Q.5  $0 = 16 + 4(m - 6)$ .

**TYPE: 6 QUESTIONS BASED ON APPLICATION OF SIMPLE EQUATIONS IN REAL LIFE SITUATIONS. (DIFFERENT TYPES OF WORD PROBLEMS)**

Q.1. Pankaj's age is 5 years more than three times the Reshma's age. Find Reshma's age if Pankaj's age is 44 years.

Q.2. Sachin scored twice as many runs as Rahul. Together their runs fell 4 runs short of a century. How many runs did each score?

Q.3. In an isosceles triangle, the base angles are equal. The vertex angle is  $70^\circ$ . What are the base angles of the triangle? (Remember, the sum of three angles of a triangle is equal to  $180^\circ$ ).

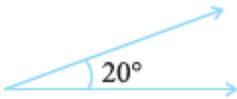
Q.4. People of Sundargram planted a total of 102 trees in the village garden. Some of the trees were fruit trees. The number of non-fruit trees was two more than three times the number of fruit trees. What was the number of fruit trees planted?

## EXERCISE 5.1

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1. Find the complement of each of the following angles:

(i)



**Solution:-**

Two angles are said to be complementary if the sum of their measures is  $90^\circ$ .

The given angle is  $20^\circ$

Let the measure of its complement be  $x^\circ$ .

Then,

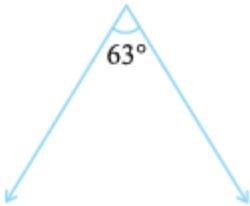
$$= x + 20^\circ = 90^\circ$$

$$= x = 90^\circ - 20^\circ$$

$$= x = 70^\circ$$

Hence, the complement of the given angle measures  $70^\circ$ .

(ii)



**Solution:-**

Two angles are said to be complementary if the sum of their measures is  $90^\circ$ .

The given angle is  $63^\circ$

Let the measure of its complement be  $x^\circ$ .

Then,

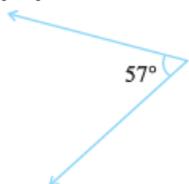
$$= x + 63^\circ = 90^\circ$$

$$= x = 90^\circ - 63^\circ$$

$$= x = 27^\circ$$

Hence, the complement of the given angle measures  $27^\circ$ .

(iii)



**Solution:-**

Two angles are said to be complementary if the sum of their measures is  $90^\circ$ .

The given angle is  $57^\circ$

Let the measure of its complement be  $x^\circ$ .

Then,

$$= x + 57^\circ = 90^\circ$$

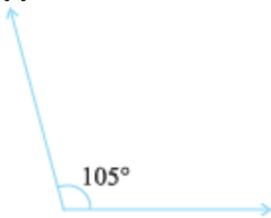
$$= x = 90^\circ - 57^\circ$$

$$= x = 33^\circ$$

Hence, the complement of the given angle measures  $33^\circ$ .

**2. Find the supplement of each of the following angles:**

(i)



**Solution:-**

Two angles are said to be supplementary if the sum of their measures is  $180^\circ$ .

The given angle is  $105^\circ$

Let the measure of its supplement be  $x^\circ$ .

Then,

$$= x + 105^\circ = 180^\circ$$

$$= x = 180^\circ - 105^\circ$$

$$= x = 75^\circ$$

Hence, the supplement of the given angle measures  $75^\circ$ .

(ii)



**Solution:-**

Two angles are said to be supplementary if the sum of their measures is  $180^\circ$ .

The given angle is  $87^\circ$

Let the measure of its supplement be  $x^\circ$ .

Then,

$$\begin{aligned} &= x + 87^\circ = 180^\circ \\ &= x = 180^\circ - 87^\circ \\ &= x = 93^\circ \end{aligned}$$

Hence, the supplement of the given angle measures  $93^\circ$ .

(iii)



**Solution:-**

Two angles are said to be supplementary if the sum of their measures is  $180^\circ$ .

The given angle is  $154^\circ$

Let the measure of its supplement be  $x^\circ$ .

Then,

$$\begin{aligned} &= x + 154^\circ = 180^\circ \\ &= x = 180^\circ - 154^\circ \\ &= x = 26^\circ \end{aligned}$$

Hence, the supplement of the given angle measures  $26^\circ$ .

**3. Identify which of the following pairs of angles are complementary and which are supplementary.**

(i)  $65^\circ$ ,  $115^\circ$

**Solution:-**

We have to find the sum of given angles to identify whether the angles are complementary or supplementary.

Then,

$$\begin{aligned} &= 65^\circ + 115^\circ \\ &= 180^\circ \end{aligned}$$

If the sum of two angle measures is  $180^\circ$ , then the two angles are said to be supplementary.

$\therefore$  These angles are supplementary angles.

(ii)  $63^\circ$ ,  $27^\circ$

**Solution:-**

We have to find the sum of given angles to identify whether the angles are complementary or supplementary.

Then,

$$= 63^\circ + 27^\circ$$

$$= 90^\circ$$

If the sum of two angle measures is  $90^\circ$ , then the two angles are said to be complementary.

∴ These angles are complementary angles.

**(iii)  $112^\circ, 68^\circ$**

**Solution:-**

We have to find the sum of given angles to identify whether the angles are complementary or supplementary.

Then,

$$= 112^\circ + 68^\circ$$

$$= 180^\circ$$

If the sum of two angle measures is  $180^\circ$ , then the two angles are said to be supplementary.

∴ These angles are supplementary angles.

**(iv)  $130^\circ, 50^\circ$**

**Solution:-**

We have to find the sum of given angles to identify whether the angles are complementary or supplementary.

Then,

$$= 130^\circ + 50^\circ$$

$$= 180^\circ$$

If the sum of two angle measures is  $180^\circ$ , then the two angles are said to be supplementary.

∴ These angles are supplementary angles.

**(v)  $45^\circ, 45^\circ$**

**Solution:-**

We have to find the sum of given angles to identify whether the angles are complementary or supplementary.

Then,

$$= 45^\circ + 45^\circ$$

$$= 90^\circ$$

If the sum of two angle measures is  $90^\circ$ , then the two angles are said to be complementary.

∴ These angles are complementary angles.

**(vi)  $80^\circ$ ,  $10^\circ$**

**Solution:-**

We have to find the sum of given angles to identify whether the angles are complementary or supplementary.

Then,

$$\begin{aligned} &= 80^\circ + 10^\circ \\ &= 90^\circ \end{aligned}$$

If the sum of two angle measures is  $90^\circ$ , then the two angles are said to be complementary.

$\therefore$  These angles are complementary angles.

**4. Find the angles which is equal to its complement.**

**Solution:-**

Let the measure of the required angle be  $x^\circ$ .

We know that, sum of measures of complementary angle pair is  $90^\circ$ .

Then,

$$\begin{aligned} &= x + x = 90^\circ \\ &= 2x = 90^\circ \\ &= x = 90/2 \\ &= x = 45^\circ \end{aligned}$$

Hence, the required angle measures is  $45^\circ$ .

**5. Find the angles which is equal to its supplement.**

**Solution:-**

Let the measure of the required angle be  $x^\circ$ .

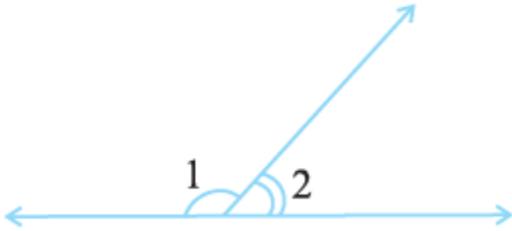
We know that, sum of measures of supplementary angle pair is  $180^\circ$ .

Then,

$$\begin{aligned} &= x + x = 180^\circ \\ &= 2x = 180^\circ \\ &= x = 180/2 \\ &= x = 90^\circ \end{aligned}$$

Hence, the required angle measures is  $90^\circ$ .

**6. In the given figure,  $\angle 1$  and  $\angle 2$  are supplementary angles. If  $\angle 1$  is decreased, what changes should take place in  $\angle 2$  so that both angles still remain supplementary.**



**Solution:-**

From the question, it is given that,  
 $\angle 1$  and  $\angle 2$  are supplementary angles.

If  $\angle 1$  is decreased, then  $\angle 2$  must be increased by the same value. Hence, this angle pair remains supplementary.

**7. Can two angles be supplementary if both of them are:**

**(i). Acute?**

**Solution:-**

No. If two angles are acute, means less than  $90^\circ$ , the two angles cannot be supplementary. Because, their sum will be always less than  $90^\circ$ .

**(ii). Obtuse?**

**Solution:-**

No. If two angles are obtuse, means more than  $90^\circ$ , the two angles cannot be supplementary. Because, their sum will be always more than  $180^\circ$ .

**(iii). Right?**

**Solution:-**

Yes. If two angles are right, means both measures  $90^\circ$ , then two angles can form a supplementary pair.

$$\therefore 90^\circ + 90^\circ = 180$$

**8. An angle is greater than  $45^\circ$ . Is its complementary angle greater than  $45^\circ$  or equal to  $45^\circ$  or less than  $45^\circ$ ?**

**Solution:-**

Let us assume the complementary angles be  $p$  and  $q$ ,

We know that, sum of measures of complementary angle pair is  $90^\circ$ .

Then,

$$= p + q = 90^\circ$$

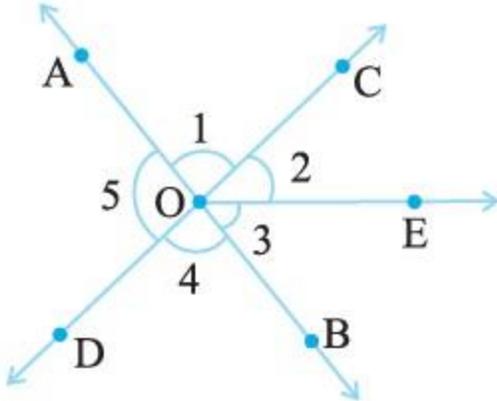
It is given in the question that  $p > 45^\circ$

Adding  $q$  on both the sides,

$$\begin{aligned} &= p + q > 45^\circ + q \\ &= 90^\circ > 45^\circ + q \\ &= 90^\circ - 45^\circ > q \\ &= q < 45^\circ \end{aligned}$$

Hence, its complementary angle is less than  $45^\circ$ .

**9. In the adjoining figure:**



**(i) Is  $\angle 1$  adjacent to  $\angle 2$ ?**

**Solution:-**

By observing the figure we came to conclude that,  
Yes, as  $\angle 1$  and  $\angle 2$  having a common vertex i.e. O and a common arm OC.  
Their non-common arms OA and OE are on both the side of common arm.

**(ii) Is  $\angle AOC$  adjacent to  $\angle AOE$ ?**

**Solution:-**

By observing the figure, we came to conclude that,  
No, since they are having a common vertex O and common arm OA.  
But, they have no non-common arms on both the side of the common arm.

**(iii) Do  $\angle COE$  and  $\angle EOD$  form a linear pair?**

**Solution:-**

By observing the figure, we came to conclude that,  
Yes, as  $\angle COE$  and  $\angle EOD$  having a common vertex i.e. O and a common arm OE.  
Their non-common arms OC and OD are on both the side of common arm.

**(iv) Are  $\angle BOD$  and  $\angle DOA$  supplementary?**

**Solution:-**

By observing the figure, we came to conclude that,  
Yes, as  $\angle BOD$  and  $\angle DOA$  having a common vertex i.e. O and a common arm OE.  
Their non-common arms OA and OB are opposite to each other.

**(v) Is  $\angle 1$  vertically opposite to  $\angle 4$ ?**

**Solution:-**

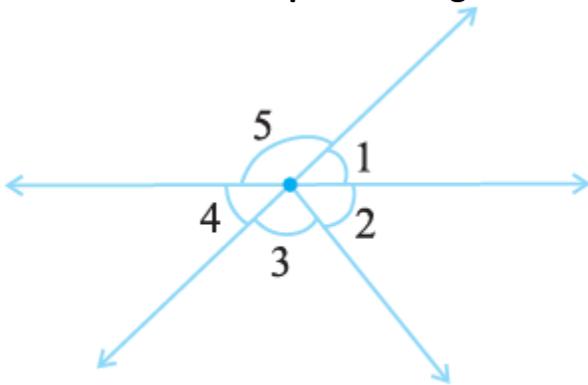
Yes,  $\angle 1$  and  $\angle 2$  are formed by the intersection of two straight lines AB and CD.

**(vi) What is the vertically opposite angle of  $\angle 5$ ?**

**Solution:-**

$\angle COB$  is the vertically opposite angle of  $\angle 5$ . Because these two angles are formed by the intersection of two straight lines AB and CD.

**10. Indicate which pairs of angles are:**



**(i) Vertically opposite angles.**

**Solution:-**

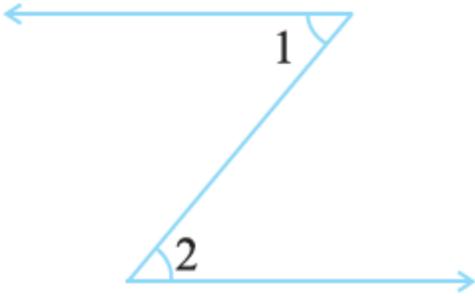
By observing the figure we can say that,  
 $\angle 1$  and  $\angle 4$ ,  $\angle 5$  and  $\angle 2 + \angle 3$  are vertically opposite angles. Because these two angles are formed by the intersection of two straight lines.

**(ii) Linear pairs.**

**Solution:-**

By observing the figure we can say that,  
 $\angle 1$  and  $\angle 5$ ,  $\angle 5$  and  $\angle 4$  as these are having a common vertex and also having non common arms opposite to each other.

**11. In the following figure, is  $\angle 1$  adjacent to  $\angle 2$ ? Give reasons.**

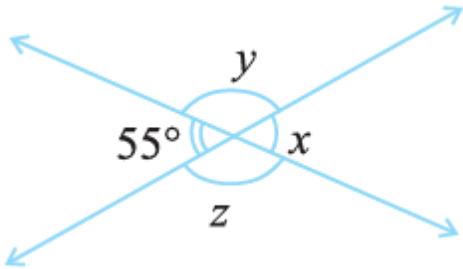


**Solution:-**

$\angle 1$  and  $\angle 2$  are not adjacent angles. Because, they are not lie on the same vertex.

**12. Find the values of the angles  $x$ ,  $y$ , and  $z$  in each of the following:**

(i)



**Solution:-**

$\angle x = 55^\circ$ , because vertically opposite angles.

$\angle x + \angle y = 180^\circ$  ... [ $\because$  linear pair]

$= 55^\circ + \angle y = 180^\circ$

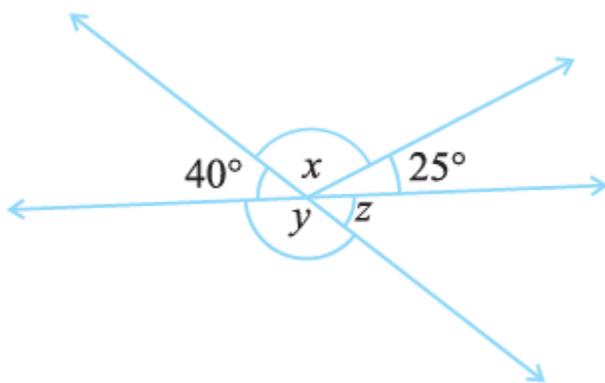
$= \angle y = 180^\circ - 55^\circ$

$= \angle y = 125^\circ$

Then,  $\angle y = \angle z$  ... [ $\because$  vertically opposite angles]

$\therefore \angle z = 125^\circ$

(ii)



**Solution:-**

$\angle z = 40^\circ$ , because vertically opposite angles.

$$\angle y + \angle z = 180^\circ \quad \dots [\because \text{linear pair}]$$

$$= \angle y + 40^\circ = 180^\circ$$

$$= \angle y = 180^\circ - 40^\circ$$

$$= \angle y = 140^\circ$$

$$\text{Then, } 40 + \angle x + 25 = 180^\circ \quad \dots [\because \text{angles on straight line}]$$

$$65 + \angle x = 180^\circ$$

$$\angle x = 180^\circ - 65$$

$$\therefore \angle x = 115^\circ$$

**13. Fill in the blanks:**

**(i) If two angles are complementary, then the sum of their measures is\_\_\_\_\_.**

**Solution:-**

If two angles are complementary, then the sum of their measures is  $90^\circ$ .

**(ii) If two angles are supplementary, then the sum of their measures is\_\_\_\_\_.**

**Solution:-**

If two angles are supplementary, then the sum of their measures is  $180^\circ$ .

**(iii) Two angles forming a linear pair are\_\_\_\_\_.**

**Solution:-**

Two angles forming a linear pair are Supplementary.

**(iv) If two adjacent angles are supplementary, they form a\_\_\_\_\_.**

**Solution:-**

If two adjacent angles are supplementary, they form a linear pair.

**(v) If two lines intersect at a point, then the vertically opposite angles are always\_\_\_\_\_.**

**Solution:-**

If two lines intersect at a point, then the vertically opposite angles are always equal.

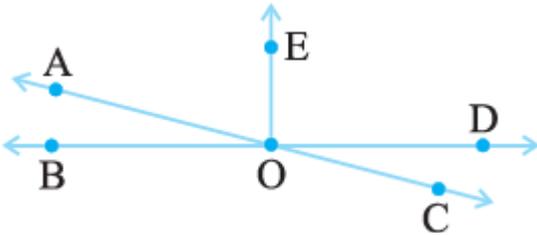
**(vi) If two lines intersect at a point, and if one pair of vertically opposite angles are acute angles, then the other pair of vertically opposite angles are\_\_\_\_\_.**

**Solution:-**

If two lines intersect at a point, and if one pair of vertically opposite angles are acute

angles, then the other pair of vertically opposite angles are Obtuse angles.

14. In the adjoining figure, name the following pairs of angles.



(i) Obtuse vertically opposite angles

Solution:-

$\angle AOD$  and  $\angle BOC$  are obtuse vertically opposite angles in the given figure.

(ii) Adjacent complementary angles

Solution:-

$\angle EOA$  and  $\angle AOB$  are adjacent complementary angles in the given figure.

(iii) Equal supplementary angles

Solution:-

$\angle EOB$  and  $\angle EOD$  are the equal supplementary angles in the given figure.

(iv) Unequal supplementary angles

Solution:-

$\angle EOA$  and  $\angle EOC$  are the unequal supplementary angles in the given figure.

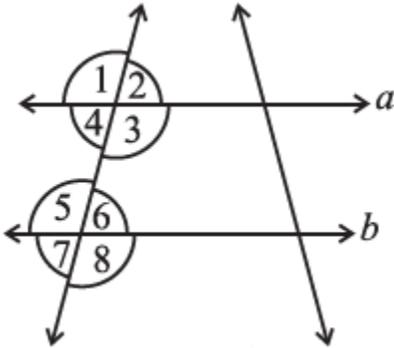
(v) Adjacent angles that do not form a linear pair

Solution:-

$\angle AOB$  and  $\angle AOE$ ,  $\angle AOE$  and  $\angle EOD$ ,  $\angle EOD$  and  $\angle COD$  are the adjacent angles that do not form a linear pair in the given figure.

**EXERCISE 5.2**

**1. State the property that is used in each of the following statements?**



**(i) If  $a \parallel b$ , then  $\angle 1 = \angle 5$ .**

**Solution:-**

Corresponding angles property is used in the above statement.

**(ii) If  $\angle 4 = \angle 6$ , then  $a \parallel b$ .**

**Solution:-**

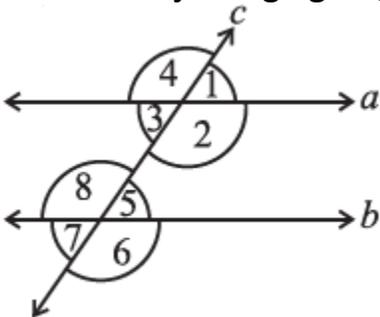
Alternate interior angles property is used in the above statement.

**(iii) If  $\angle 4 + \angle 5 = 180^\circ$ , then  $a \parallel b$ .**

**Solution:-**

Interior angles on the same side of transversal are supplementary.

**2. In the adjoining figure, identify**



**(i) The pairs of corresponding angles.**

**Solution:-**

By observing the figure, the pairs of corresponding angle are,  
 $\angle 1$  and  $\angle 5$ ,  $\angle 4$  and  $\angle 8$ ,  $\angle 2$  and  $\angle 6$ ,  $\angle 3$  and  $\angle 7$

(ii) The pairs of alternate interior angles.

**Solution:-**

By observing the figure, the pairs of alternate interior angle are,  
 $\angle 2$  and  $\angle 8$ ,  $\angle 3$  and  $\angle 5$

(iii) The pairs of interior angles on the same side of the transversal.

**Solution:-**

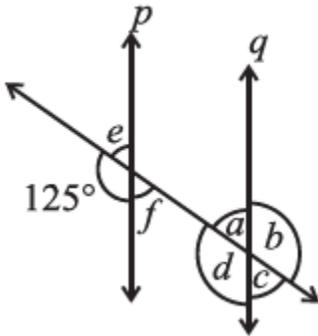
By observing the figure, the pairs of interior angles on the same side of the transversal are  $\angle 2$  and  $\angle 5$ ,  $\angle 3$  and  $\angle 8$

(iv) The vertically opposite angles.

**Solution:-**

By observing the figure, the vertically opposite angles are,  
 $\angle 1$  and  $\angle 3$ ,  $\angle 5$  and  $\angle 7$ ,  $\angle 2$  and  $\angle 4$ ,  $\angle 6$  and  $\angle 8$

3. In the adjoining figure,  $p \parallel q$ . Find the unknown angles.



**Solution:-**

By observing the figure,

$$\angle d = \angle 125^\circ \quad \dots [\because \text{corresponding angles}]$$

We know that, Linear pair is the sum of adjacent angles is  $180^\circ$

Then,

$$= \angle e + 125^\circ = 180^\circ \quad \dots [\text{Linear pair}]$$

$$= \angle e = 180^\circ - 125^\circ$$

$$= \angle e = 55^\circ$$

From the rule of vertically opposite angles,

$$\angle f = \angle e = 55^\circ$$

$$\angle b = \angle d = 125^\circ$$

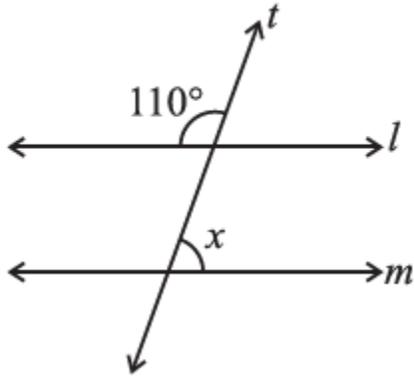
By the property of corresponding angles,

$$\angle c = \angle f = 55^\circ$$

$$\angle a = \angle e = 55^\circ$$

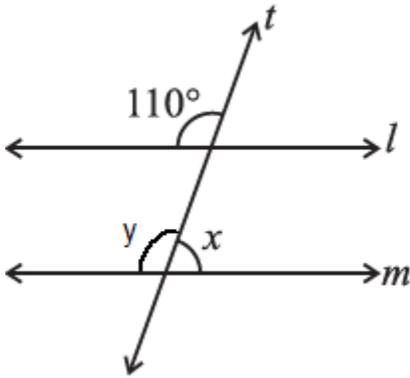
4. Find the value of  $x$  in each of the following figures if  $l \parallel m$ .

(i)



**Solution:-**

Let us assume other angle on the line  $m$  be  $\angle y$ ,



Then,

By the property of corresponding angles,

$$\angle y = 110^\circ$$

We know that Linear pair is the sum of adjacent angles is  $180^\circ$

Then,

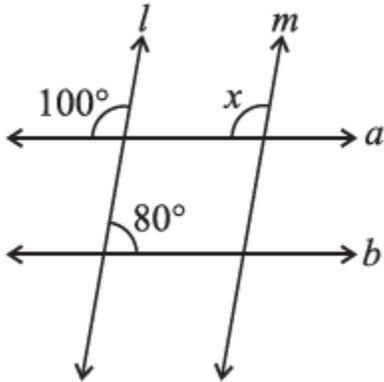
$$= \angle x + \angle y = 180^\circ$$

$$= \angle x + 110^\circ = 180^\circ$$

$$= \angle x = 180^\circ - 110^\circ$$

$$= \angle x = 70^\circ$$

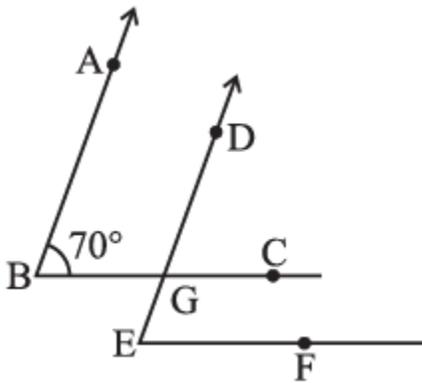
(ii)



**Solution:-**

By the property of corresponding angles,  
 $\angle x = 100^\circ$

**5. In the given figure, the arms of two angles are parallel.**



If  $\angle ABC = 70^\circ$ , then find

(i)  $\angle DGC$

(ii)  $\angle DEF$

**Solution:-**

(i) Let us consider that  $AB \parallel DG$

BC is the transversal line intersecting AB and DG

By the property of corresponding angles,

$$\angle DGC = \angle ABC$$

Then,

$$\angle DGC = 70^\circ$$

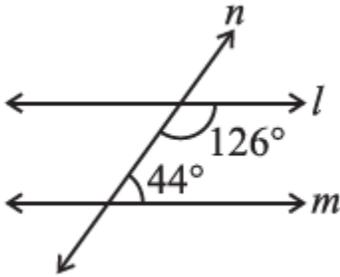
(ii) Let us consider that  $BC \parallel EF$

DE is the transversal line intersecting BC and EF

By the property of corresponding angles,  
 $\angle DEF = \angle DGC$   
Then,  
 $\angle DEF = 70^\circ$

6. In the given figures below, decide whether  $l$  is parallel to  $m$ .

(i)



**Solution:-**

Let us consider the two lines  $l$  and  $m$ ,  
 $n$  is the transversal line intersecting  $l$  and  $m$ .

We know that the sum of interior angles on the same side of transversal is  $180^\circ$ .

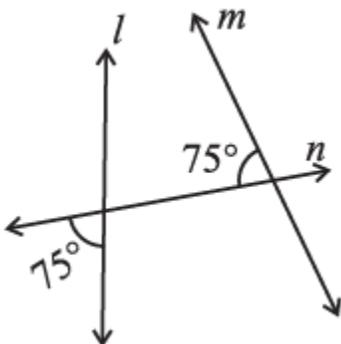
Then,

$$\begin{aligned} &= 126^\circ + 44^\circ \\ &= 170^\circ \end{aligned}$$

But, the sum of interior angles on the same side of transversal is not equal to  $180^\circ$ .

So, line  $l$  is not parallel to line  $m$ .

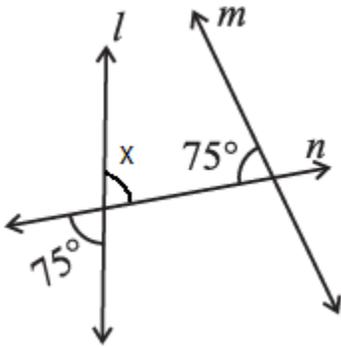
(ii)



**Solution:-**

Let us assume  $\angle x$  be the vertically opposite angle formed due to the intersection of the straight line  $l$  and transversal  $n$ ,

Then,  $\angle x = 75^\circ$



Let us consider the two lines  $l$  and  $m$ ,  
 $n$  is the transversal line intersecting  $l$  and  $m$ .

We know that the sum of interior angles on the same side of transversal is  $180^\circ$ .

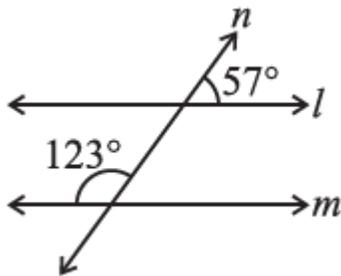
Then,

$$\begin{aligned} &= 75^\circ + 75^\circ \\ &= 150^\circ \end{aligned}$$

But, the sum of interior angles on the same side of transversal is not equal to  $180^\circ$ .

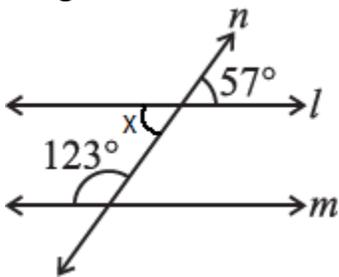
So, line  $l$  is not parallel to line  $m$ .

(iii)



**Solution:-**

Let us assume  $\angle x$  be the vertically opposite angle formed due to the intersection of the  
Straight line  $l$  and transversal line  $n$ ,



Let us consider the two lines  $l$  and  $m$ ,

n is the transversal line intersecting l and m.

We know that the sum of interior angles on the same side of transversal is  $180^\circ$ .

Then,

$$= 123^\circ + \angle x$$

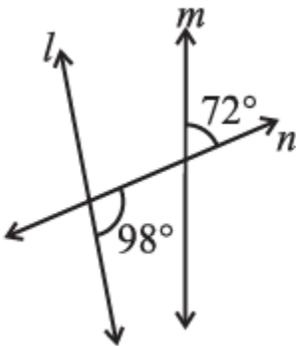
$$= 123^\circ + 57^\circ$$

$$= 180^\circ$$

$\therefore$  The sum of interior angles on the same side of transversal is equal to  $180^\circ$ .

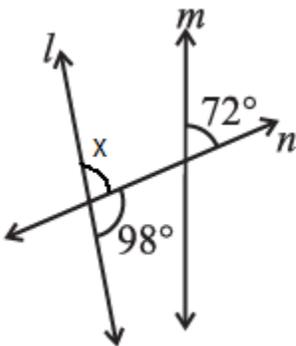
So, line l is parallel to line m.

(iv)



**Solution:-**

Let us assume  $\angle x$  be the angle formed due to the intersection of the Straight line l and transversal line n,



We know that Linear pair is the sum of adjacent angles is equal to  $180^\circ$ .

$$= \angle x + 98^\circ = 180^\circ$$

$$= \angle x = 180^\circ - 98^\circ$$

$$= \angle x = 82^\circ$$

Now, we consider  $\angle x$  and  $72^\circ$  are the corresponding angles.

For l and m to be parallel to each other, corresponding angles should be equal.

But, in the given figure corresponding angles measures  $82^\circ$  and  $72^\circ$  respectively.

∴ Line l is not parallel to line m.

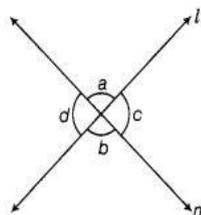
## MIND MAP

### CH 05 : LINES AND ANGLES

This chapter consists of two different topics. The most probable questions from the examination point of view are given below.

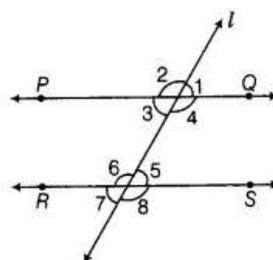
#### TYPE: 1 FINDING THE RELATED ANGLES FOR THE GIVEN PAIRS OF LINES.

- (i) Pairs of vertically opposite angles.
- (ii) Linear pairs
- (iii) Complementary angles
- (iv) Supplementary angles



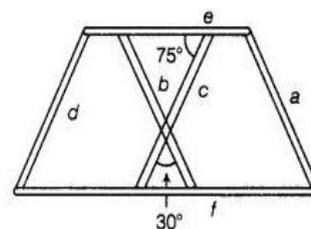
#### TYPE: 2 FINDING THE RELATED ANGLES FOR THE GIVEN PAIRS OF PARALLEL LINES.

- (i) Pair of alternate angles
- (ii) Pair of interior angles
- (iii) Pair of corresponding angles
- (iv) If measurement of angle 2 is  $120^\circ$ .

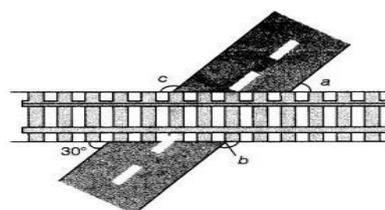


1. Iron rods a, b, c, d, e and f are making a design in a bridge as shown in the given figure, in which  $a \parallel b$ ,  $c \parallel d$  and  $e \parallel f$ , find the marked angles between

- (i) b and c
- (ii) d and e
- (iii) d and f
- (iv) c and f

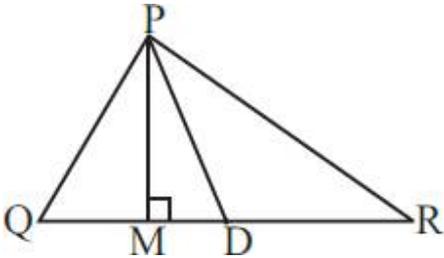


2. A road crosses a railway line at an angle of  $30^\circ$  as shown in the figure. Find the values of a, b and c.



ExErcisE 6.1

1. In  $\Delta PQR$ , D is the mid-point of  $QR$ .



(i)  $\overline{PM}$  is \_\_\_\_\_.

**Solution:-**

Altitude

An altitude has one end point at a vertex of the triangle and other on the line containing the opposite side.

(ii) PD is \_\_\_\_\_.

**Solution:-**

Median

A median connects a vertex of a triangle to the mid-point of the opposite side.

(iii) Is  $QM = MR$ ?

**Solution:-**

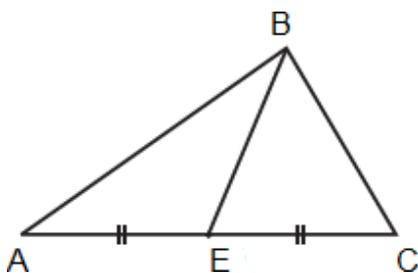
No,  $QM \neq MR$  because, D is the mid-point of QR.

2. Draw rough sketches for the following:

(a) In  $\Delta ABC$ , BE is a median.

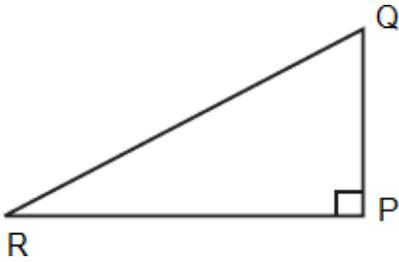
**Solution:-**

A median connects a vertex of a triangle to the mid-point of the opposite side.



**(b) In  $\Delta PQR$ ,  $PQ$  and  $PR$  are altitudes of the triangle.**

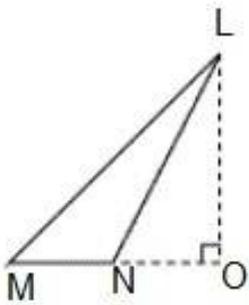
**Solution:-**



An altitude has one end point at a vertex of the triangle and other on the line containing the opposite side.

**(c) In  $\Delta XYZ$ ,  $YL$  is an altitude in the exterior of the triangle.**

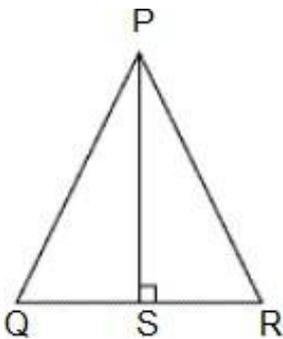
**Solution:-**



In the figure we may observe that for  $\Delta LMN$ ,  $LO$  is an altitude drawn exteriorly to side  $LN$  which is extended up to point  $L$ .

**3. Verify by drawing a diagram if the median and altitude of an isosceles triangle can be same.**

**Solution:-**



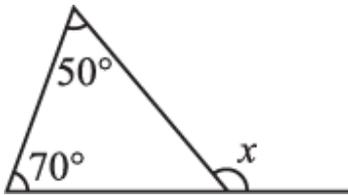
NCERT Solutions for Class 7 Maths Chapter 6  
The Triangles and its Properties

Draw a Line segment  $PS \perp BC$ . It is an altitude for this triangle. Here we observe that length of  $QS$  and  $SR$  is also same. So  $PS$  is also a median of this triangle.

## ExErcise 6.2

1. Find the value of the unknown exterior angle  $x$  in the following diagram:

(i)



**Solution:-**

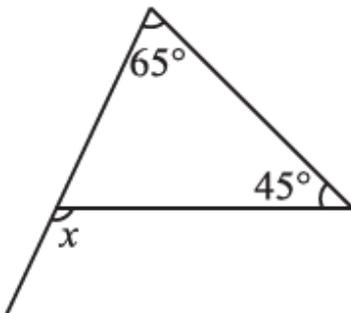
We Know That,

An exterior angle of a triangle is equal to the sum of its interior opposite angles.

$$= x = 50^\circ + 70^\circ$$

$$= x = 120^\circ$$

(ii)



**Solution:-**

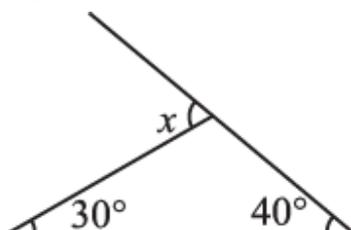
We Know That,

An exterior angle of a triangle is equal to the sum of its interior opposite angles.

$$= x = 65^\circ + 45^\circ$$

$$= x = 110^\circ$$

(iii)



**Solution:-**

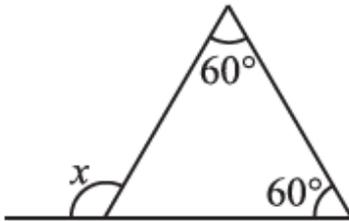
We Know That,

An exterior angle of a triangle is equal to the sum of its interior opposite angles.

$$= x = 30^\circ + 40^\circ$$

$$= x = 70^\circ$$

(iv)



**Solution:-**

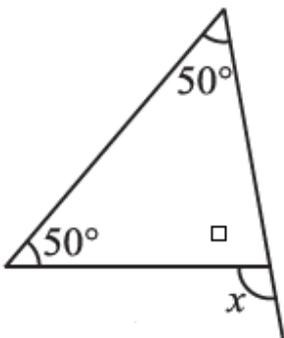
We Know That,

An exterior angle of a triangle is equal to the sum of its interior opposite angles.

$$= x = 60^\circ + 60^\circ$$

$$= x = 120^\circ$$

(v)



**Solution:-**

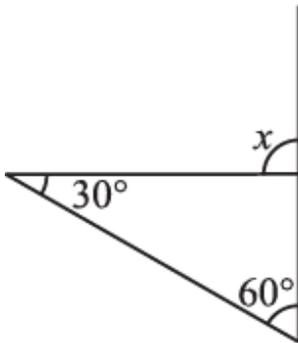
We Know That,

An exterior angle of a triangle is equal to the sum of its interior opposite angles.

$$= x = 50^\circ + 50^\circ$$

$$= x = 100^\circ$$

(vi)



**Solution:-**

We Know That,

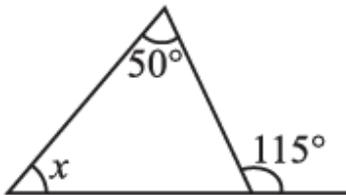
An exterior angle of a triangle is equal to the sum of its interior opposite angles.

$$= x = 30^\circ + 60^\circ$$

$$= x = 90^\circ$$

**2. Find the value of the unknown interior angle x in the following figures:**

(i)



**Solution:-**

We Know That,

An exterior angle of a triangle is equal to the sum of its interior opposite angles.

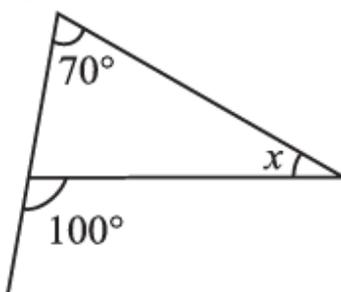
$$= x + 50^\circ = 115^\circ$$

By transposing  $50^\circ$  from LHS to RHS it becomes  $- 50^\circ$

$$= x = 115^\circ - 50^\circ$$

$$= x = 65^\circ$$

(ii)



**Solution:-**

We Know That,

An exterior angle of a triangle is equal to the sum of its interior opposite angles.

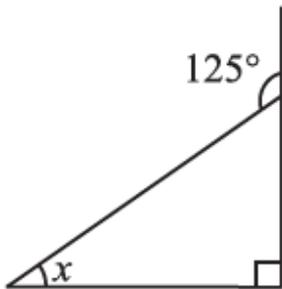
$$= 70^\circ + x = 100^\circ$$

By transposing  $70^\circ$  from LHS to RHS it becomes  $- 70^\circ$

$$= x = 100^\circ - 70^\circ$$

$$= x = 30^\circ$$

(iii)



**Solution:-**

We Know That,

An exterior angle of a triangle is equal to the sum of its interior opposite angles.

The given triangle is a right angled triangle. So the angle opposite to the  $x$  is  $90^\circ$ .

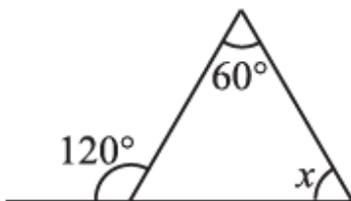
$$= x + 90^\circ = 125^\circ$$

By transposing  $90^\circ$  from LHS to RHS it becomes  $- 90^\circ$

$$= x = 125^\circ - 90^\circ$$

$$= x = 35^\circ$$

(iv)



**Solution:-**

We Know That,

An exterior angle of a triangle is equal to the sum of its interior opposite angles.

The given triangle is a right angled triangle. So the angle opposite to the  $x$  is  $90^\circ$ .

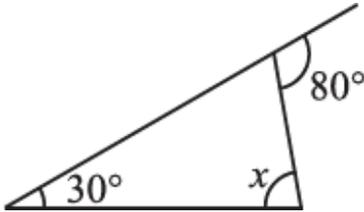
$$= x + 60^\circ = 120^\circ$$

By transposing  $60^\circ$  from LHS to RHS it becomes  $- 60^\circ$

$$= x = 120^\circ - 60^\circ$$

$$= x = 60^\circ$$

(v)



**Solution:-**

We Know That,

An exterior angle of a triangle is equal to the sum of its interior opposite angles.

The given triangle is a right angled triangle. So the angle opposite to the  $x$  is  $90^\circ$ .

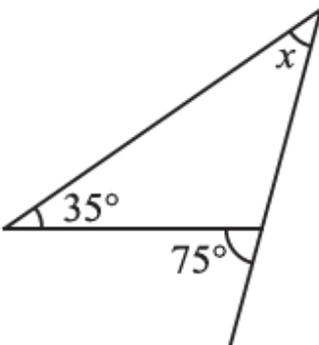
$$= x + 30^\circ = 80^\circ$$

By transposing  $30^\circ$  from LHS to RHS it becomes  $- 30^\circ$

$$= x = 80^\circ - 30^\circ$$

$$= x = 50^\circ$$

(vi)



**Solution:-**

We Know That,

An exterior angle of a triangle is equal to the sum of its interior opposite angles.

The given triangle is a right angled triangle. So the angle opposite to the  $x$  is  $90^\circ$ .

$$= x + 35^\circ = 75^\circ$$

By transposing  $35^\circ$  from LHS to RHS it becomes  $- 35^\circ$

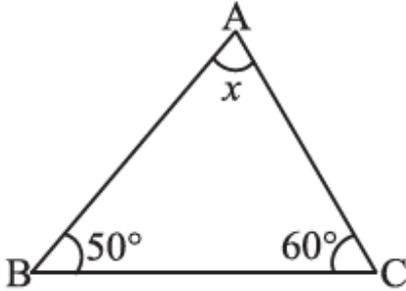
$$= x = 75^\circ - 35^\circ$$

$$= x = 40^\circ$$

### ExErcisE 6.3

1. Find the value of the unknown  $x$  in the following diagrams:

(i)



**Solution:-**

We know that,

The sum of all the interior angles of a triangle is  $180^\circ$ .

Then,

$$= \angle BAC + \angle ABC + \angle BCA = 180^\circ$$

$$= x + 50^\circ + 60^\circ = 180^\circ$$

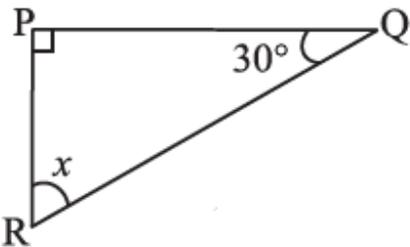
$$= x + 110^\circ = 180^\circ$$

By transposing  $110^\circ$  from LHS to RHS it becomes  $- 110^\circ$

$$= x = 180^\circ - 110^\circ$$

$$= x = 70^\circ$$

(ii)



**Solution:-**

We know that,

The sum of all the interior angles of a triangle is  $180^\circ$ .

The given triangle is a right angled triangle. So the  $\angle QPR$  is  $90^\circ$ .

Then,

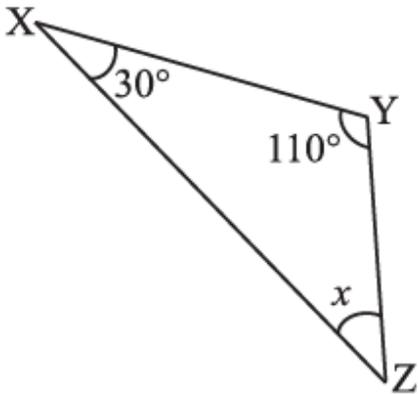
$$= \angle QPR + \angle PQR + \angle PRQ = 180^\circ$$

$$= 90^\circ + 30^\circ + x = 180^\circ$$

$$= 120^\circ + x = 180^\circ$$

By transposing  $110^\circ$  from LHS to RHS it becomes  $- 110^\circ$   
 $= x = 180^\circ - 120^\circ$   
 $= x = 60^\circ$

(iii)



**Solution:-**

We know that,

The sum of all the interior angles of a triangle is  $180^\circ$ .

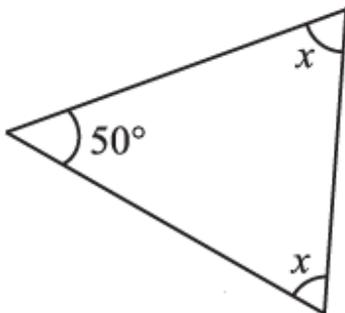
Then,

$$\begin{aligned} &= \angle XYZ + \angle YXZ + \angle XZY = 180^\circ \\ &= 110^\circ + 30^\circ + x = 180^\circ \\ &= 140^\circ + x = 180^\circ \end{aligned}$$

By transposing  $140^\circ$  from LHS to RHS it becomes  $- 140^\circ$

$$\begin{aligned} &= x = 180^\circ - 140^\circ \\ &= x = 40^\circ \end{aligned}$$

(iv)



**Solution:-**

We know that,

The sum of all the interior angles of a triangle is  $180^\circ$ .

Then,

$$= 50^\circ + x + x = 180^\circ$$

$$= 50^\circ + 2x = 180^\circ$$

By transposing  $50^\circ$  from LHS to RHS it becomes  $- 50^\circ$

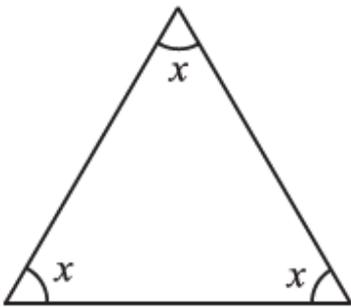
$$= 2x = 180^\circ - 50^\circ$$

$$= 2x = 130^\circ$$

$$= x = 130^\circ/2$$

$$= x = 65^\circ$$

(v)



**Solution:-**

We know that,

The sum of all the interior angles of a triangle is  $180^\circ$ .

Then,

$$= x + x + x = 180^\circ$$

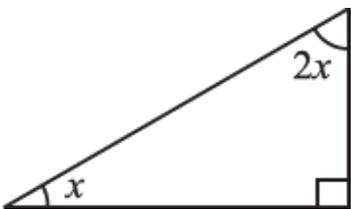
$$= 3x = 180^\circ$$

$$= x = 180^\circ/3$$

$$= x = 60^\circ$$

$\therefore$  The given triangle is an equiangular triangle.

(vi)



**Solution:-**

We know that,

The sum of all the interior angles of a triangle is  $180^\circ$ .

Then,

$$= 90^\circ + 2x + x = 180^\circ$$

$$= 90^\circ + 3x = 180^\circ$$

By transposing  $90^\circ$  from LHS to RHS it becomes  $- 90^\circ$

$$= 3x = 180^\circ - 90^\circ$$

$$= 3x = 90^\circ$$

$$= x = 90^\circ/3$$

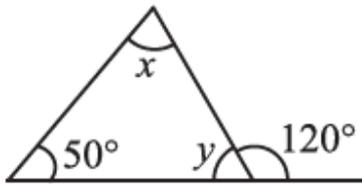
$$= x = 30^\circ$$

Then,

$$= 2x = 2 \times 30^\circ = 60^\circ$$

. Find the values of the unknowns  $x$  and  $y$  in the following diagrams:

(i)



**Solution:-**

We Know That,

An exterior angle of a triangle is equal to the sum of its interior opposite angles.

Then,

$$= 50^\circ + x = 120^\circ$$

By transposing  $50^\circ$  from LHS to RHS it becomes  $- 50^\circ$

$$= x = 120^\circ - 50^\circ$$

$$= x = 70^\circ$$

We also know that,

The sum of all the interior angles of a triangle is  $180^\circ$ .

Then,

$$= 50^\circ + x + y = 180^\circ$$

$$= 50^\circ + 70^\circ + y = 180^\circ$$

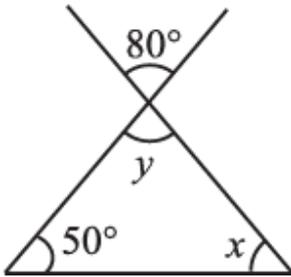
$$= 120^\circ + y = 180^\circ$$

By transposing  $120^\circ$  from LHS to RHS it becomes  $- 120^\circ$

$$= y = 180^\circ - 120^\circ$$

$$= y = 60^\circ$$

(ii)



Solution:-

From the rule of vertically opposite angles,  
 $= y = 80^\circ$

Then,

We know that,

The sum of all the interior angles of a triangle is  $180^\circ$ .

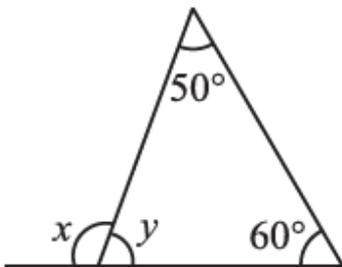
Then,

$$\begin{aligned} &= 50^\circ + 80^\circ + x = 180^\circ \\ &= 130^\circ + x = 180^\circ \end{aligned}$$

By transposing  $130^\circ$  from LHS to RHS it becomes  $- 130^\circ$

$$\begin{aligned} &= x = 180^\circ - 130^\circ \\ &= x = 50^\circ \end{aligned}$$

(iii)



Solution:-

We know that,

The sum of all the interior angles of a triangle is  $180^\circ$ .

Then,

$$\begin{aligned} &= 50^\circ + 60^\circ + y = 180^\circ \\ &= 110^\circ + y = 180^\circ \end{aligned}$$

By transposing  $110^\circ$  from LHS to RHS it becomes  $- 110^\circ$

$$\begin{aligned} &= y = 180^\circ - 110^\circ \\ &= y = 70^\circ \end{aligned}$$

Now,

From the rule of linear pair,

$$= x + y = 180^\circ$$

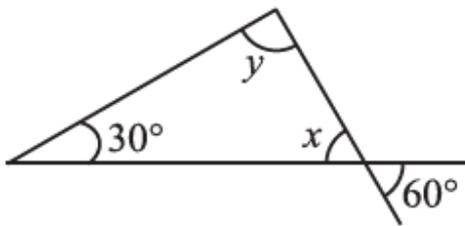
$$= x + 70^\circ = 180^\circ$$

By transposing  $70^\circ$  from LHS to RHS it becomes  $- 70^\circ$

$$= x = 180^\circ - 70$$

$$= x = 110^\circ$$

(iv)



**Solution:-**

From the rule of vertically opposite angles,

$$= x = 60^\circ$$

Then,

We know that,

The sum of all the interior angles of a triangle is  $180^\circ$ .

Then,

$$= 30^\circ + x + y = 180^\circ$$

$$= 30^\circ + 60^\circ + x = 180^\circ$$

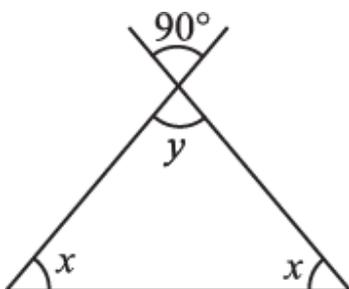
$$= 90^\circ + x = 180^\circ$$

By transposing  $90^\circ$  from LHS to RHS it becomes  $- 90^\circ$

$$= x = 180^\circ - 90^\circ$$

$$= x = 90^\circ$$

(v)



**Solution:-**

From the rule of vertically opposite angles,

$$= y = 90^\circ$$

Then,

We know that,

The sum of all the interior angles of a triangle is  $180^\circ$ .

Then,

$$= x + x + y = 180^\circ$$

$$= 2x + 90^\circ = 180^\circ$$

By transposing  $90^\circ$  from LHS to RHS it becomes  $- 90^\circ$

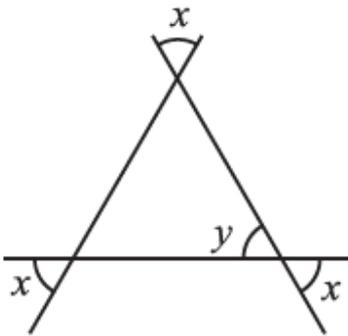
$$= 2x = 180^\circ - 90^\circ$$

$$= 2x = 90^\circ$$

$$= x = 90^\circ/2$$

$$= x = 45^\circ$$

(vi)



**Solution:-**

From the rule of vertically opposite angles,

$$= x = y$$

Then,

We know that,

The sum of all the interior angles of a triangle is  $180^\circ$ .

Then,

$$= x + x + x = 180^\circ$$

$$= 3x = 180^\circ$$

$$= x = 180^\circ/3$$

$$= x = 60^\circ$$

## ExErcisE 6.4

**1. Is it possible to have a triangle with the following sides?**

**(i) 2 cm, 3 cm, 5 cm**

**Solution:-**

Clearly, we have:

$$(2 + 3) = 5$$

$$5 = 5$$

Thus, the sum of any two of these numbers is not greater than the third.

Hence, it is not possible to draw a triangle whose sides are 2 cm, 3 cm and 5 cm.

**(ii) 3 cm, 6 cm, 7 cm**

**Solution:-**

Clearly, we have:

$$(3 + 6) = 9 > 7$$

$$(6 + 7) = 13 > 3$$

$$(7 + 3) = 10 > 6$$

Thus, the sum of any two of these numbers is greater than the third.

Hence, it is possible to draw a triangle whose sides are 3 cm, 6 cm and 7 cm.

**(iii) 6 cm, 3 cm, 2 cm**

**Solution:-**

Clearly, we have:

$$(3 + 2) = 5 < 6$$

Thus, the sum of any two of these numbers is less than the third.

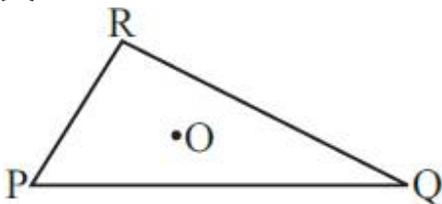
Hence, it is not possible to draw a triangle whose sides are 6 cm, 3 cm and 2 cm.

**2. Take any point O in the interior of a triangle PQR. Is**

**(i)  $OP + OQ > PQ$ ?**

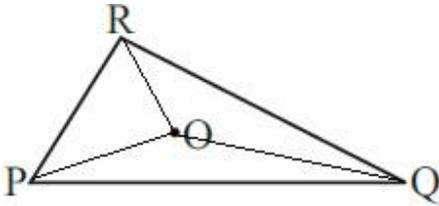
**(ii)  $OQ + OR > QR$ ?**

**(iii)  $OR + OP > RP$ ?**



**Solution:-**

If we take any point O in the interior of a triangle PQR and join OR, OP, OQ. Then, we get three triangles  $\Delta OPQ$ ,  $\Delta OQR$  and  $\Delta ORP$  is shown in the figure below.



We know that,

The sum of the length of any two sides is always greater than the third side.

(i) Yes,  $\Delta OPQ$  has sides OP, OQ and PQ.  
So,  $OP + OQ > PQ$

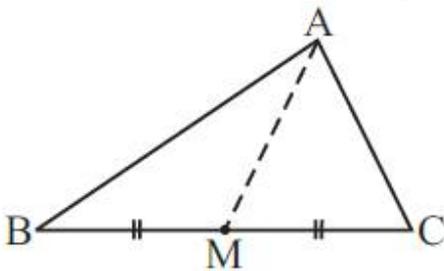
(ii) Yes,  $\Delta OQR$  has sides OR, OQ and QR.  
So,  $OQ + OR > QR$

(iii) Yes,  $\Delta ORP$  has sides OR, OP and PR.  
So,  $OR + OP > RP$

### 3. AM is a median of a triangle ABC.

Is  $AB + BC + CA > 2 AM$ ?

(Consider the sides of triangles  $\Delta ABM$  and  $\Delta AMC$ .)



**Solution:-**

We know that,

The sum of the length of any two sides is always greater than the third side.

Now consider the  $\Delta ABM$ ,

$$\text{Here, } AB + BM > AM \quad \dots \text{ [equation i]}$$

Then, consider the  $\Delta ACM$

$$\text{Here, } AC + CM > AM \quad \dots \text{ [equation ii]}$$

By adding equation [i] and [ii] we get,

$$AB + BM + AC + CM > AM + AM$$

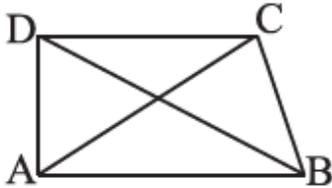
From the figure we have,  $BC = BM + CM$

$$AB + BC + AC > 2 AM$$

Hence, the given expression is true.

**4. ABCD is a quadrilateral.**

**Is  $AB + BC + CD + DA > AC + BD$ ?**



**Solution:-**

We know that,

The sum of the length of any two sides is always greater than the third side.

Now consider the  $\triangle ABC$ ,

$$\text{Here, } AB + BC > CA \quad \dots \text{ [equation i]}$$

Then, consider the  $\triangle BCD$

$$\text{Here, } BC + CD > DB \quad \dots \text{ [equation ii]}$$

Consider the  $\triangle CDA$

$$\text{Here, } CD + DA > AC \quad \dots \text{ [equation iii]}$$

Consider the  $\triangle DAB$

$$\text{Here, } DA + AB > DB \quad \dots \text{ [equation iv]}$$

By adding equation [i], [ii], [iii] and [iv] we get,

$$AB + BC + BC + CD + CD + DA + DA + AB > CA + DB + AC + DB$$

$$2AB + 2BC + 2CD + 2DA > 2CA + 2DB$$

Take out 2 on both the side,

$$2(AB + BC + CA + DA) > 2(CA + DB)$$

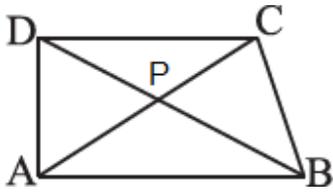
$$AB + BC + CA + DA > CA + DB$$

Hence, the given expression is true.

**5. ABCD is quadrilateral. Is  $AB + BC + CD + DA < 2 (AC + BD)$**

**Solution:-**

Let us consider ABCD is quadrilateral and P is the point where the diagonals are intersect. As shown in the figure below.



We know that,

The sum of the length of any two sides is always greater than the third side.

Now consider the  $\Delta PAB$ ,

$$\text{Here, } PA + PB < AB \quad \dots \text{ [equation i]}$$

Then, consider the  $\Delta PBC$

$$\text{Here, } PB + PC < BC \quad \dots \text{ [equation ii]}$$

Consider the  $\Delta PCD$

$$\text{Here, } PC + PD < CD \quad \dots \text{ [equation iii]}$$

Consider the  $\Delta PDA$

$$\text{Here, } PD + PA < DA \quad \dots \text{ [equation iv]}$$

By adding equation [i], [ii], [iii] and [iv] we get,

$$PA + PB + PB + PC + PC + PD + PD + PA < AB + BC + CD + DA$$

$$2PA + 2PB + 2PC + 2PD < AB + BC + CD + DA$$

$$2PA + 2PC + 2PB + 2PD < AB + BC + CD + DA$$

$$2(PA + PC) + 2(PB + PD) < AB + BC + CD + DA$$

From the figure we have,  $AC = PA + PC$  and  $BD = PB + PD$

Then,

$$2AC + 2BD < AB + BC + CD + DA$$

$$2(AC + BD) < AB + BC + CD + DA$$

Hence, the given expression is true.

**6. The lengths of two sides of a triangle are 12 cm and 15 cm. Between what two measures should the length of the third side fall?**

**Solution:-**

We know that,

The sum of the length of any two sides is always greater than the third side.

From the question, it is given that two sides of triangle are 12 cm and 15 cm.

So, the third side length should be less than the sum of other two sides,

$$12 + 15 = 27 \text{ cm.}$$

Then, it is given that the third side is cannot not be less than the difference of the two sides,  $15 - 12 = 3 \text{ cm}$

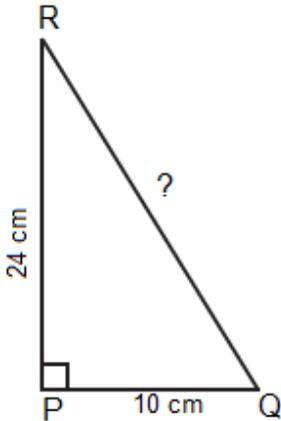
So, the length of the third side falls between 3 cm and 27 cm.

ExErcisE 6.5

1. PQR is a triangle, right-angled at P. If PQ = 10 cm and PR = 24 cm, find QR.

**Solution:-**

Let us draw a rough sketch of right-angled triangle



By the rule of Pythagoras Theorem,

Pythagoras theorem states that for any right angled triangle, the area of the square on the hypotenuse is equal to the sum of the areas of square on the legs.

In the above figure RQ is the hypotenuse,

$$QR^2 = PQ^2 + PR^2$$

$$QR^2 = 10^2 + 24^2$$

$$QR^2 = 100 + 576$$

$$QR^2 = 676$$

$$QR = \sqrt{676}$$

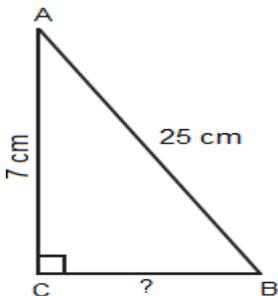
$$QR = 26 \text{ cm}$$

Hence, the length of the hypotenuse QR = 26 cm.

2. ABC is a triangle, right-angled at C. If AB = 25 cm and AC = 7 cm, find BC.

**Solution:-**

Let us draw a rough sketch of right-angled triangle



By the rule of Pythagoras Theorem,

Pythagoras theorem states that for any right angled triangle, the area of the square on the hypotenuse is equal to the sum of the areas of square on the legs.

In the above figure RQ is the hypotenuse,

$$AB^2 = AC^2 + BC^2$$

$$25^2 = 7^2 + BC^2$$

$$625 = 49 + BC^2$$

By transposing 49 from RHS to LHS it becomes - 49

$$BC^2 = 625 - 49$$

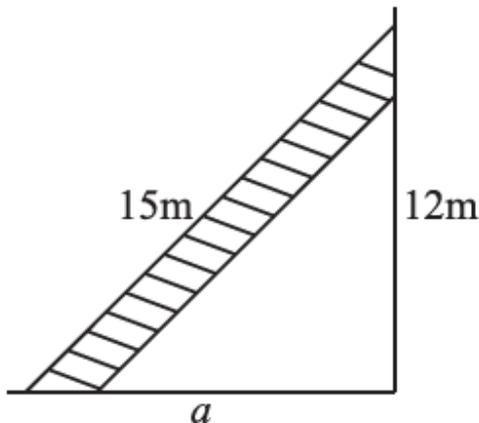
$$BC^2 = 576$$

$$BC = \sqrt{576}$$

$$BC = 24 \text{ cm}$$

Hence, the length of the BC = 24 cm.

**3. A 15 m long ladder reached a window 12 m high from the ground on placing it against a wall at a distance a. Find the distance of the foot of the ladder from the wall.**



**Solution:-**

By the rule of Pythagoras Theorem,

Pythagoras theorem states that for any right angled triangle, the area of the square on the hypotenuse is equal to the sum of the areas of square on the legs.

In the above figure RQ is the hypotenuse,

$$15^2 = 12^2 + a^2$$

$$225 = 144 + a^2$$

By transposing 144 from RHS to LHS it becomes - 144

$$a^2 = 225 - 144$$

$$a^2 = 81$$

$$a = \sqrt{81}$$

$$a = 9 \text{ m}$$

Hence, the length of  $a = 9 \text{ m}$ .

**4. Which of the following can be the sides of a right triangle?**

**(i) 2.5 cm, 6.5 cm, 6 cm.**

**(ii) 2 cm, 2 cm, 5 cm.**

**(iii) 1.5 cm, 2cm, 2.5 cm.**

**In the case of right-angled triangles, identify the right angles.**

**Solution:-**

**(i)** Let  $a = 2.5 \text{ cm}$ ,  $b = 6.5 \text{ cm}$ ,  $c = 6 \text{ cm}$

Let us assume the largest value is the hypotenuse side i.e.  $b = 6.5 \text{ cm}$ .

Then, by Pythagoras theorem,

$$b^2 = a^2 + c^2$$

$$6.5^2 = 2.5^2 + 6^2$$

$$42.25 = 6.25 + 36$$

$$42.25 = 42.25$$

The sum of square of two side of triangle is equal to the square of third side,

$\therefore$  The given triangle is right-angled triangle.

Right angle lies on the opposite of the greater side  $6.5 \text{ cm}$ .

**(ii)** Let  $a = 2 \text{ cm}$ ,  $b = 2 \text{ cm}$ ,  $c = 5 \text{ cm}$

Let us assume the largest value is the hypotenuse side i.e.  $c = 5 \text{ cm}$ .

Then, by Pythagoras theorem,

$$c^2 = a^2 + b^2$$

$$5^2 = 2^2 + 2^2$$

$$25 = 4 + 4$$

$$25 \neq 8$$

The sum of square of two side of triangle is not equal to the square of third side,

$\therefore$  The given triangle is not right-angled triangle.

**(iii)** Let  $a = 1.5 \text{ cm}$ ,  $b = 2 \text{ cm}$ ,  $c = 2.5 \text{ cm}$

Let us assume the largest value is the hypotenuse side i.e.  $b = 2.5 \text{ cm}$ .

Then, by Pythagoras theorem,

$$b^2 = a^2 + c^2$$

$$2.5^2 = 1.5^2 + 2^2$$

$$6.25 = 2.25 + 4$$

$$6.25 = 6.25$$

The sum of square of two side of triangle is equal to the square of third side,  
∴ The given triangle is right-angled triangle.

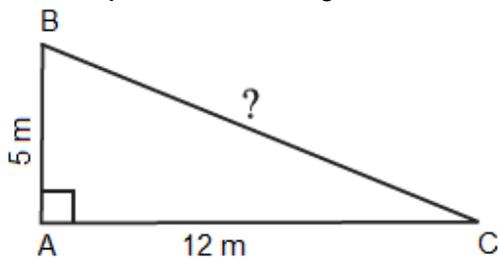
Right angle lies on the opposite of the greater side 2.5 cm.

**5. A tree is broken at a height of 5 m from the ground and its top touches the ground at a distance of 12 m from the base of the tree. Find the original height of the tree.**

**Solution:-**

Let ABC is the triangle and B is the point where tree is broken at the height 5 m from the ground.

Tree top touches the ground at a distance of AC = 12 m from the base of the tree,



By observing the figure we came to conclude that right angle triangle is formed at A.

From the rule of Pythagoras theorem,

$$BC^2 = AB^2 + AC^2$$

$$BC^2 = 5^2 + 12^2$$

$$BC^2 = 25 + 144$$

$$BC^2 = 169$$

$$BC = \sqrt{169}$$

$$BC = 13 \text{ m}$$

Then, the original height of the tree = AB + BC

$$= 5 + 13$$

$$= 18 \text{ m}$$

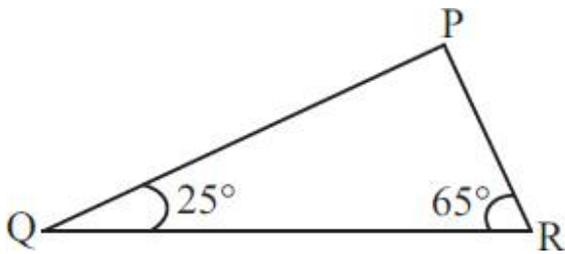
**6. Angles Q and R of a  $\Delta PQR$  are  $25^\circ$  and  $65^\circ$ .**

**Write which of the following is true:**

**(i)  $PQ^2 + QR^2 = RP^2$**

**(ii)  $PQ^2 + RP^2 = QR^2$**

**(iii)  $RP^2 + QR^2 = PQ^2$**



**Solution:-**

Given that  $\angle B = 35^\circ$ ,  $\angle C = 55^\circ$

Then,  $\angle A = ?$

We know that sum of the three interior angles of triangle is equal to  $180^\circ$ .

$$\begin{aligned} &= \angle PQR + \angle QRP + \angle RPQ = 180^\circ \\ &= 25^\circ + 65^\circ + \angle RPQ = 180^\circ \\ &= 90^\circ + \angle RPQ = 180^\circ \\ &= \angle RPQ = 180 - 90 \\ &= \angle RPQ = 90^\circ \end{aligned}$$

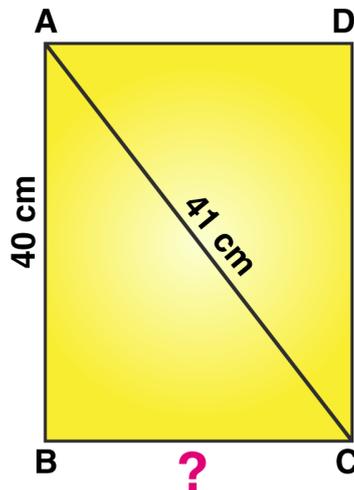
Also, we know that side opposite to the right angle is the hypotenuse.

$$\therefore QR^2 = PQ^2 + PR^2$$

Hence, (ii) is true

**7. Find the perimeter of the rectangle whose length is 40 cm and a diagonal is 41 cm.**

**Solution:-**



Let ABCD be the rectangular plot.

Then,  $AB = 40$  cm and  $AC = 41$  cm

$BC = ?$

According to Pythagoras theorem,

From right angle triangle ABC, we have:

$$\begin{aligned} &= AC^2 = AB^2 + BC^2 \\ &= 41^2 = 40^2 + BC^2 \\ &= BC^2 = 41^2 - 40^2 \\ &= BC^2 = 1681 - 1600 \\ &= BC^2 = 81 \\ &= BC = \sqrt{81} \\ &= BC = 9 \text{ cm} \end{aligned}$$

Hence, the perimeter of the rectangle plot = 2 (length + breadth)

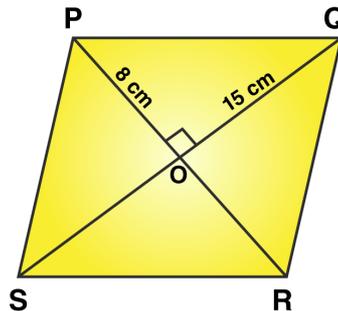
Where, length = 40 cm, breadth = 9 cm

Then,

$$\begin{aligned} &= 2(40 + 9) \\ &= 2 \times 49 \\ &= 98 \text{ cm} \end{aligned}$$

**8. The diagonals of a rhombus measure 16 cm and 30 cm. Find its perimeter.**

**Solution:-**



Let PQRS be a rhombus, all sides of rhombus has equal length and its diagonal PR and SQ are intersecting each other at a point O. Diagonals in rhombus bisect each other at  $90^\circ$ .

$$\begin{aligned} \text{So, } PO &= (PR/2) \\ &= 16/2 \\ &= 8 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{And, } SO &= (SQ/2) \\ &= 30/2 \\ &= 15 \text{ cm} \end{aligned}$$

Then, consider the triangle POS and apply the Pythagoras theorem,

$$\begin{aligned} PS^2 &= PO^2 + SO^2 \\ PS^2 &= 8^2 + 15^2 \\ PS^2 &= 64 + 225 \end{aligned}$$

NCERT Solutions for Class 7 Maths Chapter 6  
The Triangles and its Properties

$$PS^2 = 289$$

$$PS = \sqrt{289}$$

$$PS = 17 \text{ cm}$$

Hence, the length of side of rhombus is 17 cm

Now,

$$\text{Perimeter of rhombus} = 4 \times \text{side of the rhombus}$$

$$= 4 \times 17$$

$$= 68 \text{ cm}$$

$\therefore$  Perimeter of rhombus is 68 cm.

## MIND MAP

### CH 06 TRIANGLE AND ITS PROPERTIES

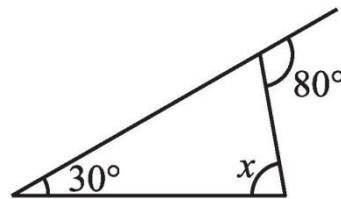
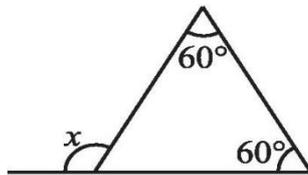
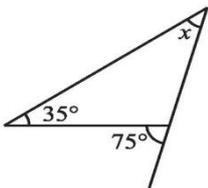
This chapter consists of six different topics. The most probable questions from examination point of view are given below.

#### TYPE: 1 FINDING MEDIAN AND ALTITUDE OF A TRIANGLE

- Q.1 Name a triangle in which altitude is equal to the median.
- Q.2 Draw a triangle in which altitude is outside the triangle.
- Q.3 Name a triangle in which its two altitudes becomes two sides of triangle.

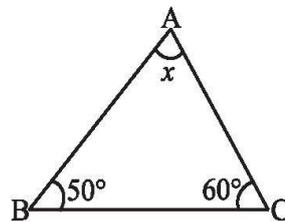
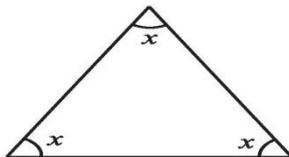
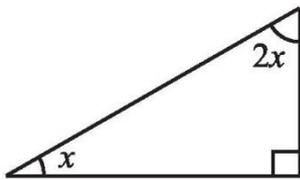
#### TYPE: 2 QUESTIONS BASED ON EXTERIOR ANGLE PROPERTY OF A TRIANGLE.

Q.1 Find the value of unknown for given figures.



#### TYPE: 3 QUESTIONS BASED ON ANGLE SUM PROPERTY OF A TRIANGLE.

Q. 1 Find the value of unknown for given figures.

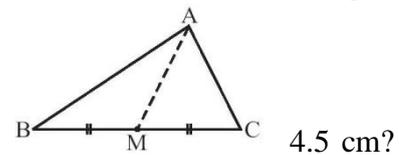


#### TYPE: 4 QUESTIONS BASED ON PROPERTY OF TRIANGLE. (SUM OF LENGTHS OF TWO SIDES OF A TRIANGLE IS GREATER THAN THE THIRD SIDE).

Q.1 The lengths of two sides of a triangle are 6 cm and 8 cm, between which two numbers can length of the third side fall?

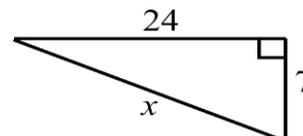
Q.2 AM is a median of a triangle ABC. Is  $AB + BC + CA > 2 AM$ ?

Q.3 Is there a triangle whose sides have lengths 10.2 cm, 5.8 cm and



#### TYPE: 5 QUESTIONS BASED ON PROERTY OF A RIGHT ANGLED TRIANGLE (PYTHAGORAS PROPERTY)

Q.1 Find the value of unknown for the adjoining figure:



#### TYPE: 6 QUESTIONS BASED ON APPLICATION OF PYTHAGORAS PROPERTY.

- Q.1. A 15 m long ladder reached a window 12 m high from the ground on placing it against a wall at a distance  $a$ . Find the distance of the foot of the ladder from the wall.
- Q.2. A tree is broken at a height of 5 m from the ground and its top touches the ground at a distance of 12 m from the base of the tree. Find the original height of the tree.

## EXERCISE 8.1

PAGE: 157

### 1. Find the ratio of:

#### (a) ₹ 5 to 50 paise

**Solution:-**

We know that,

$$₹ 1 = 100 \text{ paise}$$

Then,

$$₹ 5 = 5 \times 100 = 500 \text{ paise}$$

Now we have to find the ratio,

$$= 500/50$$

$$= 10/1$$

So, the required ratio is 10: 1.

#### (b) 15 kg to 210 g

**Solution:-**

We know that,

$$1 \text{ kg} = 1000 \text{ g}$$

Then,

$$15 \text{ kg} = 15 \times 1000 = 15000 \text{ g}$$

Now we have to find the ratio,

$$= 15000/210$$

$$= 1500/21$$

$$= 500/7$$

... [∵ divide both by 3]

So, the required ratio is 500: 7.

#### (c) 9 m to 27 cm

**Solution:-**

We know that,

$$1 \text{ m} = 100 \text{ cm}$$

Then,

$$9 \text{ m} = 9 \times 100 = 900 \text{ cm}$$

Now we have to find the ratio,

$$= 900/27$$

$$= 100/3$$

... [∵ divide both by 9]

So, the required ratio is 100: 3.

**(d) 30 days to 36 hours**

**Solution:-**

We know that,

$$1 \text{ day} = 24 \text{ hours}$$

Then,

$$30 \text{ days} = 30 \times 24 = 720 \text{ hours}$$

Now we have to find the ratio,

$$= 720/36$$

$$= 20/1 \quad \dots [\because \text{divide both by } 36]$$

So, the required ratio is 20: 1.

**2. In a computer lab, there are 3 computers for every 6 students. How many computers will be needed for 24 students?**

**Solution:-**

From the question it is given that,

Number of computer required for 6 students = 3

$$\begin{aligned} \text{So, number of computer required for 1 student} &= (3/6) \\ &= \frac{1}{2} \end{aligned}$$

$$\begin{aligned} \text{So, number of computer required for 24 students} &= 24 \times \frac{1}{2} \\ &= 24/2 \\ &= 12 \end{aligned}$$

$\therefore$  Number of computer required for 24 students is 12 computers.

**3. Population of Rajasthan = 570 lakhs and population of UP = 1660 lakhs.**

**Area of Rajasthan = 3 lakh km<sup>2</sup> and area of UP = 2 lakh km<sup>2</sup>.**

**(i) How many people are there per km<sup>2</sup> in both these States?**

**(ii) Which State is less populated?**

**Solution:-**

(i) From the question, it is given that,

Population of Rajasthan = 570 lakh

Area of Rajasthan = 3 lakh Km<sup>2</sup>

$$\begin{aligned} \text{Then, population of Rajasthan in 1 km}^2 \text{ area} &= (570 \text{ lakh}) / (3 \text{ lakh km}^2) \\ &= 190 \text{ people per km} \end{aligned}$$

Population of UP = 1660 Lakh

Area of UP = 2 Lakh km<sup>2</sup>

$$\begin{aligned} \text{Then, population of UP in 1 lakh km}^2 \text{ area} &= (1660 \text{ lakh}) / (2 \text{ lakh km}^2) \\ &= 830 \text{ people per km} \end{aligned}$$

(ii) By comparing the two states Rajasthan is the less populated state.

## EXERCISE 8.2

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### 1. Convert the given fractional numbers to percent.

(a)  $\frac{1}{8}$

**Solution:-**

In order to convert a fraction into a percentage multiply the fraction by 100 and put the percent sign %.

$$\begin{aligned} &= \left(\frac{1}{8}\right) \times 100 \% \\ &= 100/8 \% \\ &= 12.5\% \end{aligned}$$

(b)  $\frac{5}{4}$

**Solution:-**

In order to convert a fraction into a percentage multiply the fraction by 100 and put the percent sign %.

$$\begin{aligned} &= \left(\frac{5}{4}\right) \times 100 \% \\ &= 500/4 \% \\ &= 125\% \end{aligned}$$

(c)  $\frac{3}{40}$

**Solution:-**

In order to convert a fraction into a percentage multiply the fraction by 100 and put the percent sign %.

$$\begin{aligned} &= \left(\frac{3}{40}\right) \times 100 \% \\ &= 300/40 \% \\ &= 30/4 \% \\ &= 7.5\% \end{aligned}$$

(d)  $\frac{2}{7}$

**Solution:-**

In order to convert a fraction into a percentage multiply the fraction by 100 and put the percent sign %.

$$\begin{aligned} &= \left(\frac{2}{7}\right) \times 100 \% \\ &= 200/7 \% \\ &= 28\frac{4}{7}\% \end{aligned}$$

**2. Convert the given decimal fraction to percent.**

**(a) 0.65**

**Solution:-**

First we have to remove the decimal point,  
 $= 65/100$

Now,

Multiply by 100 and put the percent sign %.

We have,

$$\begin{aligned} &= (65/100) \times 100 \\ &= 65\% \end{aligned}$$

**(b) 2.1**

**Solution:-**

First we have to remove the decimal point,  
 $= 21/10$

Now,

Multiply by 100 and put the percent sign %.

We have,

$$\begin{aligned} &= (21/10) \times 100 \\ &= 210\% \end{aligned}$$

**(c) 0.02**

**Solution:-**

First we have to remove the decimal point,  
 $= 2/100$

Now,

Multiply 100 and put the percent sign %.

We have,

$$\begin{aligned} &= (2/100) \times 100 \\ &= 2\% \end{aligned}$$

**(d) 12.35**

**Solution:-**

First we have to remove the decimal point,  
 $= 1235/100$

Now,

Multiply by 100 and put the percent sign %.

We have,

$$\begin{aligned} &= (1235/100) \times 100 \\ &= 1235\% \end{aligned}$$

**3. Estimate what part of the figures is coloured and hence find the per cent which is coloured.**

(i)



**Solution:-**

By observing the given figure,

We can able to identify that 1 part is shaded out of 4 equal parts.

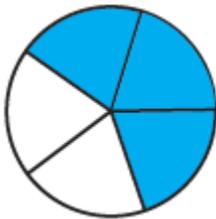
It is represented by a fraction =  $\frac{1}{4}$

Then,

$$\begin{aligned} &= \frac{1}{4} \times 100 \\ &= 100/4 \\ &= 25\% \end{aligned}$$

Hence, 25% of figure is coloured.

(ii)



**Solution:-**

By observing the given figure,

We can able to identify that 3 part is shaded out of 5 equal parts.

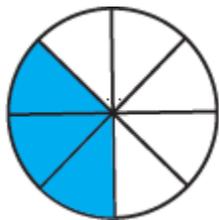
It is represented by a fraction =  $\frac{3}{5}$

Then,

$$\begin{aligned} &= (\frac{3}{5}) \times 100 \\ &= 300/5 \\ &= 60\% \end{aligned}$$

Hence, 60% of figure is coloured.

(iii)



**Solution:-**

By observing the given figure,

We can able to identify that 3 part is shaded out of 8 equal parts.

It is represented by a fraction =  $\frac{3}{8}$

Then,

$$= \left(\frac{3}{8}\right) \times 100$$

$$= \frac{300}{8}$$

$$= 37.5\%$$

Hence, 37.5% of figure is coloured.

**4. Find:**

**(a) 15% of 250**

**Solution:-**

We have,

$$= \left(\frac{15}{100}\right) \times 250$$

$$= \left(\frac{15}{10}\right) \times 25$$

$$= \left(\frac{15}{2}\right) \times 5$$

$$= \left(\frac{75}{2}\right)$$

$$= 37.5$$

**(b) 1% of 1 hour**

**Solution:-**

We know that, 1 hour = 60 minutes

Then,

1% of 60 minutes

1 minute = 60 seconds

60 minutes =  $60 \times 60 = 3600$  seconds

Now,

1% of 3600 seconds

$$= \left(\frac{1}{100}\right) \times 3600$$

$$= 1 \times 36$$

$$= 36 \text{ seconds}$$

**(c) 20% of ₹ 2500**

**Solution:-**

We have,

$$\begin{aligned} &= (20/100) \times 2500 \\ &= 20 \times 25 \\ &= ₹ 500 \end{aligned}$$

**(d) 75% of 1 kg**

**Solution:-**

We know that, 1 kg = 1000 g

Then,

$$\begin{aligned} &75\% \text{ of } 1000 \text{ g} \\ &= (75/100) \times 1000 \\ &= 75 \times 10 \\ &= 750 \text{ g} \end{aligned}$$

**5. Find the whole quantity if**

**(a) 5% of it is 600**

**Solution:-**

Let us assume the whole quantity be x,

Then,

$$\begin{aligned} (5/100) \times (x) &= 600 \\ X &= 600 \times (100/5) \\ X &= 60000/5 \\ X &= 12000 \end{aligned}$$

**(b) 12% of it is ₹ 1080.**

**Solution:-**

Let us assume the whole quantity be x,

Then,

$$\begin{aligned} (12/100) \times (x) &= 1080 \\ X &= 1080 \times (100/12) \\ X &= 540 \times (100/6) \\ X &= 90 \times 100 \\ X &= ₹ 9000 \end{aligned}$$

**(c) 40% of it is 500k km**

**Solution:-**

Let us assume the whole quantity be x,

Then,

$$(40/100) \times (x) = 500$$

$$X = 500 \times (100/40)$$

$$X = 500 \times (10/4)$$

$$X = 500 \times 2.5$$

$$X = 1250 \text{ km}$$

**(d) 70% of it is 14 minutes**

**Solution:-**

Let us assume the whole quantity be x,

Then,

$$(70/100) \times (x) = 14$$

$$X = 14 \times (100/70)$$

$$X = 14 \times (10/7)$$

$$X = 20 \text{ minutes}$$

**(e) 8% of it is 40 liters**

**Solution:-**

Let us assume the whole quantity be x,

Then,

$$(8/100) \times (x) = 40$$

$$X = 40 \times (100/8)$$

$$X = 40 \times (100/8)$$

$$X = 40 \times 12.5$$

$$X = 500 \text{ liters}$$

**6. Convert given percent to decimal fractions and also fractions in simplest forms:**

**(a) 25%**

**Solution:-**

First convert the given percentage into fraction and then put the fraction into decimal form.

$$= (25/100)$$

$$= \frac{1}{4}$$

$$= 0.25$$

**(b) 150%**

**Solution:-**

First convert the given percentage into fraction and then put the fraction into decimal form.

$$\begin{aligned} &= (150/100) \\ &= 3/2 \\ &= 1.5 \end{aligned}$$

**(c) 20%**

**Solution:-**

First convert the given percentage into fraction and then put the fraction into decimal form.

$$\begin{aligned} &= (20/100) \\ &= 1/5 \\ &= 0.2 \end{aligned}$$

**(d) 5%**

**Solution:-**

First convert the given percentage into fraction and then put the fraction into decimal form.

$$\begin{aligned} &= (5/100) \\ &= 1/20 \\ &= 0.05 \end{aligned}$$

**7. In a city, 30% are females, 40% are males and remaining are children. What per cent are children?**

**Solution:-**

From the question, it is given that

Percentage of female in a city = 30%

Percentage of male in a city = 40%

Total percentage of male and female both = 40% + 30%  
= 70%

Now we have to find the percentage of children = 100 – 70  
= 30%

So, 30% are children.

**8. Out of 15,000 voters in a constituency, 60% voted. Find the percentage of voters**

**who did not vote. Can you now find how many actually did not vote?**

**Solution:-**

From the question, it is given that

Total number of voters in the constituency = 15000

Percentage of people who voted in the election = 60%

Percentage of people who did not voted in the election =  $100 - 60$   
 $= 40\%$

Total number of voters who did not voted in the election = 40% of 15000  
 $= (40/100) \times 15000$   
 $= 0.4 \times 15000$   
 $= 6000$  voters

$\therefore$  6000 voters did not vote.

**9. Meeta saves ₹ 4000 from her salary. If this is 10% of her salary. What is her salary?**

**Solution:-**

Let us assume Meeta's salary be ₹ x,

Then,

$$10\% \text{ of } ₹ x = ₹ 4000$$

$$(10/100) \times (x) = 4000$$

$$X = 4000 \times (100/10)$$

$$X = 4000 \times 10$$

$$X = ₹ 40000$$

$\therefore$  Meeta's salary is ₹ 40000.

**10. A local cricket team played 20 matches in one season. It won 25% of them. How many matches did they win?**

**Solution:-**

From the question, it is given that

Total matches played by a local team = 20

Percentage of matches won by the local team = 25%

Then,

Number of matches won by the team = 25% of 20  
 $= (25/100) \times 20$   
 $= 25/5$   
 $= 5$  matches.

$\therefore$ The local team won 5 matches out of 20 matches.

### EXERCISE 8.3

PAGE: 171

1. Tell what is the profit or loss in the following transactions. Also find profit per cent or loss per cent in each case.

(a) Gardening shears bought for ₹ 250 and sold for ₹ 325.

**Solution:-**

From the question, it is given that

Cost price of gardening shears = ₹ 250

Selling price of gardening shears = ₹ 325

Since  $(SP) > (CP)$ , so there is a profit

$$\begin{aligned}\text{Profit} &= (SP) - (CP) \\ &= ₹ (325 - 250) \\ &= ₹ 75\end{aligned}$$

$$\begin{aligned}\text{Profit \%} &= \{(Profit/CP) \times 100\} \\ &= \{(75/250) \times 100\} \\ &= \{7500/250\} \\ &= 750/25 \\ &= 30\%\end{aligned}$$

(b) A refrigerator bought for ₹ 12,000 and sold at ₹ 13,500.

**Solution:-**

From the question, it is given that

Cost price of refrigerator = ₹ 12000

Selling price of refrigerator = ₹ 13500

Since  $(SP) > (CP)$ , so there is a profit

$$\begin{aligned}\text{Profit} &= (SP) - (CP) \\ &= ₹ (13500 - 12000) \\ &= ₹ 1500\end{aligned}$$

$$\begin{aligned}\text{Profit \%} &= \{(Profit/CP) \times 100\} \\ &= \{(1500/12000) \times 100\} \\ &= \{150000/12000\} \\ &= 150/12 \\ &= 12.5\%\end{aligned}$$

(c) A cupboard bought for ₹ 2,500 and sold at ₹ 3,000.

**Solution:-**

From the question, it is given that

Cost price of cupboard = ₹ 2500

Selling price of cupboard = ₹ 3000

Since  $(SP) > (CP)$ , so there is a profit

$$\begin{aligned}\text{Profit} &= (SP) - (CP) \\ &= ₹ (3000 - 2500) \\ &= ₹ 500\end{aligned}$$

$$\begin{aligned}\text{Profit \%} &= \left\{ \frac{\text{Profit}}{\text{CP}} \times 100 \right\} \\ &= \left\{ \frac{500}{2500} \times 100 \right\} \\ &= \left\{ \frac{50000}{2500} \right\} \\ &= \frac{500}{25} \\ &= 20\%\end{aligned}$$

**(d) A skirt bought for ₹ 250 and sold at ₹ 150.**

**Solution:-**

Since  $(SP) < (CP)$ , so there is a loss

$$\begin{aligned}\text{Loss} &= (CP) - (SP) \\ &= ₹ (250 - 150) \\ &= ₹ 100\end{aligned}$$

$$\begin{aligned}\text{Loss \%} &= \left\{ \frac{\text{Loss}}{\text{CP}} \times 100 \right\} \\ &= \left\{ \frac{100}{250} \times 100 \right\} \\ &= \left\{ \frac{10000}{250} \right\} \\ &= 40\%\end{aligned}$$

**2. Convert each part of the ratio to percentage:**

**(a) 3 : 1**

**Solution:-**

We have to find total parts by adding the given ratio =  $3 + 1 = 4$

$$\begin{aligned}1^{\text{st}} \text{ part} &= \frac{3}{4} = \left( \frac{3}{4} \right) \times 100 \% \\ &= 3 \times 25\% \\ &= 75\%\end{aligned}$$

$$\begin{aligned}2^{\text{nd}} \text{ part} &= \frac{1}{4} = \left( \frac{1}{4} \right) \times 100\% \\ &= 1 \times 25 \\ &= 25\%\end{aligned}$$

**(b) 2: 3: 5**

**Solution:-**

We have to find total parts by adding the given ratio =  $2 + 3 + 5 = 10$

$$\begin{aligned}1^{\text{st}} \text{ part} &= 2/10 = (2/10) \times 100 \% \\ &= 2 \times 10\% \\ &= 20\%\end{aligned}$$

$$\begin{aligned}2^{\text{nd}} \text{ part} &= 3/10 = (3/10) \times 100\% \\ &= 3 \times 10 \\ &= 30\%\end{aligned}$$

$$\begin{aligned}3^{\text{rd}} \text{ part} &= 5/10 = (5/10) \times 100\% \\ &= 5 \times 10 \\ &= 50\%\end{aligned}$$

**(c) 1:4**

**Solution:-**

We have to find total parts by adding the given ratio =  $1 + 4 = 5$

$$\begin{aligned}1^{\text{st}} \text{ part} &= (1/5) = (1/5) \times 100 \% \\ &= 1 \times 20\% \\ &= 20\%\end{aligned}$$

$$\begin{aligned}2^{\text{nd}} \text{ part} &= (4/5) = (4/5) \times 100\% \\ &= 4 \times 20 \\ &= 80\%\end{aligned}$$

**(d) 1: 2: 5**

**Solution:-**

We have to find total parts by adding the given ratio =  $1 + 2 + 5 = 8$

$$\begin{aligned}1^{\text{st}} \text{ part} &= 1/8 = (1/8) \times 100 \% \\ &= (100/8) \% \\ &= 12.5\%\end{aligned}$$

$$\begin{aligned}2^{\text{nd}} \text{ part} &= 2/8 = (2/8) \times 100\% \\ &= (200/8) \\ &= 25\%\end{aligned}$$

$$\begin{aligned}3^{\text{rd}} \text{ part} &= 5/8 = (5/8) \times 100\% \\ &= (500/8) \\ &= 62.5\%\end{aligned}$$

**3. The population of a city decreased from 25,000 to 24,500. Find the percentage decrease.**

**Solution:-**

From the question, it is given that

Initial population of the city = 25000

Final population of the city = 24500

$$\begin{aligned}\text{Population decrease} &= \text{Initial population} - \text{Final population} \\ &= 25000 - 24500 \\ &= 500\end{aligned}$$

Then,

$$\begin{aligned}\text{Percentage decrease in population} &= (\text{population decrease}/\text{Initial population}) \times 100 \\ &= (500/25000) \times 100 \\ &= (50000/25000) \\ &= 50/25 \\ &= 2\%\end{aligned}$$

**4. Arun bought a car for ₹ 3,50,000. The next year, the price went upto ₹ 3,70,000. What was the Percentage of price increase?**

**Solution:-**

From the question, it is given that

Arun bought a car for = ₹ 350000

The price of the car in the next year, went up to = ₹ 370000

$$\begin{aligned}\text{Then increase in price of car} &= ₹ 370000 - ₹ 350000 \\ &= ₹ 20000\end{aligned}$$

$$\begin{aligned}\text{The percentage of price increase} &= (\text{₹ } 20000 / \text{₹ } 350000) \times 100 \\ &= (2/35) \times 100 \\ &= 200/35 \\ &= 40/7 \\ &= 5\frac{5}{7}\end{aligned}$$

**5. I buy a T.V. for ₹ 10,000 and sell it at a profit of 20%. How much money do I get for it?**

**Solution:-**

From the question, it is given that

Cost price of the T.V. = ₹ 10000

Percentage of profit = 20%

$$\begin{aligned}\text{Profit} &= (20/100) \times 10000 \\ &= ₹ 2000\end{aligned}$$

Then,

$$\begin{aligned}\text{Selling price of the T.V.} &= \text{cost price} + \text{profit} \\ &= 10000 + 2000\end{aligned}$$

$$= ₹ 12000$$

∴ I will get it for ₹ 12000.

**6. Juhi sells a washing machine for ₹ 13,500. She loses 20% in the bargain. What was the price at which she bought it?**

**Solution:-**

From the question, it is given that

Selling price of washing machine = ₹ 13500

Percentage of loss = 20%

Now, we have to find the cost price washing machine

By using the formula, we have:

$$CP = ₹ \left\{ \frac{100}{(100 - \text{loss } \%)} \times SP \right\}$$

$$= \left\{ \frac{100}{(100 - 20)} \times 13500 \right\}$$

$$= \left\{ \frac{100}{80} \times 13500 \right\}$$

$$= \left\{ \frac{1350000}{80} \right\}$$

$$= \left\{ \frac{135000}{8} \right\}$$

$$= ₹ 16875$$

**7. (i) Chalk contains calcium, carbon and oxygen in the ratio 10:3:12. Find the percentage of carbon in chalk.**

**Solution:-**

From the question it is given that,

The ratio of calcium, carbon and oxygen in chalk = 10: 3: 12

So, total part = 10 + 3 + 12 = 25

In that total part amount of carbon =  $\frac{3}{25}$

Then,

$$\text{Percentage of carbon} = \left( \frac{3}{25} \right) \times 100$$

$$= 3 \times 4$$

$$= 12 \%$$

**(ii) If in a stick of chalk, carbon is 3g, what is the weight of the chalk stick?**

**Solution:-**

From the question it is given that,

Weight of carbon in the chalk = 3g

Let us assume the weight of the stick be x

Then,

$$12\% \text{ of } x = 3$$

$$(12/100) \times (x) = 3$$

$$X = 3 \times (100/12)$$

$$X = 1 \times (100/4)$$

$$X = 25g$$

∴ The weight of the stick is 25g.

**8. Amina buys a book for ₹ 275 and sells it at a loss of 15%. How much does she sell it for?**

**Solution:-**

From the question, it is given that

Cost price of book = ₹ 275

Percentage of loss = 15%

Now, we have to find the selling price book,

By using the formula, we have:

$$SP = \left\{ \left( \frac{100 - \text{loss \%}}{100} \right) \times CP \right\}$$

$$= \left\{ \left( \frac{100 - 15}{100} \right) \times 275 \right\}$$

$$= \left\{ \frac{85}{100} \times 275 \right\}$$

$$= 23375/100$$

$$= ₹ 233.75$$

**9. Find the amount to be paid at the end of 3 years in each case:**

**(a) Principal = ₹ 1,200 at 12% p.a.**

**Solution:-**

Given: - Principal (P) = ₹ 1200, Rate (R) = 12% p.a. and Time (T) = 3years.

If interest is calculated uniformly on the original principal throughout the loan period, it is called Simple interest (SI).

$$SI = (P \times R \times T)/100$$

$$= (1200 \times 12 \times 3)/ 100$$

$$= (12 \times 12 \times 3)/ 1$$

$$= ₹432$$

Amount = (principal + SI)

$$= (1200 + 432)$$

$$= ₹ 1632$$

**(b) Principal = ₹ 7,500 at 5% p.a.**

**Solution:-**

Given: - Principal (P) = ₹ 7500, Rate (R) = 5% p.a. and Time (T) = 3years.

If interest is calculated uniformly on the original principal throughout the loan period, it is called Simple interest (SI).

$$\begin{aligned} \text{SI} &= (P \times R \times T)/100 \\ &= (7500 \times 5 \times 3)/100 \\ &= (75 \times 5 \times 3)/1 \\ &= ₹ 1125 \end{aligned}$$

$$\begin{aligned} \text{Amount} &= (\text{principal} + \text{SI}) \\ &= (7500 + 1125) \\ &= ₹ 8625 \end{aligned}$$

**10. What rate gives ₹ 280 as interest on a sum of ₹ 56,000 in 2 years?**

**Solution:-**

Given: -  $P = ₹ 56000$ ,  $\text{SI} = ₹ 280$ ,  $t = 2$  years.

We know that,

$$\begin{aligned} R &= (100 \times \text{SI}) / (P \times T) \\ &= (100 \times 280) / (56000 \times 2) \\ &= (1 \times 28) / (56 \times 2) \\ &= (1 \times 14) / (56 \times 1) \\ &= (1 \times 1) / (4 \times 1) \\ &= (1/4) \\ &= 0.25\% \end{aligned}$$

**11. If Meena gives an interest of ₹ 45 for one year at 9% rate p.a. What is the sum she has borrowed?**

**Solution:-**

From the question it is given that,  $\text{SI} = ₹ 45$ ,  $R = 9\%$ ,  $T = 1$  year,  $P = ?$

$$\begin{aligned} \text{SI} &= (P \times R \times T)/100 \\ 45 &= (P \times 9 \times 1)/100 \\ P &= (45 \times 100)/9 \\ &= 5 \times 100 \\ &= ₹ 500 \end{aligned}$$

Hence, she borrowed ₹ 500.

## Mind Map

### CHAPTER 8 COMPARING QUANTITIES

This chapter consists of six different topics. The most probable questions from examination point of view are given below.

#### TYPE:1 FIND THE RATIO OF :

Q.1. 18kg to 240g

Q.2. 12 days to 36 hours

Q.3. Population of Rajasthan = 570 lakh and population of U.P. = 1660 lakh. Area of Rajasthan = 3 lakh  $km^2$  and area of U.P. = 2 lakh  $km^2$ .

#### TYPE: 2 CONVERT THE FOLLOWING

Q.1. Fractional numbers to percent.

a)  $\frac{5}{8}$

b)  $\frac{2}{7}$

Q.2. Decimal fractions to percent.

a) 0.02

b) 12.35

Q.3. Percent to decimal fractions.

a) 125%

b) 35%

Q.4. Ratio to percentage:

a) 3 : 1

b) 2 : 3 : 5

#### TYPE: 3 FIND THE VALUE OF 'x' IF:

Q.1. 5% of 'x' is 600

Q.2. 8% of 'x' is 40 liters

Q.3. 15% of 250 is 'x'

Q.4. 20% of 2500 is 'x'

#### TYPE: 4 FIND FIVE RATIONAL NUMBERS BETWEEN

Q.1. A local cricket team played 20 matches in one season. It won 25% of them. How many matches did they win?

Q.2. Meeta saves ₹400 from her salary. If this is 10% of her salary. What is her salary?

#### TYPE: 5 PROFIT AND LOSS

Q.1. I buy a T.V. for ₹10,000 and sell it at a profit of 20%. How much money do I get for it?

Q.2. Juhi sells a washing machine for ₹13,500. She loses 20% in the bargain. What was the price at which she bought it?

#### TYPE: 6 SIMPLE INTEREST

Q.1. Find the amount to be paid at the end of 3 years in each case:

(a) Principal = ₹1,200 at 12% p.a.

(b) Principal = ₹7,500 at 5% p.a.

Q.2. If Meena gives an interest of ₹45 for one year at 9% rate p.a. What is the sum she has borrowed?

## Exercise 3.1

**1. Find the range of heights of any ten students of your class. Solution:-**

Let us assume heights (in cm) of 10 students of our class.

= 130, 132, 135, 137, 139, 140, 142, 143, 145, 148

By observing the above mentioned values, the highest value is = 148 cm By observing the above mentioned values, the lowest value is = 130 cm Then,

Range of Heights = Highest value – Lowest value  
= 148 – 130  
= 18 cm

**2. Organise the following marks in a class assessment, in a tabular form. 4, 6, 7, 5, 3, 5, 4, 5, 2, 6, 2, 5, 1, 9, 6, 5, 8, 4, 6, 7**

**(i) Which number is the highest? (ii) Which number is the lowest?**

**(iii) What is the range of the data? (iv) Find the arithmetic mean. Solution:-**

First, we have to arrange the given marks in ascending order.

= 1, 2, 2, 3, 4, 4, 4, 5, 5, 5, 5, 5, 6, 6, 6, 6, 7, 7, 8, 9

Now, we will draw the frequency table of the given data.

Mark s	Tally Marks	Frequenc y
1		1
2		2
3		1
4		3
5		5
6		4
7		2
8		1
9		1

(i) By observing the table clearly, the highest number among the given data is 9.

(ii) By observing the table clearly, the lowest number among the given data is

# Class 7 Maths Chapter 3 Data Handling

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$$\begin{aligned} 1. \text{ We know that, Range} &= \text{Highest value} - \text{Lowest value} \\ &= 9 - 1 \\ &= 8 \end{aligned}$$

(iii) Now we have to calculate Arithmetic Mean,

Arithmetic mean = (Sum of all observations)/ (Total number of observation) Then,

$$\begin{aligned} \text{Sum of all observation} &= 1 + 2 + 2 + 3 + 4 + 4 + 4 + 5 + 5 + 5 + 5 + 5 + 6 + 6 + 6 + \\ &6 + 7 + 7 \\ &\quad + 8 + 9 \\ &= 100 \end{aligned}$$

Total Number of Observation = 20

$$\begin{aligned} \text{Arithmetic mean} &= (100/20) \\ &= 5 \end{aligned}$$

### 3. Find the mean of the first five whole numbers. Solutions:-

The first five Whole numbers are 0, 1, 2, 3, and 4.

Mean = (Sum of first five whole numbers)/ (Total number of whole numbers) Then,

$$\begin{aligned} \text{Sum of five whole numbers} &= 0 + 1 + 2 + 3 + 4 \\ &= 10 \end{aligned}$$

Total Number of whole numbers = 5

$$\begin{aligned} \text{Mean} &= (10/5) \\ &= 2 \end{aligned}$$

∴ Mean of first five whole numbers is 2.

### 4. A cricketer scores the following runs in eight innings: 58, 76, 40, 35, 46, 45, 0, 100. Find the mean score. Solution:-

Mean score = (Total runs scored by the cricketer in all innings)/ (Total number of innings Played by the cricketer)

$$\begin{aligned} \text{Total runs scored by the cricketer in all innings} &= 58 + 76 + 40 + 35 + 46 + 45 + 0 \\ &+ 100 \\ &= 400 \end{aligned}$$

Total number of innings = 8 Then,

$$\begin{aligned} \text{Mean} &= (400/8) \\ &= 50 \end{aligned}$$

∴ Mean score of the cricketer is 50. Following table shows the points of each player scored in four games:

# Class 7 Maths Chapter 3 Data Handling

Player	Game 1	Game 2	Game 3	Game 4
A	14	16	10	10
B	0	8	6	4
C	8	11	Did not Play	13

Now answer the following questions:

(i) Find the mean to determine A's average number of points scored per game.

(ii) To find the mean number of points per game for C, would you divide the total points by 3 or by 4? Why?

(iii) B played in all the four games. How would you find the mean?

(iv) Who is the best

performer? **Solution:-**

(i) A's average number of points scored per game = Total points scored by A in 4 games/

$$\begin{aligned} & \text{Total number of games} \\ & = (14 + 16 + 10 + 10) / 4 \\ & = 50 / 4 \\ & = 12.5 \text{ points} \end{aligned}$$

(ii) To find the mean number of points per game for C, we will divide the total points by

3. Because C played only 3 games.

(iii) B played in all the four games, so we will divide the total points by 4 to find out the mean.

Then,

Mean of B's score = Total points scored by B in 4 games/ Total number of games

$$\begin{aligned} & = (0 + 8 + 6 + 4) / 4 \\ & = 18 / 4 \\ & = 4.5 \text{ points} \end{aligned}$$

(vi) Now, we have to find the best performer among 3 players. So, we have to find the average points of C =  $(8 + 11 + 13) / 3$

$$\begin{aligned} & = 32 / 3 \\ & = 10.67 \text{ points} \end{aligned}$$

By observing, the average points scored A is 12.5 which is more than B and C. Clearly, we can say that A is the best performer among three.

**6. The marks (out of 100) obtained by a group of students in a science test are 85, 76, 90, 85, 39, 48, 56, 95, 81 and 75. Find the:**

(i) Highest and the lowest marks obtained by the students.

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**(ii) Range of the marks obtained.**

**(iii) Mean marks obtained by the group. Solution:-**

First we have to arrange the marks obtained by a group of students in a science test in an ascending order,

$$= 39, 48, 56, 75, 76, 81, 85, 85, 90, 95$$

(i) The highest marks obtained by the student

$$= 95 \text{ The lowest marks obtained by the student} = 39$$

(ii) We know that, Range = Highest marks – Lowest marks

$$= 95 - 39$$

$$= 56$$

(iii) Mean of Marks = (Sum of all marks obtained by the group of students)/ (Total number of marks)

$$= (39 + 48 + 56 + 75 + 76 + 81 + 85 + 85 + 90 + 95)/ 10$$

$$= 730/10$$

$$= 73$$

**7. The enrolment in a school during six consecutive years was as follows: 1555, 1670, 1750, 2013, 2540, 2820.**

**Find the mean enrolment of the school for this period. Solution:-**

Mean enrolment = Sum of all observations/ Number of observations

$$= (1555 + 1670 + 1750 + 2013 + 2540 + 2820)/ 6$$

$$= (12348/6)$$

$$= 2058$$

∴ The mean enrolment of the school for this given period is 2058.

**8. The rainfall (in mm) in a city on 7 days of a certain week was recorded as follows:**

Day	Mon	Tue	Wed	Thurs	Fri	Sat	Sun
Rainfall (in mm)	0.0	12.2	2.1	0.0	20.5	5.5	1.0

**(i) Find the range of the rainfall in the above data.**

**(ii) Find the mean rainfall for the week.**

**(iii) On how many days was the rainfall less than the mean rainfall. Solution:-**

(i) Range of rainfall = Highest rainfall – Lowest rainfall

$$= 20.5 - 0.0 = 20.5 \text{ mm}$$

# Class 7 Maths Chapter 3 Data Handling

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(ii) Mean of rainfall = Sum of all observations/ Number of observation  
=  $(0.0 + 12.2 + 2.1 + 0.0 + 20.5 + 5.5 + 1.0) / 7$   
=  $41.3 / 7$   
= 5.9 mm

(iii) We may observe that for 5 days i.e. Monday, Wednesday, Thursday, Saturday and Sunday the rainfall was less than the average rainfall.

**9. The heights of 10 girls were measured in cm and the results are as follows: 135, 150, 139, 128, 151, 132, 146, 149, 143, 141.**

**(i) What is the height of the tallest girl? (ii) What is the height of the shortest girl?**

**(iii) What is the range of the data? (iv) What is the mean height of the girls?**

**(v) How many girls have heights more than the mean height. Solution:-**

First we have to arrange the given data in an ascending order,

$$= 128, 132, 135, 139, 141, 143, 146, 149, 150, 151$$

(i) The height of the tallest girl is 151 cm

(ii) The height of the shortest girl is 128 cm

(iii) Range of given data = Tallest height – Shortest height  
=  $151 - 128$   
= 23 cm

(iv) Mean height of the girls = Sum of height of all the girls/ Number of girls  
=  $(128 + 132 + 135 + 139 + 141 + 143 + 146 + 149 + 150 + 151) / 10$   
=  $1414 / 10$   
= 141.4 cm

(v) 5 girls have heights more than the mean height (i.e. 141.4 cm).

## Exercise 3.2

**1. The scores in mathematics test (out of 25) of 15 students is as follows: 19, 25, 23, 20, 9, 20, 15, 10, 5, 16, 25, 20, 24, 12, 20**

**Find the mode and median of this data. Are they same? Solution:-**

Arranging the given scores in an ascending order,  
we get 5, 9, 10, 12, 15, 16, 19, 20, 20, 20, 20,  
23, 24, 25, 25

Mode,

Mode is the value of the variable which occurs most frequently.

Clearly, 20 occurs maximum number of times. Hence, mode of the given scores is

20

Median,

The value of the middle-most observation is called the median of the data.

Here  $n = 15$ , which is odd.

Where,  $n$  is the number of the students.

$\therefore$  median = value of  $\frac{1}{2}(n + 1)^{\text{th}}$  observation.

$$= \frac{1}{2}(15 + 1)$$

$$= \frac{1}{2}(16)$$

$$= 16/2$$

$$= 8$$

Then, value of 8<sup>th</sup> term = 20

Hence, the median is 20.

Yes, both the values are same.

**2. The runs scored in a cricket match by 11 players is as follows: 6, 15, 120, 50, 100, 80, 10, 15, 8, 10, 15**

**Find the mean, mode and median of this data. Are the three same? Solution:-**

Arranging the runs scored in a cricket match by 11 players in an ascending order, we get 6, 8, 10, 10, 15, 15, 15, 50, 80, 100, 120

Mean,

$$\begin{aligned}\text{Mean of the given data} &= \text{Sum of all observations} / \text{Total number of observations} \\ &= (6 + 8 + 10 + 10 + 15 + 15 + 15 + 50 + 80 + 100 + 120) / \\ &\quad 11 \\ &= 429/11 \\ &= 39\end{aligned}$$

Mode, Mode is the value of the variable which occurs most frequently.

Clearly, 15 occurs maximum number of

# Class 7 Maths Chapter 3 Data Handling

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times. Hence, mode of the given sores is

15

Median,

The value of the middle-most observation is called the median of the data.

Here  $n = 11$ , which is odd.

Where,  $n$  is the number of the students.

$\therefore$  median = value of  $\frac{1}{2}(n + 1)^{\text{th}}$  observation.

$$= \frac{1}{2}(11 + 1)$$

$$= \frac{1}{2}(12)$$

$$= 12/2$$

$$= 6$$

Then, value of  $6^{\text{th}}$  term = 15

Hence, the median is 15.

No, these three are not same.

**3. The weights (in kg.) of 15 students of a class are:**

**38, 42, 35, 37, 45, 50, 32, 43, 43, 40, 36, 38, 43, 38, 47**

**(i) Find the mode and median of this data.**

**(ii) Is there more than one**

**mode? Solution:-**

Arranging the given weights 15 students of a class in an ascending order,  
we get 32, 35, 36, 37, 38, 38, 38, 40, 42, 43, 43, 43, 45, 47, 50

(i) Mode and

Median Mode,

Mode is the value of the variable which occurs most frequently.

Clearly, 38 and 43 both occurs 3 times.

Hence, mode of the given weights are 38 and

43. Median,

The value of the middle-most observation is called the median of the data.

Here  $n = 15$ , which is odd.

Where,  $n$  is the number of the students.

$\therefore$  median = value of  $\frac{1}{2}(n + 1)^{\text{th}}$  observation.

$$= \frac{1}{2}(15 + 1)$$

$$= \frac{1}{2}(16)$$

$$= 16/2$$

$$= 8$$

# Class 7 Maths Chapter 3 Data Handling

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Then, value of 8<sup>th</sup> term = 40

Hence, the median is 40.

(ii) Yes, there are 2 modes for the given weights of the students.

**4. Find the mode and median of the data: 13, 16, 12, 14, 19, 12, 14, 13, 14 Solution:-**

Arranging the given data in an ascending order, we get

$$= 12, 12, 13, 13, 14, 14, 14, 16, 19$$

Mode,

Mode is the value of the variable which occurs most frequently.

Clearly, 14 occurs maximum number of times. Hence, mode of the given data is

14.

Median,

The value of the middle-most observation is called the median of the data.

Here  $n = 9$ , which is odd.

Where,  $n$  is the number of the students.

$\therefore$  median = value of  $\frac{1}{2}(9 + 1)$ <sup>th</sup> observation.

$$= \frac{1}{2}(9 + 1)$$

$$= \frac{1}{2}(10)$$

$$= 10/2$$

$$= 5$$

Then, value of 5<sup>th</sup> term = 14

Hence, the median is 14.

**5. Tell whether the statement is true or false:**

**(i) The mode is always one of the numbers in a data. Solution:-**

The statement is given above is true.

Because, Mode is the value of the variable which occurs most frequently in the given data.

Hence, mode is always one of the numbers in a data.

**(ii) The mean is one of the numbers in a data. Solution:-**

The statement is given above is false.

Because, mean is may be or may not be one of the number in a data.

**(iii) The median is always one of the numbers in a data. Solution:-**

The statement is given above is true.

Because, median is the value of the middle-most observation in the given data while arranged in ascending or descending order.

Hence, median is always one of the numbers in a data

**(iv) The data 6, 4, 3, 8, 9, 12, 13, 9 has mean 9. Solution:-**

Mean = Sum of all given observations/ number of observations

$$= (6 + 4 + 3 + 8 + 9 + 12 + 13 + 9)/8$$

$$= (64/8)$$

$$= 8$$

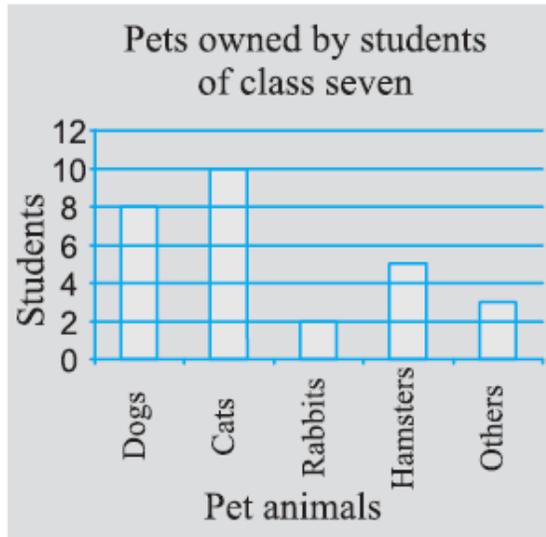
Hence, the given statement is false.

### Exercise 3.3

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**1. Use the bar graph (Fig 3.3) to answer the following questions.**

**(a) Which is the most popular pet? (b) How many students have dog as a pet?**



**Solution:-**

The bar graph represents the pets owned by the students.

(a) From bar graph, the most popular pet is Cat. It is owned by the 10 students out of 12 students.

(b) From the bar graph, 8 students have dog as a pet out of 12 students.

**2. Read the bar graph (Fig 3.4) which shows the number of books sold by a bookstore during five consecutive years and answer the following**

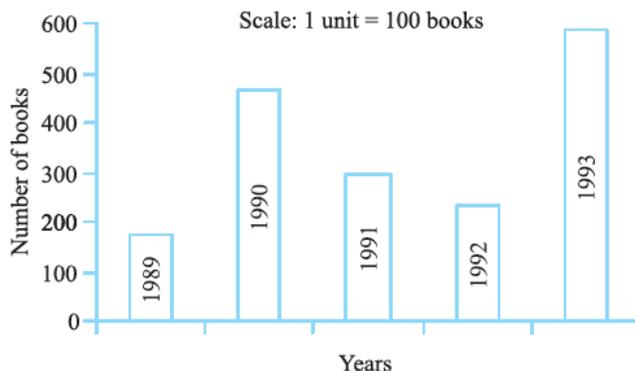
questions:

(i) About how many books were sold in 1989? 1990? 1992?

(ii) In which year were about 475 books sold? About 225 books sold?

(iii) In which years were fewer than 250 books sold?

(iv) Can you explain how you would estimate the number of books sold in 1989?



**Solution:-**

(i) By observing bar graph, 175 books were sold in the year 1989. 475 books were sold in the year 1990. 225 books were sold in the year 1992.

(ii) By observing bar graph, 475 books were sold in the year 1990. 225 books were sold in the year 1992.

(iii) By observing bar graph, In the years 1989 and 1992, the number of books sold were less than 250.

(iv) By observing the bar graph, we can conclude that, The number of books sold in the year 1989 is about 1 and  $\frac{3}{4}$ <sup>th</sup> part of 1 cm. WKT, Scale is taken as 1 cm = 100 books

$$\begin{aligned}
 &= 100 + (\frac{3}{4} \times 100) \\
 &= 100 + (3 \times 25) \\
 &= 100 + 75 \\
 &= 175
 \end{aligned}$$

3. Number of children in six different classes are given below. Represent the data on a bar graph.

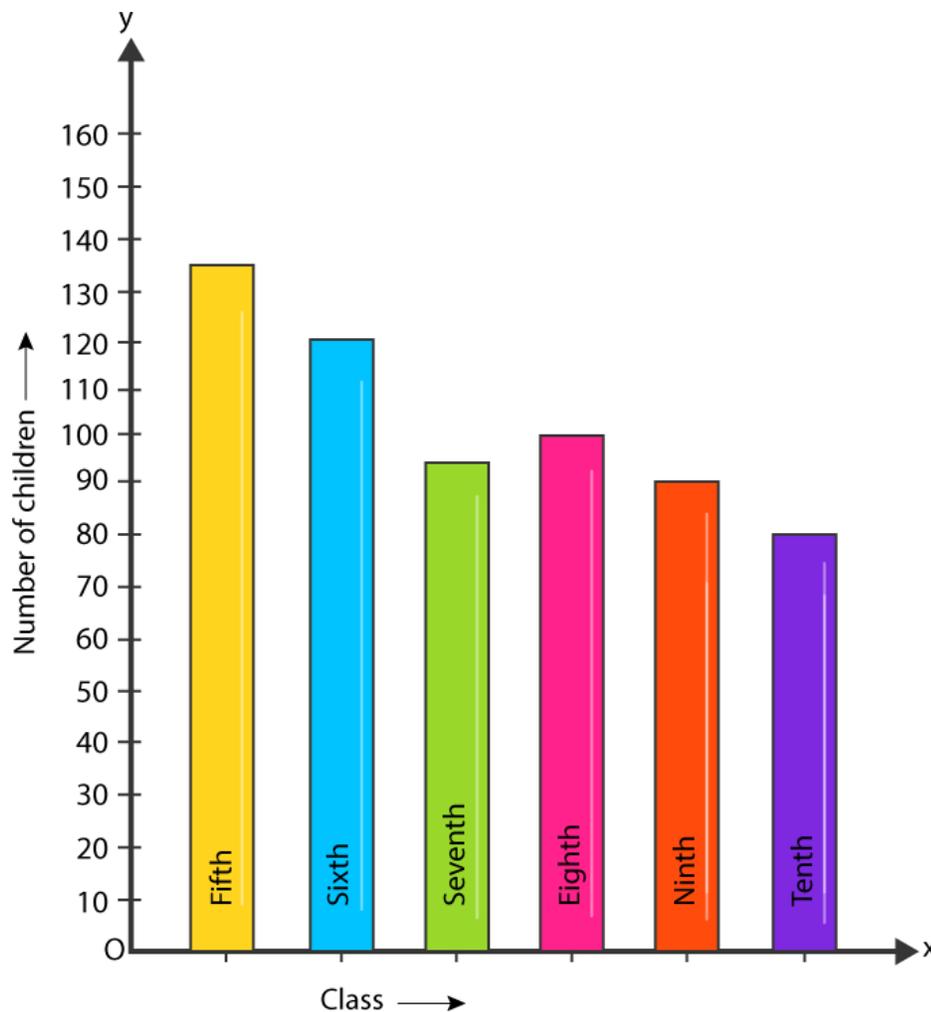
Class	Fifth	Sixth	Seventh	Eighth	Ninth	Tenth
Number of Children	135	120	95	100	90	80

(a) How would you choose a scale?

(b) Answer the following questions:

(i) Which class has the maximum number of children? And the minimum?

(ii) Find the ratio of students of class sixth to the students of class eight. Solution:-



(a) We will take the scale as 1 unit = 10 children. Because, we can represent a better and clear difference among the number of students of class 7<sup>th</sup> and class 9<sup>th</sup>.

(b) (i) Class 5<sup>th</sup> has the maximum number of children i.e. 135 and class 7<sup>th</sup> has the minimum number of children i.e. 95.

(ii) The total number of students in class 6<sup>th</sup> is 120 and the total number of students in class 8<sup>th</sup> is 100

Then,

Ratio between the number of students of class 6<sup>th</sup> and 8<sup>th</sup>,

$$= (120/100)$$

$$= 6/5$$

$$= 6: 5$$

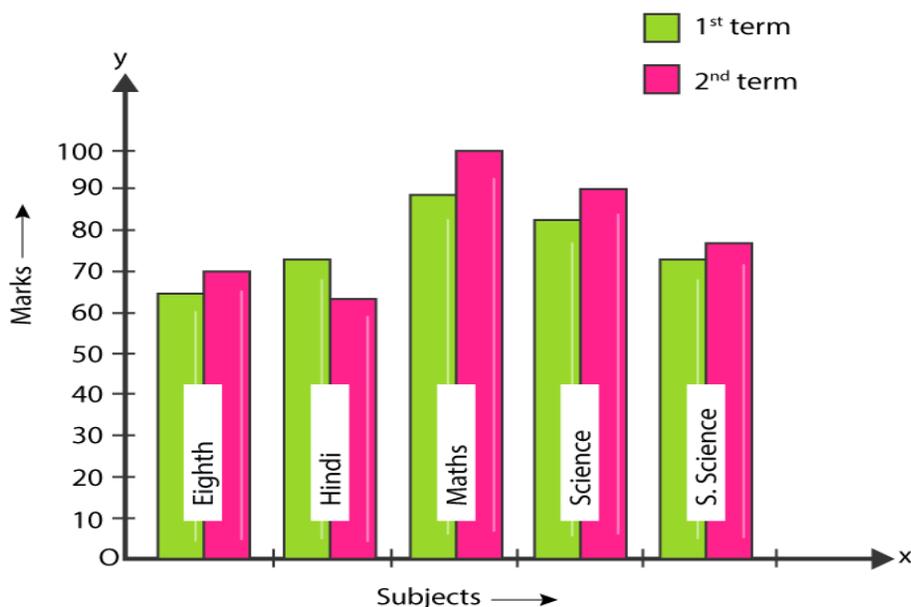
4. The performance of a student in 1st Term and 2nd Term is given. Draw a double bar graph choosing appropriate scale and answer the following:

Subject	English	Hindi	Maths	Science	S. Science
1 <sup>st</sup> Term (M.M. 100)	67	72	88	81	73
2 <sup>nd</sup> Term (M.M. 100)	70	65	95	85	75

(i) In which subject, has the child improved his performance the most?

(ii) In which subject is the improvement the least?

(iii) Has the performance gone down in any subject? Solution:-

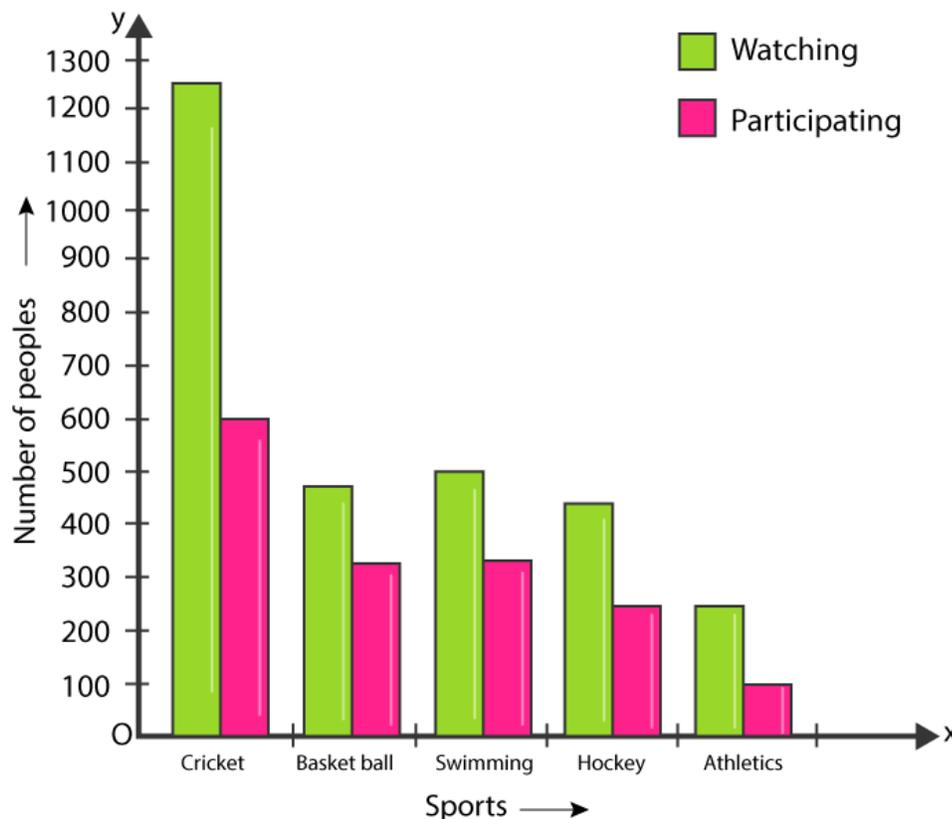


- (i) By observing the double bar graph, there was a maximum marks increase in the Maths subject. So, the child has improved his performance in Maths.
- (ii) By observing the double bar graph, the improvement was the least in S. Science.
- (iii) By observing the double bar graph, the performance In Hindi has gone down.

**5. Consider this data collected from a survey of a colony.**

Favourite Sport	Crick et	Basket Ball	swimmin g	Hocke y	Athletic s
Watching	1240	470	510	430	250
Participating	620	320	320	250	105

- (i) Draw a double bar graph choosing an appropriate scale. What do you infer from the bar graph?
- (ii) Which sport is most popular?
- (iii) Which is more preferred, watching or participating in sports? **Solution:-**



(i) The fig above is the double bar graph. Which represents the people who prefer either watching or participating in different sports. By observing the double bar graph, we came to conclude that most of the people like watching and participating cricket while least number of people like watching and participating in Athletics.

(ii) By observing the double bar graph, we came to conclude that the people who like watching and participating in cricket is the tallest among all the bars. So, cricket is the most popular sport.

(iii) By observing the double bar graph, we came to conclude that watching sports has more preference, rather than participating in sports.

**6. Take the data giving the minimum and the maximum temperature of various cities given in the beginning of this Chapter (Table 3.1). Plot a double bar graph using the data and answer the following:**

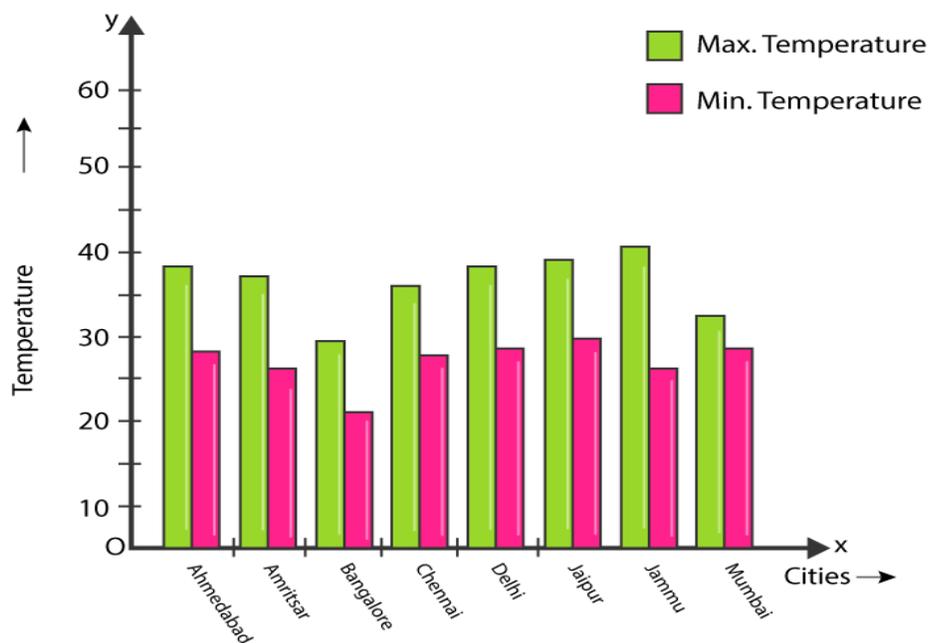
**(i) Which city has the largest difference in the minimum and maximum temperature on the given date?**

**(ii) Which is the hottest city and which is the coldest city?**

**(iii) Name two cities where maximum temperature of one was less than the minimum temperature of the other.**

**(iv) Name the city which has the least difference between its minimum and the maximum temperature.**

**Solution:-**



(i) By observing the double bar graph, we came to conclude that Jammu has the largest difference in the minimum and maximum temperature on 20.6.2006.

(ii) By observing the double bar graph, we came to conclude that Jammu is the hottest city and Bangalore is the coldest city.

(iii) By observing the double bar graph, Bangalore and Jaipur, Bangalore and Ahmedabad. For Bangalore, the maximum temperature was  $28^{\circ}\text{C}$ , while minimum temperature of both Ahmadabad and Jaipur was  $29^{\circ}\text{C}$ .

(iv) By observing the double bar graph, Mumbai has the least difference between its minimum and the maximum temperature.

### Exercise 3.4

**1. Tell whether the following is certain to happen, impossible, can happen but not certain.**

**(i) You are older today than yesterday. Solution:-**

It is certain to happen.

**(ii) A tossed coin will land heads up. Solution:-**

It can happen but not certain.

**(iii) A die when tossed shall land up with 8 on top. Solution:-**

It is impossible. Because, there are only six faces on a die is marked as 1, 2, 3, 4, 5, and 6 on it.

**(iv) The next traffic light seen will be green. Solution:-**

It can happen but not certain.

**(v) Tomorrow will be a cloudy day. Solution:-**

It can happen but not certain.

**2. There are 6 marbles in a box with numbers from 1 to 6 marked on each of**

them.

**(i) What is the probability of drawing a marble with number 2? Solution:-**

From the question, it is given that

There are 6 marbles in the box with numbers from 1 to 6 are marked.

$$\begin{aligned} \text{Probability of drawing a marble with number 2} &= \frac{\text{Number of favourable outcomes}}{\text{Number of possible outcomes}} \\ &= (1/6) \end{aligned}$$

**(ii) What is the probability of drawing a marble with number 5? Solution:-**

From the question, it is given that

There are 6 marbles in the box with numbers from 1 to 6 are marked.

$$\begin{aligned} \text{Probability of drawing a marble with number 5} &= \frac{\text{Number of favourable outcomes}}{\text{Number of possible outcomes}} \\ &= (1/6) \end{aligned}$$

**3. A coin is flipped to decide which team starts the game. What is the probability that your team will start?**

**Solution:-**

A coin has two faces one is Head and other one is Tail. Now, one team can choose either Head or Tail.

$$\begin{aligned} \text{Probability of our team starts first} &= \frac{\text{Number of favourable outcomes}}{\text{Number of possible outcomes}} \\ &= \frac{1}{2} \end{aligned}$$

**MIND MAP**  
**CHAPTER 3 DATA HANDLING**

This chapter consists of four different topics. The most probable questions from examination point of view are given below.

**TYPE:1 Finding the value(mean, median, range and mode):**

Q.1. Find the range of heights (in feet) of ten students of a class.

4.2,4.5,5,5.1,5.2,5.3,5.1,4.7,4.9,4.5

Q.2 Organize the following marks in a class assessment, in a tabular form:

4, 6, 7,

5, 3, 5, 4, 5, 2, 6, 2, 5, 1, 9, 6, 5, 8, 4, 6, 7.

- (i) Which number is the highest?
- (ii) Which number of the lowest?
- (iii) What is the range of the lowest?
- (iv) Find the arithmetic mean.

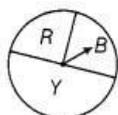
Q.3 The rainfall (in mm) in a city on 7 days of a certain week was recorded as follows:

Days	Mon	Tue	Wed	Thurs	Fri	Sat	Sun
Rainfall (in mm)	0	12.2	2.1	0	20.5	5.5	1

- (i) Find the range of the rainfall in the above data.
- (ii) Find the mean and median rainfall for the week.
- (iii) On how many days was the rainfall less than the mean rainfall?

**TYPE:2 Finding the Probability:**

- (i) When a spinner with three colours given in figure is rotated, which colour has more chance to show up with arrow than the others?



**TYPE:2 Reading the bar graph and drawing the double bar graph:**

1. Following table shows the points of each player scored in four games:

Player	Game 1	Game 2	Game 3	Game 4
A	16	18	20	10
B	18	18	16	14

Draw a double bar graph using suitable scale.

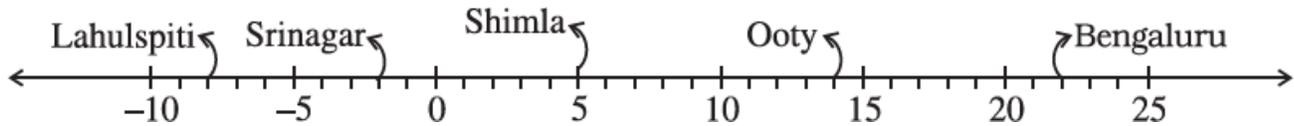
Answer the following questions using the data shown above.

- (i) In which game Player A scored maximum points?
- (ii) In which games Player B scored same points?

# CHAPTER-1 INTEGERS

## EXERCISE 1.1

1. Following number line shows the temperature in degree celsius ( $^{\circ}\text{C}$ ) at different places on a particular day.



(a) Observe this number line and write the temperature of the places marked on it.

**Solution:-**

By observing the number line, we can find the temperature of the cities as follows,

Temperature at the Lahulspiti is  $-8^{\circ}\text{C}$

Temperature at the Srinagar is  $-2^{\circ}\text{C}$

Temperature at the Shimla is  $5^{\circ}\text{C}$

Temperature at the Ooty is  $14^{\circ}\text{C}$

Temperature at the Bengaluru is  $22^{\circ}\text{C}$

(b) What is the temperature difference between the hottest and the coldest places among the above?

**Solution:-**

From the number line we observe that,

The temperature at the hottest place i.e., Bengaluru is  $22^{\circ}\text{C}$

The temperature at the coldest place i.e., Lahulspiti is  $-8^{\circ}\text{C}$

$$\begin{aligned}\text{Temperature difference between hottest and coldest place is} &= 22^{\circ}\text{C} - (-8^{\circ}\text{C}) \\ &= 22^{\circ}\text{C} + 8^{\circ}\text{C} \\ &= 30^{\circ}\text{C}\end{aligned}$$

Hence, the temperature difference between the hottest and the coldest place is  $30^{\circ}\text{C}$ .

(c) What is the temperature difference between Lahulspiti and Srinagar?

**Solution:-**

From the given number line,

The temperature at the Lahulspiti is  $-8^{\circ}\text{C}$

The temperature at the Srinagar is  $-2^{\circ}\text{C}$

$$\begin{aligned}\therefore \text{The temperature difference between Lahulspiti and Srinagar is} &= -2^{\circ}\text{C} - (-8^{\circ}\text{C}) \\ &= -2^{\circ}\text{C} + 8^{\circ}\text{C} \\ &= 6^{\circ}\text{C}\end{aligned}$$

(d) Can we say temperature of Srinagar and Shimla taken together is less than the

**temperature at Shimla? Is it also less than the temperature at Srinagar?**

**Solution:-**

From the given number line,

The temperature at Srinagar =  $-2^{\circ}\text{C}$

The temperature at Shimla =  $5^{\circ}\text{C}$

The temperature of Srinagar and Shimla taken together is =  $-2^{\circ}\text{C} + 5^{\circ}\text{C}$   
=  $3^{\circ}\text{C}$

$\therefore 5^{\circ}\text{C} > 3^{\circ}\text{C}$

So, the temperature of Srinagar and Shimla taken together is less than the temperature at Shimla.

Then,

$3^{\circ} > -2^{\circ}$

No, the temperature of Srinagar and Shimla taken together is not less than the temperature of Srinagar.

**2. In a quiz, positive marks are given for correct answers and negative marks are given for incorrect answers. If Jack's scores in five successive rounds were 25, - 5, - 10, 15 and 10, what was his total at the end?**

**Solution:-**

From the question,

Jack's score in five successive rounds are 25, -5, -10, 15 and 10

The total score of Jack at the end will be =  $25 + (-5) + (-10) + 15 + 10$   
=  $25 - 5 - 10 + 15 + 10$   
=  $50 - 15$   
=  $35$

$\therefore$  Jack's total score at the end is 35.

**3. At Srinagar temperature was  $-5^{\circ}\text{C}$  on Monday and then it dropped by  $2^{\circ}\text{C}$  on Tuesday. What was the temperature of Srinagar on Tuesday? On Wednesday, it rose by  $4^{\circ}\text{C}$ . What was the temperature on this day?**

**Solution:-**

From the question,

Temperature on Monday at Srinagar =  $-5^{\circ}\text{C}$

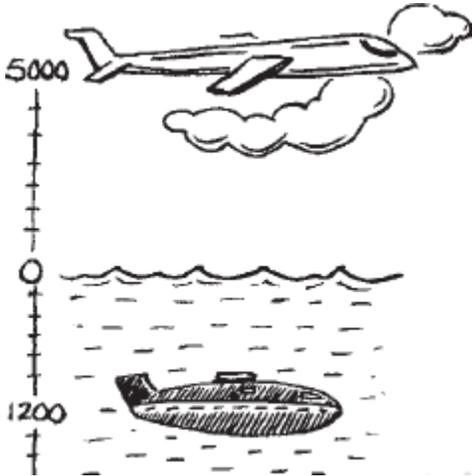
Temperature on Tuesday at Srinagar is dropped by  $2^{\circ}\text{C}$  = Temperature on Monday  $- 2^{\circ}\text{C}$   
=  $-5^{\circ}\text{C} - 2^{\circ}\text{C}$   
=  $-7^{\circ}\text{C}$

Temperature on Wednesday at Srinagar is rose by  $4^{\circ}\text{C}$  = Temperature on Tuesday +  $4^{\circ}\text{C}$

$$\begin{aligned} &= -7^{\circ}\text{C} + 4^{\circ}\text{C} \\ &= -3^{\circ}\text{C} \end{aligned}$$

Thus, the temperature on Tuesday and Wednesday was  $-7^{\circ}\text{C}$  and  $-3^{\circ}\text{C}$  respectively.

**4. A plane is flying at the height of 5000 m above the sea level. At a particular point, it is exactly above a submarine floating 1200 m below the sea level. What is the vertical distance between them?**



**Solution:-**

From the question,

Plane is flying at the height = 5000 m

Depth of Submarine =  $-1200$  m

$$\begin{aligned} \text{The vertical distance between plane and submarine} &= 5000 \text{ m} - (-1200) \text{ m} \\ &= 5000 \text{ m} + 1200 \text{ m} \\ &= 6200 \text{ m} \end{aligned}$$

**5. Mohan deposits ₹ 2,000 in his bank account and withdraws ₹ 1,642 from it, the next day. If withdrawal of amount from the account is represented by a negative integer, then how will you represent the amount deposited? Find the balance in Mohan's account after the withdrawal.**

**Solution:-**

Withdrawal of amount from the account is represented by a negative integer.

Then, deposit of amount to the account is represented by a positive integer.

From the question,

Total amount deposited in bank account by the Mohan = ₹ 2000

Total amount withdrawn from the bank account by the Mohan =  $-\text{₹ } 1642$

Balance in Mohan's account after the withdrawal = amount deposited + amount withdrawn

$$\begin{aligned} &= ₹ 2000 + (-₹ 1642) \\ &= ₹ 2000 - ₹ 1642 \\ &= ₹ 358 \end{aligned}$$

Hence, the balance in Mohan's account after the withdrawal is ₹ 358

6. Rita goes 20 km towards east from a point A to the point B. From B, she moves 30 km towards west along the same road. If the distance towards east is represented by a positive integer then, how will you represent the distance travelled towards west? By which integer will you represent her final position from A?



**Solution:-**

From the question, it is given that

A positive integer represents the distance towards the east.

Then, distance travelled towards the west will be represented by a negative integer.

Rita travels a distance in east direction = 20 km

Rita travels a distance in west direction = - 30 km

∴ Distance travelled from A =  $20 + (- 30)$

$$= 20 - 30$$

$$= -10 \text{ km}$$

Hence, we will represent the distance travelled by Rita from point A by a negative integer, i.e. - 10 km

7. In a magic square each row, column and diagonal have the same sum. Check which of the following is a magic square.

5	-1	-4
-5	-2	7
0	3	-3

(i)

1	-10	0
-4	-3	-2
-6	4	-7

(ii)

**Solution:-**

First we consider the square (i)

By adding the numbers in each rows we get,

$$\begin{aligned} &= 5 + (-1) + (-4) = 5 - 1 - 4 = 5 - 5 = 0 \\ &= -5 + (-2) + 7 = -5 - 2 + 7 = -7 + 7 = 0 \\ &= 0 + 3 + (-3) = 3 - 3 = 0 \end{aligned}$$

By adding the numbers in each columns we get,

$$\begin{aligned} &= 5 + (-5) + 0 = 5 - 5 = 0 \\ &= (-1) + (-2) + 3 = -1 - 2 + 3 = -3 + 3 = 0 \\ &= -4 + 7 + (-3) = -4 + 7 - 3 = -7 + 7 = 0 \end{aligned}$$

By adding the numbers in diagonals we get,

$$\begin{aligned} &= 5 + (-2) + (-3) = 5 - 2 - 3 = 5 - 5 = 0 \\ &= -4 + (-2) + 0 = -4 - 2 = -6 \end{aligned}$$

Because sum of one diagonal is not equal to zero,

So, (i) is not a magic square

Now, we consider the square (ii)

By adding the numbers in each rows we get,

$$\begin{aligned} &= 1 + (-10) + 0 = 1 - 10 + 0 = -9 \\ &= (-4) + (-3) + (-2) = -4 - 3 - 2 = -9 \\ &= (-6) + 4 + (-7) = -6 + 4 - 7 = -13 + 4 = -9 \end{aligned}$$

By adding the numbers in each columns we get,

$$\begin{aligned} &= 1 + (-4) + (-6) = 1 - 4 - 6 = 1 - 10 = -9 \\ &= (-10) + (-3) + 4 = -10 - 3 + 4 = -13 + 4 \\ &= 0 + (-2) + (-7) = 0 - 2 - 7 = -9 \end{aligned}$$

By adding the numbers in diagonals we get,

$$\begin{aligned} &= 1 + (-3) + (-7) = 1 - 3 - 7 = 1 - 10 = -9 \\ &= 0 + (-3) + (-6) = 0 - 3 - 6 = -9 \end{aligned}$$

This (ii) square is a magic square, because sum of each row, each column and diagonal is equal to -9.

**8. Verify  $a - (-b) = a + b$  for the following values of a and b.**

**(i)  $a = 21$ ,  $b = 18$**

**Solution:-**

From the question,

$a = 21$  and  $b = 18$

To verify  $a - (-b) = a + b$

$$\begin{aligned} \text{Let us take Left Hand Side (LHS)} &= a - (-b) \\ &= 21 - (-18) \\ &= 21 + 18 \end{aligned}$$

$$= 39$$

$$\begin{aligned}\text{Now, Right Hand Side (RHS)} &= a + b \\ &= 21 + 18 \\ &= 39\end{aligned}$$

By comparing LHS and RHS

$$\text{LHS} = \text{RHS}$$

$$39 = 39$$

Hence, the value of a and b is verified.

**(ii) a = 118, b = 125**

**Solution:-**

From the question,

$$a = 118 \text{ and } b = 125$$

To verify  $a - (-b) = a + b$

$$\begin{aligned}\text{Let us take Left Hand Side (LHS)} &= a - (-b) \\ &= 118 - (-125) \\ &= 118 + 125 \\ &= 243\end{aligned}$$

$$\begin{aligned}\text{Now, Right Hand Side (RHS)} &= a + b \\ &= 118 + 125 \\ &= 243\end{aligned}$$

By comparing LHS and RHS

$$\text{LHS} = \text{RHS}$$

$$243 = 243$$

Hence, the value of a and b is verified.

**(iii) a = 75, b = 84**

**Solution:-**

From the question,

$$a = 75 \text{ and } b = 84$$

To verify  $a - (-b) = a + b$

$$\begin{aligned}\text{Let us take Left Hand Side (LHS)} &= a - (-b) \\ &= 75 - (-84) \\ &= 75 + 84 \\ &= 159\end{aligned}$$

$$\begin{aligned}\text{Now, Right Hand Side (RHS)} &= a + b \\ &= 75 + 84\end{aligned}$$

$$= 159$$

By comparing LHS and RHS

$$\text{LHS} = \text{RHS}$$

$$159 = 159$$

Hence, the value of a and b is verified.

**(iv) a = 28, b = 11**

**Solution:-**

From the question,

$$a = 28 \text{ and } b = 11$$

To verify  $a - (-b) = a + b$

$$\begin{aligned} \text{Let us take Left Hand Side (LHS)} &= a - (-b) \\ &= 28 - (-11) \\ &= 28 + 11 \\ &= 39 \end{aligned}$$

$$\begin{aligned} \text{Now, Right Hand Side (RHS)} &= a + b \\ &= 28 + 11 \\ &= 39 \end{aligned}$$

By comparing LHS and RHS

$$\text{LHS} = \text{RHS}$$

$$39 = 39$$

Hence, the value of a and b is verified.

**9. Use the sign of >, < or = in the box to make the statements true.**

**(a)  $(-8) + (-4)$  [ ]  $(-8) - (-4)$**

**Solution:-**

$$\begin{aligned} \text{Let us take Left Hand Side (LHS)} &= (-8) + (-4) \\ &= -8 - 4 \\ &= -12 \end{aligned}$$

$$\begin{aligned} \text{Now, Right Hand Side (RHS)} &= (-8) - (-4) \\ &= -8 + 4 \\ &= -4 \end{aligned}$$

By comparing LHS and RHS

$$\text{LHS} < \text{RHS}$$

$$-12 < -4$$

$\therefore (-8) + (-4)$  [ $<$ ]  $(-8) - (-4)$

(b)  $(-3) + 7 - (19)$  [ ]  $15 - 8 + (-9)$

Solution:-

Let us take Left Hand Side (LHS) =  $(-3) + 7 - 19$   
=  $-3 + 7 - 19$   
=  $-22 + 7$   
=  $-15$

Now, Right Hand Side (RHS) =  $15 - 8 + (-9)$   
=  $15 - 8 - 9$   
=  $15 - 17$   
=  $-2$

By comparing LHS and RHS

$$\text{LHS} < \text{RHS}$$

$$-15 < -2$$

$$\therefore (-3) + 7 - (19) [<] 15 - 8 + (-9)$$

(c)  $23 - 41 + 11$  [ ]  $23 - 41 - 11$

Solution:-

Let us take Left Hand Side (LHS) =  $23 - 41 + 11$   
=  $34 - 41$   
=  $-7$

Now, Right Hand Side (RHS) =  $23 - 41 - 11$   
=  $23 - 52$   
=  $-29$

By comparing LHS and RHS

$$\text{LHS} > \text{RHS}$$

$$-7 > -29$$

$$\therefore 23 - 41 + 11 [>] 23 - 41 - 11$$

(d)  $39 + (-24) - (15)$  [ ]  $36 + (-52) - (-36)$

Solution:-

Let us take Left Hand Side (LHS) =  $39 + (-24) - 15$   
=  $39 - 24 - 15$   
=  $39 - 39$   
=  $0$

Now, Right Hand Side (RHS) =  $36 + (-52) - (-36)$   
=  $36 - 52 + 36$   
=  $72 - 52$

$$= 20$$

By comparing LHS and RHS

$$\text{LHS} < \text{RHS}$$

$$0 < 20$$

$$\therefore 39 + (-24) - (15) [<] 36 + (-52) - (-36)$$

$$\text{(e) } -231 + 79 + 51 [ \quad ] -399 + 159 + 81$$

**Solution:-**

Let us take Left Hand Side (LHS) =  $-231 + 79 + 51$

$$= -231 + 130$$

$$= -101$$

Now, Right Hand Side (RHS) =  $-399 + 159 + 81$

$$= -399 + 240$$

$$= -159$$

By comparing LHS and RHS

$$\text{LHS} > \text{RHS}$$

$$-101 > -159$$

$$\therefore -231 + 79 + 51 [>] -399 + 159 + 81$$

**10. A water tank has steps inside it. A monkey is sitting on the topmost step (i.e., the first step). The water level is at the ninth step.**



**(i) He jumps 3 steps down and then jumps back 2 steps up. In how many jumps will he reach the water level?**

**Solution:-**

Let us consider steps moved down are represented by positive integers and then, steps moved up are represented by negative integers.

Initially monkey is sitting on the top most step i.e., first step

In 1<sup>st</sup> jump monkey will be at step =  $1 + 3 = 4$  steps

In 2<sup>nd</sup> jump monkey will be at step =  $4 + (-2) = 4 - 2 = 2$  steps

In 3<sup>rd</sup> jump monkey will be at step =  $2 + 3 = 5$  steps

In 4<sup>th</sup> jump monkey will be at step =  $5 + (-2) = 5 - 2 = 3$  steps

In 5<sup>th</sup> jump monkey will be at step =  $3 + 3 = 6$  steps

In 6<sup>th</sup> jump monkey will be at step =  $6 + (-2) = 6 - 2 = 4$  steps

In 7<sup>th</sup> jump monkey will be at step =  $4 + 3 = 7$  steps

In 8<sup>th</sup> jump monkey will be at step =  $7 + (-2) = 7 - 2 = 5$  steps

In 9<sup>th</sup> jump monkey will be at step =  $5 + 3 = 8$  steps

In 10<sup>th</sup> jump monkey will be at step =  $8 + (-2) = 8 - 2 = 6$  steps

In 11<sup>th</sup> jump monkey will be at step =  $6 + 3 = 9$  steps

∴ Monkey took 11 jumps (i.e., 9<sup>th</sup> step) to reach the water level

**(ii) After drinking water, he wants to go back. For this, he jumps 4 steps up and then jumps back 2 steps down in every move. In how many jumps will he reach back the top step?**

**Solution:-**

Let us consider steps moved down are represented by positive integers and then, steps moved up are represented by negative integers.

Initially monkey is sitting on the ninth step i.e., at the water level

In 1<sup>st</sup> jump monkey will be at step =  $9 + (-4) = 9 - 4 = 5$  steps

In 2<sup>nd</sup> jump monkey will be at step =  $5 + 2 = 7$  steps

In 3<sup>rd</sup> jump monkey will be at step =  $7 + (-4) = 7 - 4 = 3$  steps

In 4<sup>th</sup> jump monkey will be at step =  $3 + 2 = 5$  steps

In 5<sup>th</sup> jump monkey will be at step =  $5 + (-4) = 5 - 4 = 1$  step

∴ Monkey took 5 jumps to reach back the top step i.e., first step.

**(iii) If the number of steps moved down is represented by negative integers and the number of steps moved up by positive integers, represent his moves in part (i) and (ii) by completing the following; (a)  $-3 + 2 - \dots = -8$  (b)  $4 - 2 + \dots = 8$ . In (a) the sum  $(-8)$  represents going down by eight steps. So, what will the sum 8 in (b) represent?**

**Solution:-**

From the question, it is given that

If the number of steps moved down is represented by negative integers and the number of steps moved up by positive integers.

Monkey moves in part (i)

$$= -3 + 2 - \dots = -8$$

$$\begin{aligned} \text{Then LHS} &= -3 + 2 - 3 + 2 - 3 + 2 - 3 + 2 - 3 + 2 - 3 \\ &= -18 + 10 \\ &= -8 \end{aligned}$$

$$\text{RHS} = -8$$

∴ Moves in part (i) represents monkey is going down 8 steps. Because negative integer.

Now,

Monkey moves in part (ii)

$$= 4 - 2 + \dots = 8$$

$$\begin{aligned} \text{Then LHS} &= 4 - 2 + 4 - 2 + 4 \\ &= 12 - 4 \\ &= 8 \end{aligned}$$

$$\text{RHS} = 8$$

∴ Moves in part (ii) represents monkey is going up 8 steps. Because positive integer.

## EXERCISE 1.2

1. Write down a pair of integers whose:

(a) sum is -7

Solution:-

$$\begin{aligned} &= -4 + (-3) \\ &= -4 - 3 && \dots [\because (+ \times - = -)] \\ &= -7 \end{aligned}$$

(b) difference is -10

Solution:-

$$\begin{aligned} &= -25 - (-15) \\ &= -25 + 15 && \dots [\because (- \times - = +)] \\ &= -10 \end{aligned}$$

(c) sum is 0

Solution:-

$$\begin{aligned} &= 4 + (-4) \\ &= 4 - 4 \\ &= 0 \end{aligned}$$

2. (a) Write a pair of negative integers whose difference gives 8

Solution:-

$$\begin{aligned} &= (-5) - (-13) \\ &= -5 + 13 && \dots [\because (- \times - = +)] \\ &= 8 \end{aligned}$$

(b) Write a negative integer and a positive integer whose sum is -5.

Solution:-

$$\begin{aligned} &= -25 + 20 \\ &= -5 \end{aligned}$$

(c) Write a negative integer and a positive integer whose difference is -3.

Solution:-

$$\begin{aligned} &= -6 - (-3) \\ &= -6 + 3 && \dots [\because (- \times - = +)] \\ &= -3 \end{aligned}$$

**3. In a quiz, team A scored – 40, 10, 0 and team B scored 10, 0, – 40 in three successive rounds. Which team scored more? Can we say that we can add integers in any order?**

**Solution:-**

From the question, it is given that

Score of team A = -40, 10, 0

$$\begin{aligned}\text{Total score obtained by team A} &= -40 + 10 + 0 \\ &= -30\end{aligned}$$

Score of team B = 10, 0, -40

$$\begin{aligned}\text{Total score obtained by team B} &= 10 + 0 + (-40) \\ &= 10 + 0 - 40 \\ &= -30\end{aligned}$$

Thus, the score of the both A team and B team is same.

Yes, we can say that we can add integers in any order.

**4. Fill in the blanks to make the following statements true:**

**(i)  $(-5) + (-8) = (-8) + ( \dots\dots\dots )$**

**Solution:-**

Let us assume the missing integer be x,

Then,

$$\begin{aligned}&= (-5) + (-8) = (-8) + (x) \\ &= -5 - 8 = -8 + x \\ &= -13 = -8 + x\end{aligned}$$

By sending – 8 from RHS to LHS it becomes 8,

$$\begin{aligned}&= -13 + 8 = x \\ &= x = -5\end{aligned}$$

Now substitute the x value in the blank place,

$(-5) + (-8) = (-8) + (-5) \dots$  [This equation is in the form of Commutative law of Addition]

**(ii)  $-53 + \dots\dots\dots = -53$**

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= -53 + x = -53$$

By sending – 53 from LHS to RHS it becomes 53,

$$\begin{aligned}&= x = -53 + 53 \\ &= x = 0\end{aligned}$$

Now substitute the x value in the blank place,

$$= -53 + 0 = -53 \dots \text{ [This equation is in the form of Closure property of Addition]}$$

**(iii)  $17 + \dots = 0$**

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= 17 + x = 0$$

By sending 17 from LHS to RHS it becomes -17,

$$= x = 0 - 17$$

$$= x = -17$$

Now substitute the x value in the blank place,

$$= 17 + (-17) = 0 \dots \text{ [This equation is in the form of Closure property of Addition]}$$

$$= 17 - 17 = 0$$

**(iv)  $[13 + (-12)] + (\dots) = 13 + [(-12) + (-7)]$**

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= [13 + (-12)] + (x) = 13 + [(-12) + (-7)]$$

$$= [13 - 12] + (x) = 13 + [-12 - 7]$$

$$= [1] + (x) = 13 + [-19]$$

$$= 1 + (x) = 13 - 19$$

$$= 1 + (x) = -6$$

By sending 1 from LHS to RHS it becomes -1,

$$= x = -6 - 1$$

$$= x = -7$$

Now substitute the x value in the blank place,

$= [13 + (-12)] + (-7) = 13 + [(-12) + (-7)] \dots \text{ [This equation is in the form of Associative property of Addition]}$

**(v)  $(-4) + [15 + (-3)] = [-4 + 15] + \dots$**

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= (-4) + [15 + (-3)] = [-4 + 15] + x$$

$$= (-4) + [15 - 3] = [-4 + 15] + x$$

$$= (-4) + [12] = [11] + x$$

$$= 8 = 11 + x$$

By sending 11 from RHS to LHS it becomes -11,

$$= 8 - 11 = x$$

$$= x = -3$$

Now substitute the x value in the blank place,

$= (-4) + [15 + (-3)] = [-4 + 15] + -3$  ... [This equation is in the form of Associative property of Addition]

# EXERCISE 1.3

1. Find each of the following products:

(a)  $3 \times (-1)$

**Solution:-**

By the rule of Multiplication of integers,

$$= 3 \times (-1)$$

$$= -3$$

... [ $\because (+ \times - = -)$ ]

(b)  $(-1) \times 225$

**Solution:-**

By the rule of Multiplication of integers,

$$= (-1) \times 225$$

$$= -225$$

... [ $\because (- \times + = -)$ ]

(c)  $(-21) \times (-30)$

**Solution:-**

By the rule of Multiplication of integers,

$$= (-21) \times (-30)$$

$$= 630$$

... [ $\because (- \times - = +)$ ]

(d)  $(-316) \times (-1)$

**Solution:-**

By the rule of Multiplication of integers,

$$= (-316) \times (-1)$$

$$= 316$$

... [ $\because (- \times - = +)$ ]

(e)  $(-15) \times 0 \times (-18)$

**Solution:-**

By the rule of Multiplication of integers,

$$= (-15) \times 0 \times (-18)$$

$$= 0$$

$\because$  Any integer is multiplied with zero and the answer is zero itself.

(f)  $(-12) \times (-11) \times (10)$

**Solution:-**

By the rule of Multiplication of integers,

$$= (-12) \times (-11) \times (10)$$

First multiply the two numbers having same sign,

$$= 132 \times 10 \quad \dots [\because (- \times - = +)]$$

$$= 1320$$

$$\text{(g) } 9 \times (-3) \times (-6)$$

**Solution:-**

By the rule of Multiplication of integers,

$$= 9 \times (-3) \times (-6)$$

First multiply the two numbers having same sign,

$$= 9 \times 18 \quad \dots [\because (- \times - = +)]$$

$$= 162$$

$$\text{(h) } (-18) \times (-5) \times (-4)$$

**Solution:-**

By the rule of Multiplication of integers,

$$= (-18) \times (-5) \times (-4)$$

First multiply the two numbers having same sign,

$$= 90 \times -4 \quad \dots [\because (- \times - = +)]$$

$$= -360 \quad \dots [\because (+ \times - = -)]$$

$$\text{(i) } (-1) \times (-2) \times (-3) \times 4$$

**Solution:-**

By the rule of Multiplication of integers,

$$= [(-1) \times (-2)] \times [(-3) \times 4]$$

$$= 2 \times (-12) \quad \dots [\because (- \times - = +), (- \times + = -)]$$

$$= -24$$

$$\text{(j) } (-3) \times (-6) \times (-2) \times (-1)$$

**Solution:-**

By the rule of Multiplication of integers,

$$= [(-3) \times (-6)] \times [(-2) \times (-1)]$$

First multiply the two numbers having same sign,

$$= 18 \times 2 \quad \dots [\because (- \times - = +)]$$

$$= 36$$

**2. Verify the following:**

$$(a) 18 \times [7 + (-3)] = [18 \times 7] + [18 \times (-3)]$$

**Solution:-**

From the given equation,

$$\begin{aligned} \text{Let us consider the Left Hand Side (LHS) first} &= 18 \times [7 + (-3)] \\ &= 18 \times [7 - 3] \\ &= 18 \times 4 \\ &= 72 \end{aligned}$$

$$\begin{aligned} \text{Now, consider the Right Hand Side (RHS)} &= [18 \times 7] + [18 \times (-3)] \\ &= [126] + [-54] \\ &= 126 - 54 \\ &= 72 \end{aligned}$$

By comparing LHS and RHS,

$$72 = 72$$

$$\text{LHS} = \text{RHS}$$

Hence, the given equation is verified.

$$(b) (-21) \times [(-4) + (-6)] = [(-21) \times (-4)] + [(-21) \times (-6)]$$

**Solution:-**

From the given equation,

$$\begin{aligned} \text{Let us consider the Left Hand Side (LHS) first} &= (-21) \times [(-4) + (-6)] \\ &= (-21) \times [-4 - 6] \\ &= (-21) \times [-10] \\ &= 210 \end{aligned}$$

$$\begin{aligned} \text{Now, consider the Right Hand Side (RHS)} &= [(-21) \times (-4)] + [(-21) \times (-6)] \\ &= [84] + [126] \\ &= 210 \end{aligned}$$

By comparing LHS and RHS,

$$210 = 210$$

$$\text{LHS} = \text{RHS}$$

Hence, the given equation is verified.

**3. (i)** For any integer  $a$ , what is  $(-1) \times a$  equal to?

**Solution:-**

$$= (-1) \times a = -a$$

Because, when we multiplied any integer  $a$  with  $-1$ , then we get additive inverse of that integer.

**(ii). Determine the integer whose product with (-1) is**

**(a) -22**

**Solution:-**

Now, multiply -22 with (-1), we get

$$= -22 \times (-1)$$

$$= 22$$

Because, when we multiplied integer -22 with -1, then we get additive inverse of that integer.

**(b) 37**

**Solution:-**

Now, multiply 37 with (-1), we get

$$= 37 \times (-1)$$

$$= -37$$

Because, when we multiplied integer 37 with -1, then we get additive inverse of that integer.

**(c) 0**

**Solution:-**

Now, multiply 0 with (-1), we get

$$= 0 \times (-1)$$

$$= 0$$

Because, the product of negative integers and zero give zero only.

**4. Starting from  $(-1) \times 5$ , write various products showing some pattern to show  $(-1) \times (-1) = 1$ .**

**Solution:-**

The various products are,

$$= -1 \times 5 = -5$$

$$= -1 \times 4 = -4$$

$$= -1 \times 3 = -3$$

$$= -1 \times 2 = -2$$

$$= -1 \times 1 = -1$$

$$= -1 \times 0 = 0$$

$$= -1 \times -1 = 1$$

We concluded that the product of one negative integer and one positive integer is negative integer. Then, the product of two negative integers is a positive integer.

**5. Find the product, using suitable properties:**

**(a)  $26 \times (-48) + (-48) \times (-36)$**

**Solution:-**

The given equation is in the form of Distributive law of Multiplication over Addition.

$$= a \times (b + c) = (a \times b) + (a \times c)$$

Let,  $a = -48$ ,  $b = 26$ ,  $c = -36$

Now,

$$= 26 \times (-48) + (-48) \times (-36)$$

$$= -48 \times (26 + (-36))$$

$$= -48 \times (26 - 36)$$

$$= -48 \times (-10)$$

$$= 480$$

$$\dots [\because (- \times - = +)]$$

**(b)  $8 \times 53 \times (-125)$**

**Solution:-**

The given equation is in the form of Commutative law of Multiplication.

$$= a \times b = b \times a$$

Then,

$$= 8 \times [53 \times (-125)]$$

$$= 8 \times [(-125) \times 53]$$

$$= [8 \times (-125)] \times 53$$

$$= [-1000] \times 53$$

$$= -53000$$

**(c)  $15 \times (-25) \times (-4) \times (-10)$**

**Solution:-**

The given equation is in the form of Commutative law of Multiplication.

$$= a \times b = b \times a$$

Then,

$$= 15 \times [(-25) \times (-4)] \times (-10)$$

$$= 15 \times [100] \times (-10)$$

$$= 15 \times [-1000]$$

$$= -15000$$

**(d)  $(-41) \times 102$**

**Solution:-**

The given equation is in the form of Distributive law of Multiplication over Addition.

$$\begin{aligned}
&= a \times (b + c) = (a \times b) + (a \times c) \\
&= (-41) \times (100 + 2) \\
&= (-41) \times 100 + (-41) \times 2 \\
&= -4100 - 82 \\
&= -4182
\end{aligned}$$

**(e)  $625 \times (-35) + (-625) \times 65$**

**Solution:-**

The given equation is in the form of Distributive law of Multiplication over Addition.

$$\begin{aligned}
&= a \times (b + c) = (a \times b) + (a \times c) \\
&= 625 \times [(-35) + (-65)] \\
&= 625 \times [-100] \\
&= -62500
\end{aligned}$$

**(f)  $7 \times (50 - 2)$**

**Solution:-**

The given equation is in the form of Distributive law of Multiplication over Subtraction.

$$\begin{aligned}
&= a \times (b - c) = (a \times b) - (a \times c) \\
&= (7 \times 50) - (7 \times 2) \\
&= 350 - 14 \\
&= 336
\end{aligned}$$

**(g)  $(-17) \times (-29)$**

**Solution:-**

The given equation is in the form of Distributive law of Multiplication over Addition.

$$\begin{aligned}
&= a \times (b + c) = (a \times b) + (a \times c) \\
&= (-17) \times [-30 + 1] \\
&= [(-17) \times (-30)] + [(-17) \times 1] \\
&= [510] + [-17] \\
&= 493
\end{aligned}$$

**(h)  $(-57) \times (-19) + 57$**

**Solution:-**

The given equation is in the form of Distributive law of Multiplication over Addition.

$$\begin{aligned}
&= a \times (b + c) = (a \times b) + (a \times c) \\
&= (57 \times 19) + (57 \times 1) \\
&= 57 [19 + 1]
\end{aligned}$$

$$= 57 \times 20$$
$$= 1140$$

**6. A certain freezing process requires that room temperature be lowered from  $40^{\circ}\text{C}$  at the rate of  $5^{\circ}\text{C}$  every hour. What will be the room temperature 10 hours after the process begins?**

**Solution:-**

From the question, it is given that

Let us take the lowered temperature as negative,

Initial temperature =  $40^{\circ}\text{C}$

Change in temperature per hour =  $-5^{\circ}\text{C}$

Change in temperature after 10 hours =  $(-5) \times 10 = -50^{\circ}\text{C}$

$\therefore$  The final room temperature after 10 hours of freezing process =  $40^{\circ}\text{C} + (-50^{\circ}\text{C})$   
 $= -10^{\circ}\text{C}$

**7. In a class test containing 10 questions, 5 marks are awarded for every correct answer and  $(-2)$  marks are awarded for every incorrect answer and 0 for questions not attempted.**

**(i) Mohan gets four correct and six incorrect answers. What is his score?**

**Solution:-**

From the question,

Marks awarded for 1 correct answer = 5

Then,

Total marks awarded for 4 correct answer =  $4 \times 5 = 20$

Marks awarded for 1 wrong answer = -2

Then,

Total marks awarded for 6 wrong answer =  $6 \times -2 = -12$

$\therefore$  Total score obtained by Mohan =  $20 + (-12)$   
 $= 20 - 12$   
 $= 8$

**(ii) Reshma gets five correct answers and five incorrect answers, what is her score?**

**Solution:-**

From the question,

Marks awarded for 1 correct answer = 5

Then,

Total marks awarded for 5 correct answer =  $5 \times 5 = 25$

Marks awarded for 1 wrong answer = -2

Then,

Total marks awarded for 5 wrong answer =  $5 \times -2 = -10$

$$\begin{aligned}\therefore \text{Total score obtained by Reshma} &= 25 + (-10) \\ &= 25 - 10 \\ &= 15\end{aligned}$$

**(iii) Heena gets two correct and five incorrect answers out of seven questions she attempts. What is her score?**

**Solution:-**

From the question,

Marks awarded for 1 correct answer = 5

Then,

Total marks awarded for 2 correct answer =  $2 \times 5 = 10$

Marks awarded for 1 wrong answer = -2

Then,

Total marks awarded for 5 wrong answer =  $5 \times -2 = -10$

Marks awarded for questions not attempted is = 0

$$\begin{aligned}\therefore \text{Total score obtained by Heena} &= 10 + (-10) \\ &= 10 - 10 \\ &= 0\end{aligned}$$

**8. A cement company earns a profit of ₹ 8 per bag of white cement sold and a loss of ₹ 5 per bag of grey cement sold.**

**(a) The company sells 3,000 bags of white cement and 5,000 bags of grey cement in a month. What is its profit or loss?**

**Solution:-**

We denote profit in positive integer and loss in negative integer,

From the question,

Cement company earns a profit on selling 1 bag of white cement = ₹ 8 per bag

Then,

$$\begin{aligned}\text{Cement company earns a profit on selling 3000 bags of white cement} &= 3000 \times ₹ 8 \\ &= ₹ 24000\end{aligned}$$

Loss on selling 1 bag of grey cement = - ₹ 5 per bag

Then,

$$\begin{aligned}\text{Loss on selling 5000 bags of grey cement} &= 5000 \times - ₹ 5 \\ &= - ₹ 25000\end{aligned}$$

$$\begin{aligned} \text{Total loss or profit earned by the cement company} &= \text{profit} + \text{loss} \\ &= 24000 + (-25000) \\ &= - ₹1000 \end{aligned}$$

Thus, a loss of ₹ 1000 will be incurred by the company.

**(b) What is the number of white cement bags it must sell to have neither profit nor loss, if the number of grey bags sold is 6,400 bags.**

**Solution:-**

We denote profit in positive integer and loss in negative integer,

From the question,

Cement company earns a profit on selling 1 bag of white cement = ₹ 8 per bag

Let the number of white cement bags be  $x$ .

Then,

$$\begin{aligned} \text{Cement company earns a profit on selling } x \text{ bags of white cement} &= (x) \times ₹ 8 \\ &= ₹ 8x \end{aligned}$$

Loss on selling 1 bag of grey cement = - ₹ 5 per bag

Then,

$$\begin{aligned} \text{Loss on selling 6400 bags of grey cement} &= 6400 \times - ₹ 5 \\ &= - ₹ 32000 \end{aligned}$$

According to the question,

Company must sell to have neither profit nor loss.

$$= \text{Profit} + \text{loss} = 0$$

$$= 8x + (-32000) = 0$$

By sending -32000 from LHS to RHS it becomes 32000

$$= 8x = 32000$$

$$= x = 32000/8$$

$$= x = 4000$$

Hence, the 4000 bags of white cement have neither profit nor loss.

**9. Replace the blank with an integer to make it a true statement.**

**(a)  $(-3) \times \underline{\hspace{2cm}} = 27$**

**Solution:-**

Let us assume the missing integer be  $x$ ,

Then,

$$= (-3) \times (x) = 27$$

$$= x = - (27/3)$$

$$= x = -9$$

Let us substitute the value of x in the place of blank,  
 $= (-3) \times (-9) = 27$  ... [ $\because (- \times - = +)$ ]

**(b)  $5 \times \underline{\hspace{2cm}} = -35$**

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= (5) \times (x) = -35$$

$$= x = - (-35/5)$$

$$= x = -7$$

Let us substitute the value of x in the place of blank,  
 $= (5) \times (-7) = -35$  ... [ $\because (+ \times - = -)$ ]

**(c)  $\underline{\hspace{2cm}} \times (-8) = -56$**

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= (x) \times (-8) = -56$$

$$= x = (-56/-8)$$

$$= x = 7$$

Let us substitute the value of x in the place of blank,  
 $= (7) \times (-8) = -56$  ... [ $\because (+ \times - = -)$ ]

**(d)  $\underline{\hspace{2cm}} \times (-12) = 132$**

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= (x) \times (-12) = 132$$

$$= x = - (132/12)$$

$$= x = - 11$$

Let us substitute the value of x in the place of blank,  
 $= (-11) \times (-12) = 132$  ... [ $\because (- \times - = +)$ ]

## EXERCISE 1.4

**1. Evaluate each of the following:**

**(a)  $(-30) \div 10$**

**Solution:-**

$$\begin{aligned} &= (-30) \div 10 \\ &= -3 \end{aligned}$$

When we divide a negative integer by a positive integer, we first divide them as whole numbers and then put minus sign (-) before the quotient.

**(b)  $50 \div (-5)$**

**Solution:-**

$$\begin{aligned} &= (50) \div (-5) \\ &= -10 \end{aligned}$$

When we divide a positive integer by a negative integer, we first divide them as whole numbers and then put minus sign (-) before the quotient.

**(c)  $(-36) \div (-9)$**

**Solution:-**

$$\begin{aligned} &= (-36) \div (-9) \\ &= 4 \end{aligned}$$

When we divide a negative integer by a negative integer, we first divide them as whole numbers and then put positive sign (+) before the quotient.

**(d)  $(-49) \div (49)$**

**Solution:-**

$$\begin{aligned} &= (-49) \div 49 \\ &= -1 \end{aligned}$$

When we divide a negative integer by a positive integer, we first divide them as whole numbers and then put minus sign (-) before the quotient.

**(e)  $13 \div [(-2) + 1]$**

**Solution:-**

$$\begin{aligned} &= 13 \div [(-2) + 1] \\ &= 13 \div (-1) \\ &= -13 \end{aligned}$$

When we divide a positive integer by a negative integer, we first divide them as whole

numbers and then put minus sign (-) before the quotient.

**(f)  $0 \div (-12)$**

**Solution:-**

$$\begin{aligned} &= 0 \div (-12) \\ &= 0 \end{aligned}$$

When we divide zero by a negative integer gives zero.

**(g)  $(-31) \div [(-30) + (-1)]$**

**Solution:-**

$$\begin{aligned} &= (-31) \div [(-30) + (-1)] \\ &= (-31) \div [-30 - 1] \\ &= (-31) \div (-31) \\ &= 1 \end{aligned}$$

When we divide a negative integer by a negative integer, we first divide them as whole numbers and then put positive sign (+) before the quotient.

**(h)  $[(-36) \div 12] \div 3$**

**Solution:-**

First we have to solve the integers with in the bracket,

$$\begin{aligned} &= [(-36) \div 12] \\ &= (-36) \div 12 \\ &= -3 \end{aligned}$$

Then,

$$\begin{aligned} &= (-3) \div 3 \\ &= -1 \end{aligned}$$

When we divide a negative integer by a positive integer, we first divide them as whole numbers and then put minus sign (-) before the quotient.

**(i)  $[(-6) + 5] \div [(-2) + 1]$**

**Solution:-**

The given question can be written as,

$$\begin{aligned} &= [-1] \div [-1] \\ &= 1 \end{aligned}$$

When we divide a negative integer by a negative integer, we first divide them as whole numbers and then put positive sign (+) before the quotient.

**2. Verify that  $a \div (b + c) \neq (a \div b) + (a \div c)$  for each of the following values of a, b and c.**

**(a)  $a = 12, b = -4, c = 2$**

**Solution:-**

From the question,  $a \div (b + c) \neq (a \div b) + (a \div c)$

Given,  $a = 12, b = -4, c = 2$

$$\begin{aligned}\text{Now, consider LHS} &= a \div (b + c) \\ &= 12 \div (-4 + 2) \\ &= 12 \div (-2) \\ &= -6\end{aligned}$$

When we divide a positive integer by a negative integer, we first divide them as whole numbers and then put minus sign (-) before the quotient.

$$\begin{aligned}\text{Then, consider RHS} &= (a \div b) + (a \div c) \\ &= (12 \div (-4)) + (12 \div 2) \\ &= (-3) + (6) \\ &= 3\end{aligned}$$

By comparing LHS and RHS

$$\begin{aligned}&= -6 \neq 3 \\ &= \text{LHS} \neq \text{RHS}\end{aligned}$$

Hence, the given values are verified.

**(b)  $a = (-10), b = 1, c = 1$**

**Solution:-**

From the question,  $a \div (b + c) \neq (a \div b) + (a \div c)$

Given,  $a = (-10), b = 1, c = 1$

$$\begin{aligned}\text{Now, consider LHS} &= a \div (b + c) \\ &= (-10) \div (1 + 1) \\ &= (-10) \div (2) \\ &= -5\end{aligned}$$

When we divide a negative integer by a positive integer, we first divide them as whole numbers and then put minus sign (-) before the quotient.

$$\begin{aligned}\text{Then, consider RHS} &= (a \div b) + (a \div c) \\ &= ((-10) \div (1)) + ((-10) \div 1) \\ &= (-10) + (-10) \\ &= -10 - 10 \\ &= -20\end{aligned}$$

By comparing LHS and RHS

$$= -5 \neq -20$$
$$= \text{LHS} \neq \text{RHS}$$

Hence, the given values are verified.

### 3. Fill in the blanks:

(a)  $369 \div \underline{\hspace{2cm}} = 369$

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= 369 \div x = 369$$

$$= x = (369/369)$$

$$= x = 1$$

Now, put the value of x in the blank.

$$= 369 \div 1 = 369$$

(b)  $(-75) \div \underline{\hspace{2cm}} = -1$

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= (-75) \div x = -1$$

$$= x = (-75/-1)$$

$$= x = 75$$

Now, put the value of x in the blank.

$$= (-75) \div 75 = -1$$

(c)  $(-206) \div \underline{\hspace{2cm}} = 1$

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= (-206) \div x = 1$$

$$= x = (-206/1)$$

$$= x = -206$$

Now, put the value of x in the blank.

$$= (-206) \div (-206) = 1$$

(d)  $-87 \div \underline{\hspace{2cm}} = 87$

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= (-87) \div x = 87$$

$$= x = (-87)/87$$

$$= x = -1$$

Now, put the value of x in the blank.

$$= (-87) \div (-1) = 87$$

**(e) \_\_\_\_\_  $\div$  1 = - 87**

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= (x) \div 1 = -87$$

$$= x = (-87) \times 1$$

$$= x = -87$$

Now, put the value of x in the blank.

$$= (-87) \div 1 = -87$$

**(f) \_\_\_\_\_  $\div$  48 = -1**

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= (x) \div 48 = -1$$

$$= x = (-1) \times 48$$

$$= x = -48$$

Now, put the value of x in the blank.

$$= (-48) \div 48 = -1$$

**(g) 20  $\div$  \_\_\_\_\_ = -2**

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= 20 \div x = -2$$

$$= x = (20)/ (-2)$$

$$= x = -10$$

Now, put the value of x in the blank.

$$= (20) \div (-10) = -2$$

**(h) \_\_\_\_\_  $\div$  (4) = -3**

**Solution:-**

Let us assume the missing integer be x,

Then,

$$= (x) \div 4 = -3$$

$$= x = (-3) \times 4$$

$$= x = -12$$

Now, put the value of x in the blank.

$$= (-12) \div 4 = -3$$

**4. Write five pairs of integers (a, b) such that  $a \div b = -3$ . One such pair is (6, -2) because  $6 \div (-2) = (-3)$ .**

**Solution:-**

(i) (15, -5)

$$\text{Because, } 15 \div (-5) = (-3)$$

(ii) (-15, 5)

$$\text{Because, } (-15) \div (5) = (-3)$$

(iii) (18, -6)

$$\text{Because, } 18 \div (-6) = (-3)$$

(iv) (-18, 6)

$$\text{Because, } (-18) \div 6 = (-3)$$

(v) (21, -7)

$$\text{Because, } 21 \div (-7) = (-3)$$

**5. The temperature at 12 noon was  $10^{\circ}\text{C}$  above zero. If it decreases at the rate of  $2^{\circ}\text{C}$  per hour until midnight, at what time would the temperature be  $8^{\circ}\text{C}$  below zero? What would be the temperature at mid-night?**

**Solution:-**

From the question is given that,

Temperature at the beginning i.e., at 12 noon =  $10^{\circ}\text{C}$

Rate of change of temperature =  $-2^{\circ}\text{C}$  per hour

Then,

$$\text{Temperature at 1 PM} = 10 + (-2) = 10 - 2 = 8^{\circ}\text{C}$$

$$\text{Temperature at 2 PM} = 8 + (-2) = 8 - 2 = 6^{\circ}\text{C}$$

$$\text{Temperature at 3 PM} = 6 + (-2) = 6 - 2 = 4^{\circ}\text{C}$$

$$\text{Temperature at 4 PM} = 4 + (-2) = 4 - 2 = 2^{\circ}\text{C}$$

Temperature at 5 PM =  $2 + (-2) = 2 - 2 = 0^{\circ}\text{C}$   
 Temperature at 6 PM =  $0 + (-2) = 0 - 2 = -2^{\circ}\text{C}$   
 Temperature at 7 PM =  $-2 + (-2) = -2 - 2 = -4^{\circ}\text{C}$   
 Temperature at 8 PM =  $-4 + (-2) = -4 - 2 = -6^{\circ}\text{C}$   
 Temperature at 9 PM =  $-6 + (-2) = -6 - 2 = -8^{\circ}\text{C}$   
 $\therefore$  At 9 PM the temperature will be  $8^{\circ}\text{C}$  below zero

Then,

The temperature at mid-night i.e., at 12 AM

Change in temperature in 12 hours =  $-2^{\circ}\text{C} \times 12 = -24^{\circ}\text{C}$

So, at midnight temperature will be =  $10 + (-24)$   
 $= -14^{\circ}\text{C}$

So, at midnight temperature will be  $14^{\circ}\text{C}$  below 0.

**6. In a class test (+ 3) marks are given for every correct answer and (-2) marks are given for every incorrect answer and no marks for not attempting any question. (i) Radhika scored 20 marks. If she has got 12 correct answers, how many questions has she attempted incorrectly? (ii) Mohini scores -5 marks in this test, though she has got 7 correct answers. How many questions has she attempted incorrectly?**

**Solution:-**

From the question,

Marks awarded for 1 correct answer = + 3

Marks awarded for 1 wrong answer = -2

(i) Radhika scored 20 marks

Then,

Total marks awarded for 12 correct answers =  $12 \times 3 = 36$

Marks awarded for incorrect answers = Total score – Total marks awarded for 12 correct Answers

$$= 20 - 36$$

$$= -16$$

So, the number of incorrect answers made by Radhika =  $(-16) \div (-2)$   
 $= 8$

(ii) Mohini scored -5 marks

Then,

Total marks awarded for 7 correct answers =  $7 \times 3 = 21$

Marks awarded for incorrect answers = Total score – Total marks awarded for 12 correct Answers

$$= -5 - 21$$

$$= - 26$$

So, the number of incorrect answers made by Radhika =

$$(-26) \div (-2)$$

$$= 13$$

**7. An elevator descends into a mine shaft at the rate of 6 m/min. If the descent starts from 10 m above the ground level, how long will it take to reach – 350 m.**

**Solution:-**

From the question,

The initial height of the elevator = 10 m

Final depth of elevator = - 350 m ... [ $\because$  distance descended is denoted by a negative integer]

The total distance to descended by the elevator =  $(-350) - (10)$   
= - 360 m

Then,

Time taken by the elevator to descend -6 m = 1 min

So, time taken by the elevator to descend – 360 m =  $(-360) \div (-60)$

$$= 60 \text{ minutes}$$

$$= 1 \text{ hour}$$

**DELHI PUBLIC SCHOOL, GANDHINAGAR**

**CHAPTER 1 - INTEGERS**

**MIND MAP**

This chapter consists of three different topics. The most probable questions from the examination point of view are given below.

**TYPE: 1 SOLVE THE FOLLOWING:**

1. What is the value of  $(-22) - [(-23) - (-17) - (-61)]$ ?
2. Evaluate (a)  $(-100) - 5$       (b)  $(-36) \times (-4)$       (c)  $\frac{3}{4} + 12$       (d)  $[(-35) \div 5]$

**TYPE: 2 VERIFICATION OF THE PROPERTIES**

1. Verify the following:

A.  $(-22) \times [(-4) + (-5)] = [(-22) \times (-4)] + [(-22) \times (-5)]$

B.  $(-12) \times [(3) + (-9)] = [(-12) \times (4)] + [(-12) \times (-9)]$

**TYPE: 3 WORD PROBLEMS**

1. In a test (+5) marks are given for every correct answer and (-2) marks are given for every incorrect answer. Radhika answered all the questions and scored 30 marks and got 10 correct answers. How many incorrect answers had she attempted?
  
2. The price of the stock decreases ₹ 45 per day for four consecutive days. What was the total change in value of the stock over 4 day period?
  
3. Write down the pair of integers whose
  - a. Sum is -4
  - b. Sum is 0
  - c. Difference is 2
  - d. Difference is -6.

## Ch.2 FRACTIONS AND DECIMALS

### Exercise 2.1

**1. Solve:**

**(i)  $2 - (3/5)$**

**Solution:-**

For subtraction of two unlike fractions, first change them to the like fractions.

LCM of 1, 5 = 5

Now, let us change each of the given fraction into an equivalent fraction having 5 as the denominator.

$$= [(2/1) \times (5/5)] = (10/5)$$

$$= [(3/5) \times (1/1)] = (3/5)$$

Now,

$$= (10/5) - (3/5)$$

$$= [(10 - 3)/5]$$

$$= (7/5)$$

**(ii)  $4 + (7/8)$**

**Solution:-**

For addition of two unlike fractions, first change them to the like fractions.

LCM of 1, 8 = 8

Now, let us change each of the given fraction into an equivalent fraction having 8 as the denominator.

$$= [(4/1) \times (8/8)] = (32/8)$$

$$= [(7/8) \times (1/1)] = (7/8)$$

Now,

$$= (32/8) + (7/8)$$

$$= [(32 + 7)/8]$$

$$= (39/8)$$

$$= 4\frac{7}{8}$$

**(iii)  $(3/5) + (2/7)$**

**Solution:-**

For addition of two unlike fractions, first change them to the like fractions.

LCM of 5, 7 = 35

Now, let us change each of the given fraction into an equivalent fraction having 35 as the denominator.

$$= [(3/5) \times (7/7)] = (21/35)$$

$$= [(2/7) \times (5/5)] = (10/35)$$

Now,

$$= (21/35) + (10/35)$$

$$= [(21 + 10)/35]$$

$$= (31/35)$$

#### **(iv) (9/11) – (4/15)**

**Solution:-**

For subtraction of two unlike fractions, first change them to the like fractions.

LCM of 11, 15 = 165

Now, let us change each of the given fraction into an equivalent fraction having 165 as the denominator.

$$= [(9/11) \times (15/15)] = (135/165)$$

$$= [(4/15) \times (11/11)] = (44/165)$$

Now,

$$= (135/165) - (44/165)$$

$$= [(135 - 44)/165]$$

$$= (91/165)$$

#### **(v) (7/10) + (2/5) + (3/2)**

**Solution:-**

For addition of two unlike fractions, first change them to the like fractions.

LCM of 10, 5, 2 = 10

Now, let us change each of the given fraction into an equivalent fraction having 10 as the denominator.

$$= [(7/10) \times (1/1)] = (7/10)$$

$$= [(2/5) \times (2/2)] = (4/10)$$

$$= [(3/2) \times (5/5)] = (15/10)$$

Now,

$$= (7/10) + (4/10) + (15/10)$$

$$= [(7 + 4 + 15)/10]$$

$$= (26/10)$$

$$= (13/5)$$

$$= 2\frac{3}{5}$$

(vi)  $2\frac{2}{3} + 3\frac{1}{2}$

**Solution:-**

First convert mixed fraction into improper fraction,

$$= 2\frac{2}{3} = \frac{8}{3}$$

$$= 3\frac{1}{2} = \frac{7}{2}$$

For addition of two unlike fractions, first change them to the like fractions.

LCM of 3, 2 = 6

Now, let us change each of the given fraction into an equivalent fraction having 6 as the denominator.

$$= \left[\left(\frac{8}{3}\right) \times \left(\frac{2}{2}\right)\right] = \left(\frac{16}{6}\right)$$

$$= \left[\left(\frac{7}{2}\right) \times \left(\frac{3}{3}\right)\right] = \left(\frac{21}{6}\right)$$

Now,

$$= \left(\frac{16}{6}\right) + \left(\frac{21}{6}\right)$$

$$= \left[\frac{(16 + 21)}{6}\right]$$

$$= \left(\frac{37}{6}\right)$$

$$= 6\frac{1}{6}$$

(vii)  $8\frac{1}{2} + 3\frac{5}{8}$

**Solution:-**

First convert mixed fraction into improper fraction,

$$= 8\frac{1}{2} = \frac{17}{2}$$

$$= 3\frac{5}{8} = \frac{29}{8}$$

For Subtraction of two unlike fractions, first change them to the like fractions.

LCM of 2, 8 = 8

Now, let us change each of the given fraction into an equivalent fraction having 8 as the denominator.

$$= \left[\left(\frac{17}{2}\right) \times \left(\frac{4}{4}\right)\right] = \left(\frac{68}{8}\right)$$

$$= \left[\left(\frac{29}{8}\right) \times \left(\frac{1}{1}\right)\right] = \left(\frac{29}{8}\right)$$

Now,

$$= \left(\frac{68}{8}\right) - \left(\frac{29}{8}\right)$$

$$= \left[\frac{(68 - 29)}{8}\right]$$

$$= \left(\frac{39}{8}\right)$$

$$= 4\frac{7}{8}$$

**2. Arrange the following in descending order:**

**(i)  $\frac{2}{9}, \frac{2}{3}, \frac{8}{21}$**

**Solution:-**

LCM of 9, 3, 21 = 63

Now, let us change each of the given fraction into an equivalent fraction having 63 as the denominator.

$$[(\frac{2}{9}) \times (\frac{7}{7})] = (\frac{14}{63})$$

$$[(\frac{2}{3}) \times (\frac{21}{21})] = (\frac{42}{63})$$

$$[(\frac{8}{21}) \times (\frac{3}{3})] = (\frac{24}{63})$$

Clearly,

$$(\frac{42}{63}) > (\frac{24}{63}) > (\frac{14}{63})$$

Hence,

$$(\frac{2}{3}) > (\frac{8}{21}) > (\frac{2}{9})$$

Hence, the given fractions in descending order are  $(\frac{2}{3}), (\frac{8}{21}), (\frac{2}{9})$

**(ii)  $\frac{1}{5}, \frac{3}{7}, \frac{7}{10}$**

**Solution:-**

LCM of 5, 7, 10 = 70

Now, let us change each of the given fraction into an equivalent fraction having 70 as the denominator.

$$[(\frac{1}{5}) \times (\frac{14}{14})] = (\frac{14}{70})$$

$$[(\frac{3}{7}) \times (\frac{10}{10})] = (\frac{30}{70})$$

$$[(\frac{7}{10}) \times (\frac{7}{7})] = (\frac{49}{70})$$

Clearly,

$$(\frac{49}{70}) > (\frac{30}{70}) > (\frac{14}{70})$$

Hence,

$$(\frac{7}{10}) > (\frac{3}{7}) > (\frac{1}{5})$$

Hence, the given fractions in descending order are  $(\frac{7}{10}), (\frac{3}{7}), (\frac{1}{5})$

**3. In a “magic square”, the sum of the numbers in each row, in each column and along the diagonals is the same. Is this a magic square?**

$\frac{4}{11}$	$\frac{9}{11}$	$\frac{2}{11}$
$\frac{3}{11}$	$\frac{5}{11}$	$\frac{7}{11}$
$\frac{8}{11}$	$\frac{1}{11}$	$\frac{6}{11}$

**Solution:-**

Sum along the first row =  $(\frac{4}{11}) + (\frac{9}{11}) + (\frac{2}{11}) = (\frac{15}{11})$

Sum along the second row =  $(\frac{3}{11}) + (\frac{5}{11}) + (\frac{7}{11}) = (\frac{15}{11})$

Sum along the third row =  $(\frac{8}{11}) + (\frac{1}{11}) + (\frac{6}{11}) = (\frac{15}{11})$

Sum along the first column =  $(4/11) + (3/11) + (8/11) = (15/11)$

Sum along the second column =  $(9/11) + (5/11) + (1/11) = (15/11)$

Sum along the third column =  $(2/11) + (7/11) + (6/11) = (15/11)$

Sum along the first diagonal =  $(4/11) + (5/11) + (6/11) = (15/11)$

Sum along the second diagonal =  $(2/11) + (5/11) + (8/11) = (15/11)$

Yes. The sum of the numbers in each row, in each column and along the diagonals is the same, so it is a magic square.

**4. A rectangular sheet of paper is  $12 \frac{1}{2}$  cm long and  $10 \frac{2}{3}$  cm wide. Find its perimeter.**

**Solution:-**

From the question, it is given that,

Length =  $12 \frac{1}{2}$  cm =  $25/2$  cm

Breadth =  $10 \frac{2}{3}$  cm =  $32/3$  cm

We know that,

Perimeter of the rectangle =  $2 \times (\text{length} + \text{breadth})$

$$= 2 \times [(25/2) + (32/3)]$$

$$= 2 \times \{[(25 \times 3) + (32 \times 2)]/6\}$$

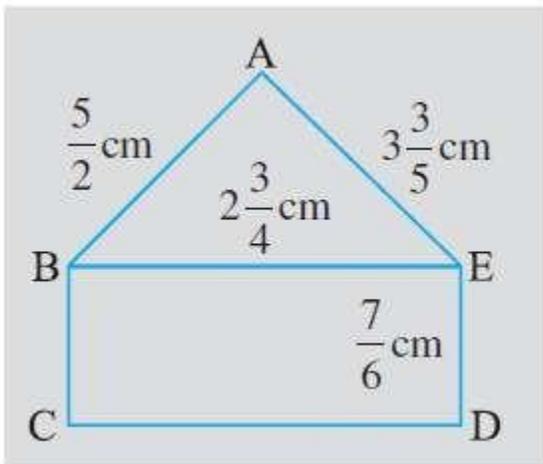
$$= 2 \times [(75 + 64)/6]$$

$$= 2 \times [139/6]$$

$$= 139/3 \text{ cm}$$

Hence, the perimeter of the sheet of paper is  $46 \frac{1}{3}$  cm

**5. Find the perimeters of (i) Triangle ABE (ii) the rectangle BCDE in this figure. Whose perimeter is greater?**



**Solution:-**

From the fig,

$$AB = (5/2) \text{ cm}$$

$$AE = 3\frac{3}{5} = 18/5 \text{ cm}$$

$$BE = 2\frac{3}{4} = 11/4 \text{ cm}$$

$$ED = 7/6 \text{ cm}$$

(i) We know that,

Perimeter of the triangle = Sum of all sides

Then,

$$\begin{aligned} \text{Perimeter of triangle ABE} &= AB + BE + EA \\ &= (5/2) + (11/4) + (18/5) \end{aligned}$$

The LCM of 2, 4, 5 = 20

Now, let us change each of the given fraction into an equivalent fraction having 20 as the denominator.

$$\begin{aligned} &= \{[(5/2) \times (10/10)] + [(11/4) \times (5/5)] + [(18/5) \times (4/4)]\} \\ &= (50/20) + (55/20) + (72/20) \\ &= (50 + 55 + 72)/20 \\ &= 177/20 \\ &= 8\frac{17}{20} \text{ cm} \end{aligned}$$

(ii) Now, we have to find the perimeter of the rectangle,

We know that,

Perimeter of the rectangle = 2 × (length + breadth)

Then,

$$\begin{aligned} \text{Perimeter of rectangle BCDE} &= 2 \times (BE + ED) \\ &= 2 \times [(11/4) + (7/6)] \end{aligned}$$

The LCM of 4, 6 = 12

Now, let us change each of the given fraction into an equivalent fraction having 20 as the denominator

$$\begin{aligned} &= 2 \times \{[(11/4) \times (3/3)] + [(7/6) \times (2/2)]\} \\ &= 2 \times [(33/12) + (14/12)] \\ &= 2 \times [(33 + 14)/12] \\ &= 2 \times (47/12) \\ &= 47/6 \\ &= 7\frac{5}{6} \end{aligned}$$

Finally, we have find which one is having greater perimeter.

Perimeter of triangle ABE = (177/20)

Perimeter of rectangle BCDE = (47/6)

The two perimeters are in the form of unlike fraction.

Changing perimeters into like fractions we have,

$$(177/20) = (177/20) \times (3/3) = 531/60$$

$$(43/6) = (43/6) \times (10/10) = 430/60$$

Clearly,  $(531/60) > (430/60)$

Hence,  $(177/20) > (43/6)$

$\therefore$  Perimeter of Triangle ABE  $>$  Perimeter of Rectangle (BCDE)

**6. Salil wants to put a picture in a frame. The picture is  $7\frac{3}{5}$  cm wide. To fit in the frame the picture cannot be more than  $7\frac{3}{10}$  cm wide. How much should the picture be trimmed?**

**Solution:-**

From the question, it is given that,

Picture having a width of  $= 7\frac{3}{5} = 38/5$  cm

Frame having a width of  $= 7\frac{3}{10} = 73/10$  cm

$\therefore$  The picture should be trimmed by  $= [(38/5) - (73/10)]$

The LCM of 5, 10 = 10

Now, let us change each of the given fraction into an equivalent fraction having 10 as the denominator.

$$\begin{aligned} &= [(38/5) \times (2/2)] - [(73/10) \times (1/1)] \\ &= (76/10) - (73/10) \\ &= (76 - 73)/10 \\ &= 3/10 \text{ cm} \end{aligned}$$

Thus, the picture should be trimmed by  $(3/10)$  cm

**7. Ritu ate  $(3/5)$  part of an apple and the remaining apple was eaten by her brother Somu. How much part of the apple did Somu eat? Who had the larger share? By how much?**

**Solution:-**

From the question, it is given that,

Part of apple eaten by Ritu is  $= (3/5)$

Part of apple eaten by Somu is  $= 1 -$  Part of apple eaten by Ritu  
 $= 1 - (3/5)$

The LCM of 1, 5 = 5

Now, let us change each of the given fraction into an equivalent fraction having 10 as the denominator.

$$\begin{aligned}
&= [(1/1) \times (5/5)] - [(3/5) \times (1/1)] \\
&= (5/5) - (3/5) \\
&= (5 - 3)/5 \\
&= 2/5
\end{aligned}$$

$\therefore$  Part of apple eaten by Somu is  $(2/5)$

So,  $(3/5) > (2/5)$  hence, Ritu ate larger size of apple.

$$\begin{aligned}
\text{Now, the difference between the 32 shares} &= (3/5) - (2/5) \\
&= (3 - 2)/5 \\
&= 1/5
\end{aligned}$$

Thus, Ritu's share is larger than share of Somu by  $(1/5)$

**8. Michael finished colouring a picture in  $(7/12)$  hour. Vaibhav finished colouring the same picture in  $(3/4)$  hour. Who worked longer? By what fraction was it longer?**

**Solution:-**

From the question, it is given that,

Time taken by the Michael to colour the picture is  $= (7/12)$

Time taken by the Vaibhav to colour the picture is  $= (3/4)$

The LCM of 12, 4 = 12

Now, let us change each of the given fraction into an equivalent fraction having 12 as the denominator.

$$(7/12) = (7/12) \times (1/1) = 7/12$$

$$(3/4) = (3/4) \times (3/3) = 9/12$$

Clearly,  $(7/12) < (9/12)$

Hence,  $(7/12) < (3/4)$

Thus, Vaibhav worked for longer time.

$$\begin{aligned}
\text{So, Vaibhav worked longer time by} &= (3/4) - (7/12) \\
&= (9/12) - (7/12) \\
&= (9 - 7)/12 \\
&= (2/12) \\
&= (1/6) \text{ of an hour.}
\end{aligned}$$

## Exercise 2.2

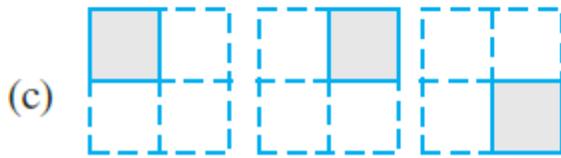
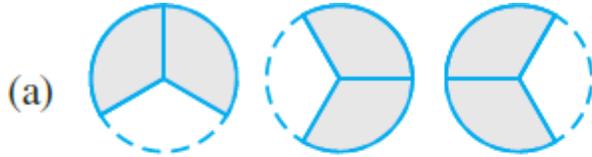
1. Which of the drawings (a) to (d) show:

(i)  $2 \times (1/5)$

(ii)  $2 \times 1/2$

(iii)  $3 \times (2/3)$

(iv)  $3 \times 1/4$



**Solution:-**

(i)  $2 \times (1/5)$  represents the addition of 2 figures, each represents 1 shaded part out of the given 5 equal parts.

$\therefore 2 \times (1/5)$  is represented by fig (d).

(ii)  $2 \times 1/2$  represents the addition of 2 figures, each represents 1 shaded part out of the given 2 equal parts.

$\therefore 2 \times 1/2$  is represented by fig (b).

(iii)  $3 \times (2/3)$  represents the addition of 3 figures, each represents 2 shaded part out of the given 3 equal parts.

$\therefore 3 \times (2/3)$  is represented by fig (a).

(iv)  $3 \times 1/4$  represents the addition of 3 figures, each represents 1 shaded part out of the given 4 equal parts.

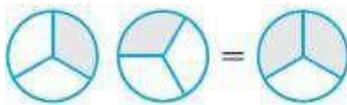
$\therefore 3 \times 1/4$  is represented by fig (c).

2. Some pictures (a) to (c) are given below. Tell which of them show:

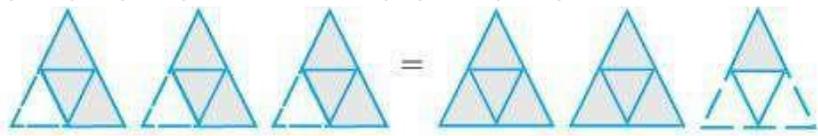
(i)  $3 \times (1/5) = (3/5)$

(ii)  $2 \times (1/3) = (2/3)$

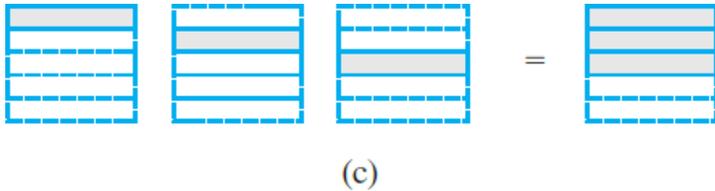
(iii)  $3 \times (3/4) = 2 1/4$



(a)



(b)



**Solution:-**

(i)  $3 \times (1/5)$  represents the addition of 3 figures, each represents 1 shaded part out of the given 5 equal parts and  $(3/5)$  represents 3 shaded parts out of 5 equal parts.

$\therefore 3 \times (1/5) = (3/5)$  is represented by fig (c).

(ii)  $2 \times (1/3)$  represents the addition of 2 figures, each represents 1 shaded part out of the given 3 equal parts and  $(2/3)$  represents 2 shaded parts out of 3 equal parts.

$\therefore 2 \times (1/3) = (2/3)$  is represented by fig (a).

(iii)  $3 \times (3/4)$  represents the addition of 3 figures, each represents 3 shaded part out of the given 4 equal parts and  $2 \frac{1}{4}$  represents 2 fully and 1 figure having 1 part as shaded out of 4 equal parts.

$\therefore 3 \times (3/4) = 2 \frac{1}{4}$  is represented by fig (b).

**3. Multiply and reduce to lowest form and convert into a mixed fraction:**

**(i)  $7 \times (3/5)$**

**Solution:-**

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned}
 &= (7/1) \times (3/5) \\
 &= (7 \times 3)/ (1 \times 5) \\
 &= (21/5) \\
 &= 4 \frac{1}{5}
 \end{aligned}$$

**(ii)  $4 \times (1/3)$**

**Solution:-**

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned}
 &= (4/1) \times (1/3) \\
 &= (4 \times 1)/ (1 \times 3)
 \end{aligned}$$

$$= (4/3)$$
$$= 1\frac{1}{3}$$

**(iii)  $2 \times (6/7)$**

**Solution:-**

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$= (2/1) \times (6/7)$$
$$= (2 \times 6)/ (1 \times 7)$$
$$= (12/7)$$
$$= 1\frac{5}{7}$$

**(iv)  $5 \times (2/9)$**

**Solution:-**

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$= (5/1) \times (2/9)$$
$$= (5 \times 2)/ (1 \times 9)$$
$$= (10/9)$$
$$= 1\frac{1}{9}$$

**(v)  $(2/3) \times 4$**

**Solution:-**

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$= (2/3) \times (4/1)$$
$$= (2 \times 4)/ (3 \times 1)$$
$$= (8/3)$$
$$= 2\frac{2}{3}$$

**(vi)  $(5/2) \times 6$**

**Solution:-**

By the rule Multiplication of fraction

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned} &= (5/2) \times (6/1) \\ &= (5 \times 6)/ (2 \times 1) \\ &= (30/2) \\ &= 15 \end{aligned}$$

**(vii)  $11 \times (4/7)$**

**Solution:-**

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned} &= (11/1) \times (4/7) \\ &= (11 \times 4)/ (1 \times 7) \\ &= (44/7) \\ &= 6\frac{2}{7} \end{aligned}$$

**(viii)  $20 \times (4/5)$**

**Solution:-**

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned} &= (20/1) \times (4/5) \\ &= (20 \times 4)/ (1 \times 5) \\ &= (80/5) \\ &= 16 \end{aligned}$$

**(ix)  $13 \times (1/3)$**

**Solution:-**

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned} &= (13/1) \times (1/3) \\ &= (13 \times 1)/ (1 \times 3) \\ &= (13/3) \\ &= 4\frac{1}{3} \end{aligned}$$

**(x)  $15 \times (3/5)$**

**Solution:-**

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

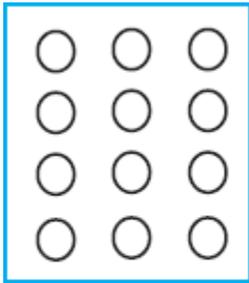
$$\begin{aligned} &= (15/1) \times (3/5) \\ &= (15 \times 3)/ (1 \times 5) \\ &= (45/5) \\ &= 9 \end{aligned}$$

**4. Shade:**

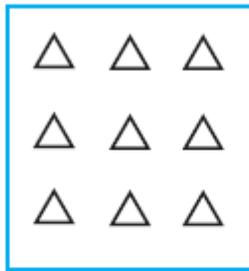
**(i)  $1/2$  of the circles in box (a)**

**(b)  $2/3$  of the triangles in box (b)**

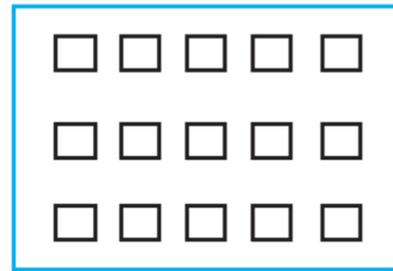
**(iii)  $3/5$  of the squares in the box (c)**



(a)



(b)



(c)

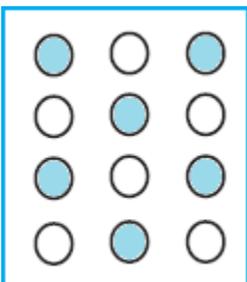
**Solution:-**

(i) From the question,

We may observe that there are 12 circles in the given box. So, we have to shade  $1/2$  of the circles in the box.

$$\begin{aligned} \therefore 12 \times 1/2 &= 12/2 \\ &= 6 \end{aligned}$$

So we have to shade any 6 circles in the box.

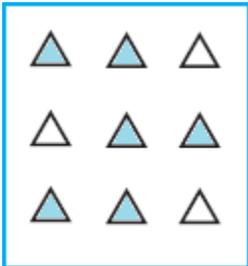


(ii) From the question,

We may observe that there are 9 triangles in the given box. So, we have to shade  $\frac{2}{3}$  of the triangles in the box.

$$\begin{aligned}\therefore 9 \times \left(\frac{2}{3}\right) &= \frac{18}{3} \\ &= 6\end{aligned}$$

So we have to shade any 6 triangles in the box.

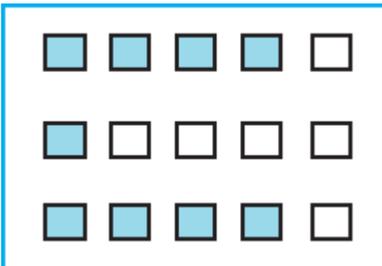


(iii) From the question,

We may observe that there are 15 squares in the given box. So, we have to shade  $\frac{3}{5}$  of the squares in the box.

$$\begin{aligned}\therefore 15 \times \left(\frac{3}{5}\right) &= \frac{45}{5} \\ &= 9\end{aligned}$$

So we have to shade any 9 squares in the box.



**5. Find:**

**(a)  $\frac{1}{2}$  of (i) 24 (ii) 46**

**Solution:-**

(i) 24

We have,

$$= \frac{1}{2} \times 24$$

$$= \frac{24}{2}$$

$$= 12$$

(ii) 46

We have,

$$\begin{aligned} &= \frac{1}{2} \times 46 \\ &= 46/2 \\ &= 23 \end{aligned}$$

**(b) 2/3 of (i) 18      (ii) 27**

**Solution:-**

(i) 18

We have,

$$\begin{aligned} &= \frac{2}{3} \times 18 \\ &= 2 \times 6 \\ &= 12 \end{aligned}$$

(ii) 27

We have,

$$\begin{aligned} &= \frac{2}{3} \times 27 \\ &= 2 \times 9 \\ &= 18 \end{aligned}$$

**(c) 3/4 of (i) 16      (ii) 36**

**Solution:-**

(i) 16

We have,

$$\begin{aligned} &= \frac{3}{4} \times 16 \\ &= 3 \times 4 \\ &= 12 \end{aligned}$$

(ii) 36

We have

$$\begin{aligned} &= \frac{3}{4} \times 36 \\ &= 3 \times 9 \\ &= 27 \end{aligned}$$

**(d) 4/5 of (i) 20      (ii) 35**

**Solution:-**

(i) 20

We have,

$$\begin{aligned} &= \frac{4}{5} \times 20 \\ &= 4 \times 4 \end{aligned}$$

$$= 16$$

(ii) 35

We have,

$$= 4/5 \times 35$$

$$= 4 \times 7$$

$$= 28$$

**6. Multiply and express as a mixed fraction:**

**(a)  $3 \times 5\frac{1}{5}$**

**Solution:-**

First convert the given mixed fraction into improper fraction.

$$= 5\frac{1}{5} = 26/5$$

Now,

$$= 3 \times (26/5)$$

$$= 78/5$$

$$= 15\frac{3}{5}$$

**(b)  $5 \times 6\frac{3}{4}$**

**Solution:-**

First convert the given mixed fraction into improper fraction.

$$= 6\frac{3}{4} = 27/4$$

Now,

$$= 5 \times (27/4)$$

$$= 135/4$$

$$= 33\frac{3}{4}$$

**(c)  $7 \times 2\frac{1}{4}$**

**Solution:-**

First convert the given mixed fraction into improper fraction.

$$= 2\frac{1}{4} = 9/4$$

Now,

$$= 7 \times (9/4)$$

$$= 63/4$$

$$= 15\frac{3}{4}$$

**(d)  $4 \times 6\frac{1}{3}$**

**Solution:-**

First convert the given mixed fraction into improper fraction.

$$= 6\frac{1}{3} = 19/3$$

Now,

$$= 4 \times (19/3)$$

$$= 76/3$$

$$= 25\frac{1}{3}$$

**(e)  $3\frac{1}{4} \times 6$**

**Solution:-**

First convert the given mixed fraction into improper fraction.

$$= 3\frac{1}{4} = 13/4$$

Now,

$$= (13/4) \times 6$$

$$= (13/2) \times 3$$

$$= 39/2$$

$$= 19\frac{1}{2}$$

**(f)  $3\frac{2}{5} \times 8$**

**Solution:-**

First convert the given mixed fraction into improper fraction.

$$= 3\frac{2}{5} = 17/5$$

Now,

$$= (17/5) \times 8$$

$$= 136/5$$

$$= 27\frac{1}{5}$$

**7. Find:**

**(a)  $\frac{1}{2}$  of (i)  $2\frac{3}{4}$       (ii)  $4\frac{2}{9}$**

**Solution:-**

(i)  $2\frac{3}{4}$

First convert the given mixed fraction into improper fraction.

$$= 2\frac{3}{4} = 11/4$$

Now,

$$= \frac{1}{2} \times 11/4$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned} &= \frac{1}{2} \times \left(\frac{11}{4}\right) \\ &= \frac{(1 \times 11)}{(2 \times 4)} \\ &= \left(\frac{11}{8}\right) \\ &= 1\frac{3}{8} \end{aligned}$$

(ii)  $4\frac{2}{9}$

First convert the given mixed fraction into improper fraction.

$$= 4\frac{2}{9} = \frac{38}{9}$$

Now,

$$= \frac{1}{2} \times \left(\frac{38}{9}\right)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned} &= \frac{1}{2} \times \left(\frac{38}{9}\right) \\ &= \frac{(1 \times 38)}{(2 \times 9)} \\ &= \left(\frac{38}{18}\right) \\ &= \frac{19}{9} \\ &= 2\frac{1}{9} \end{aligned}$$

**(b) 5/8 of (i)  $3\frac{5}{6}$     (ii)  $9\frac{2}{3}$**

**Solution:-**

(i)  $3\frac{5}{6}$

First convert the given mixed fraction into improper fraction.

$$= 3\frac{5}{6} = \frac{23}{6}$$

Now,

$$= \left(\frac{5}{8}\right) \times \left(\frac{23}{6}\right)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned} &= \left(\frac{5}{8}\right) \times \left(\frac{23}{6}\right) \\ &= \frac{(5 \times 23)}{(8 \times 6)} \\ &= \left(\frac{115}{48}\right) \\ &= 2\frac{19}{48} \end{aligned}$$

(ii)  $9\frac{2}{3}$

First convert the given mixed fraction into improper fraction.

$$= 9\frac{2}{3} = 29/3$$

Now,

$$= (5/8) \times (29/3)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$= (5/8) \times (29/3)$$

$$= (5 \times 29) / (8 \times 3)$$

$$= (145/24)$$

$$= 6\frac{1}{24}$$

**8. Vidya and Pratap went for a picnic. Their mother gave them a water bottle that contained 5 liters water. Vidya consumed  $2/5$  of the water. Pratap consumed the remaining water.**

**(i) How much water did Vidya drink?**

**(ii) What fraction of the total quantity of water did Pratap drink?**

**Solution:-**

(i) From the question, it is given that,

Amount of water in the water bottle = 5 liters

Amount of water consumed by Vidya =  $2/5$  of 5 liters

$$= (2/5) \times 5$$

$$= 2 \text{ liters}$$

So, the total amount of water drank by Vidya is 2 liters

(ii) From the question, it is given that,

Amount of water in the water bottle = 5 liters

Then,

Amount of water consumed by Pratap = (1 – water consumed by Vidya)

$$= (1 - (2/5))$$

$$= (5-2)/5$$

$$= 3/5$$

$\therefore$  Total amount of water consumed by Pratap =  $3/5$  of 5 liters

$$= (3/5) \times 5$$

$$= 3 \text{ liters}$$

So, the total amount of water drank by Pratap is 3 liters

### Exercise 2.3

**1. Find:**

**(i)  $\frac{1}{4}$  of      (a)  $\frac{1}{4}$       (b)  $\frac{3}{5}$       (c)  $\frac{4}{3}$**

**Solution:-**

(a)  $\frac{1}{4}$

We have,

$$= \frac{1}{4} \times \frac{1}{4}$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned} &= \frac{1}{4} \times \frac{1}{4} \\ &= \frac{(1 \times 1)}{(4 \times 4)} \\ &= \frac{1}{16} \end{aligned}$$

(b)  $\frac{3}{5}$

We have,

$$= \frac{1}{4} \times \frac{3}{5}$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned} &= \frac{1}{4} \times \frac{3}{5} \\ &= \frac{(1 \times 3)}{(4 \times 5)} \\ &= \frac{3}{20} \end{aligned}$$

(c)  $\frac{4}{3}$

We have,

$$= \frac{1}{4} \times \frac{4}{3}$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned} &= \frac{1}{4} \times \frac{4}{3} \\ &= \frac{(1 \times 4)}{(4 \times 3)} \\ &= \frac{4}{12} \\ &= \frac{1}{3} \end{aligned}$$

**(ii)  $\frac{1}{7}$  of      (a)  $\frac{2}{9}$       (b)  $\frac{6}{5}$       (c)  $\frac{3}{10}$**

**Solution:-**

(a)  $2/9$

We have,

$$= (1/7) \times (2/9)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned} &= (1/7) \times (2/9) \\ &= (1 \times 2) / (7 \times 9) \\ &= (2/63) \end{aligned}$$

(b)  $6/5$

We have,

$$= (1/7) \times (6/5)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned} &= (1/7) \times (6/5) \\ &= (1 \times 6) / (7 \times 5) \\ &= (6/35) \end{aligned}$$

(c)  $3/10$

We have,

$$= (1/7) \times (3/10)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned} &= (1/7) \times (3/10) \\ &= (1 \times 3) / (7 \times 10) \\ &= (3/70) \end{aligned}$$

**2. Multiply and reduce to lowest form (if possible):**

(i)  $(2/3) \times 2\frac{2}{3}$

**Solution:-**

First convert the given mixed fraction into improper fraction.

$$= 2\frac{2}{3} = 8/3$$

Now,

$$= (2/3) \times (8/3)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$= (2 \times 8)/ (3 \times 3)$$

$$= (16/9)$$

$$= 1\frac{7}{9}$$

**(ii)  $(2/7) \times (7/9)$**

**Solution:-**

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$= (2 \times 7)/ (7 \times 9)$$

$$= (2 \times 1)/ (1 \times 9)$$

$$= (2/9)$$

**(iii)  $(3/8) \times (6/4)$**

**Solution:-**

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$= (3 \times 6)/ (8 \times 4)$$

$$= (3 \times 3)/ (4 \times 4)$$

$$= (9/16)$$

**(iv)  $(9/5) \times (3/5)$**

**Solution:-**

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$= (9 \times 3)/ (5 \times 5)$$

$$= (27/25)$$

$$= 1\frac{2}{25}$$

**(v)  $(1/3) \times (15/8)$**

**Solution:-**

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$= (1 \times 15) / (3 \times 8)$$

$$= (1 \times 5) / (1 \times 8)$$

$$= (5/8)$$

**(vi)  $(11/2) \times (3/10)$** **Solution:-**

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$= (11 \times 3) / (2 \times 10)$$

$$= (33/20)$$

$$= 1\frac{13}{20}$$

**(vii)  $(4/5) \times (12/7)$** **Solution:-**

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$= (4 \times 12) / (5 \times 7)$$

$$= (48/35)$$

$$= 1\frac{13}{35}$$

**3. Multiply the following fractions:****(i)  $(2/5) \times 5\frac{1}{4}$** **Solution:-**

First convert the given mixed fraction into improper fraction.

$$= 5\frac{1}{4} = 21/4$$

Now,

$$= (2/5) \times (21/4)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned}
&= (2 \times 21) / (5 \times 4) \\
&= (1 \times 21) / (5 \times 2) \\
&= (21/10) \\
&= 2\frac{1}{10}
\end{aligned}$$

**(ii)  $6\frac{2}{5} \times (7/9)$**

**Solution:-**

First convert the given mixed fraction into improper fraction.

$$= 6\frac{2}{5} = 32/5$$

Now,

$$= (32/5) \times (7/9)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator) / (product of denominator)

Then,

$$\begin{aligned}
&= (32 \times 7) / (5 \times 9) \\
&= (224/45) \\
&= 4\frac{44}{45}
\end{aligned}$$

**(iii)  $(3/2) \times 5\frac{1}{3}$**

**Solution:-**

First convert the given mixed fraction into improper fraction.

$$= 5\frac{1}{3} = 16/3$$

Now,

$$= (3/2) \times (16/3)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator) / (product of denominator)

Then,

$$\begin{aligned}
&= (3 \times 16) / (2 \times 3) \\
&= (1 \times 8) / (1 \times 1) \\
&= 8
\end{aligned}$$

**(iv)  $(5/6) \times 2\frac{3}{7}$**

**Solution:-**

First convert the given mixed fraction into improper fraction.

$$= 2\frac{3}{7} = 17/7$$

Now,

$$= (5/6) \times (17/7)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$= (5 \times 17)/ (6 \times 7)$$

$$= (85/42)$$

$$= 2\frac{1}{42}$$

(v)  $3\frac{2}{5} \times (4/7)$

**Solution:-**

First convert the given mixed fraction into improper fraction.

$$= 3\frac{2}{5} = 17/5$$

Now,

$$= (17/5) \times (4/7)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$= (17 \times 4)/ (5 \times 7)$$

$$= (68/35)$$

$$= 1\frac{33}{35}$$

(vi)  $2\frac{3}{5} \times 3$

**Solution:-**

First convert the given mixed fraction into improper fraction.

$$= 2\frac{3}{5} = 13/5$$

Now,

$$= (13/5) \times (3/1)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$= (13 \times 3)/ (5 \times 1)$$

$$= (39/5)$$

$$= 7\frac{4}{5}$$

(vi)  $3\frac{4}{7} \times (3/5)$

**Solution:-**

First convert the given mixed fraction into improper fraction.

$$= \frac{3\frac{4}{7}}{1} = \frac{25}{7}$$

Now,

$$= (25/7) \times (3/5)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned} &= (25 \times 3) / (7 \times 5) \\ &= (5 \times 3) / (7 \times 1) \\ &= (15/7) \\ &= 2\frac{1}{7} \end{aligned}$$

**4. Which is greater:**

(i)  $(2/7)$  of  $(3/4)$  or  $(3/5)$  of  $(5/8)$

**Solution:-**

We have,

$$= (2/7) \times (3/4) \text{ and } (3/5) \times (5/8)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$\begin{aligned} &= (2/7) \times (3/4) \\ &= (2 \times 3) / (7 \times 4) \\ &= (1 \times 3) / (7 \times 2) \\ &= (3/14) \qquad \dots \text{ [i]} \end{aligned}$$

And,

$$\begin{aligned} &= (3/5) \times (5/8) \\ &= (3 \times 5) / (5 \times 8) \\ &= (3 \times 1) / (1 \times 8) \\ &= (3/8) \qquad \dots \text{ [ii]} \end{aligned}$$

Now, convert [i] and [ii] into like fractions,

LCM of 14 and 8 is 56

Now, let us change each of the given fraction into an equivalent fraction having 56 as the denominator.

$$[(3/14) \times (4/4)] = (12/56)$$

$$[(3/8) \times (7/7)] = (21/56)$$

Clearly,

$$(12/56) < (21/56)$$

Hence,

$$(3/14) < (3/8)$$

**(ii) (1/2) of (6/7) or (2/3) of (3/7)**

**Solution:-**

We have,

$$= (1/2) \times (6/7) \text{ and } (2/3) \times (3/7)$$

By the rule Multiplication of fraction,

Product of fraction = (product of numerator)/ (product of denominator)

Then,

$$= (1/2) \times (6/7)$$

$$= (1 \times 6)/ (2 \times 7)$$

$$= (1 \times 3)/ (1 \times 7)$$

$$= (3/7) \quad \dots \text{ [i]}$$

And,

$$= (2/3) \times (3/7)$$

$$= (2 \times 3)/ (3 \times 7)$$

$$= (2 \times 1)/ (1 \times 7)$$

$$= (2/7) \quad \dots \text{ [ii]}$$

By comparing [i] and [ii],

Clearly,

$$(3/7) < (2/7)$$

**5. Saili plants 4 saplings, in a row, in her garden. The distance between two adjacent saplings is  $\frac{3}{4}$  m. Find the distance between the first and the last sapling.**

**Solution:-**

From the question, it is given that,

The distance between two adjacent saplings =  $\frac{3}{4}$  m

Number of saplings planted by Saili in a row = 4

Then, number of gap in saplings =  $\frac{3}{4} \times 4$   
= 3

∴ The distance between the first and the last saplings =  $3 \times \frac{3}{4}$   
=  $(\frac{9}{4})$  m  
=  $2 \frac{1}{4}$  m

Hence, the distance between the first and the last saplings is  $2 \frac{1}{4}$  m.

**6. Lipika reads a book for  $1 \frac{3}{4}$  hours every day. She reads the entire book in 6 days. How many hours in all were required by her to read the book?**

**Solution:-**

From the question, it is given that,

Lipika reads the book for =  $1 \frac{3}{4}$  hours every day =  $\frac{7}{4}$  hours

Number of days she took to read the entire book = 6 days

∴ Total number of hours required by her to complete the book =  $(\frac{7}{4}) \times 6$   
=  $(\frac{7}{2}) \times 3$   
=  $\frac{21}{2}$   
=  $10 \frac{1}{2}$  hours

Hence, the total number of hours required by her to complete the book is  $10 \frac{1}{2}$  hours.

**7. A car runs 16 km using 1 litre of petrol. How much distance will it cover using  $2 \frac{3}{4}$  litres of petrol.**

**Solution:-**

From the question, it is given that,

The total number of distance travelled by a car in 1 liter of petrol = 16 km

Then,

Total quantity of petrol =  $2 \frac{3}{4}$  liter =  $\frac{11}{4}$  liters

Total number of distance travelled by car in  $\frac{11}{4}$  liters of petrol =  $(\frac{11}{4}) \times 16$   
=  $11 \times 4$   
= 44 km

∴ Total number of distance travelled by car in  $\frac{11}{4}$  liters of petrol is 44 km.

**8. (a) (i) provide the number in the box [ ], such that  $(\frac{2}{3}) \times [ ] = (\frac{10}{30})$**

**Solution:-**

Let the required number be x,

Then,

$$= (\frac{2}{3}) \times (x) = (\frac{10}{30})$$

By cross multiplication,

$$\begin{aligned}
&= x = (10/30) \times (3/2) \\
&= x = (10 \times 3) / (30 \times 2) \\
&= x = (5 \times 1) / (10 \times 1) \\
&= x = 5/10
\end{aligned}$$

∴ The required number in the box is (5/20)

**(ii) The simplest form of the number obtained in [ ] is**

**Solution:-**

The number in the box is 5/10

Then,

The simplest form of 5/10 is  $\frac{1}{2}$

**(b) (i) provide the number in the box [ ], such that  $(3/5) \times [ ] = (24/75)$**

**Solution:-**

Let the required number be x,

Then,

$$= (3/5) \times (x) = (24/75)$$

By cross multiplication,

$$\begin{aligned}
&= x = (24/75) \times (5/3) \\
&= x = (24 \times 5) / (75 \times 3) \\
&= x = (8 \times 1) / (15 \times 1) \\
&= x = 8/15
\end{aligned}$$

∴ The required number in the box is (8/15)

**(ii) The simplest form of the number obtained in [ ] is**

**Solution:-**

The number in the box is 8/15

Then,

The simplest form of 8/15 is 8/15

## Exercise 2.4

**1. Find:**

**(i)  $12 \div \frac{3}{4}$**

**Solution:-**

We have,

$$\begin{aligned} &= 12 \times \text{reciprocal of } \frac{3}{4} \\ &= 12 \times \left(\frac{4}{3}\right) \\ &= 4 \times 4 \\ &= 16 \end{aligned}$$

**(ii)  $14 \div \left(\frac{5}{6}\right)$**

**Solution:-**

We have,

$$\begin{aligned} &= 14 \times \text{reciprocal of } \left(\frac{5}{6}\right) \\ &= 14 \times \left(\frac{6}{5}\right) \\ &= \frac{84}{5} \end{aligned}$$

**(iii)  $8 \div \left(\frac{7}{3}\right)$**

**Solution:-**

We have,

$$\begin{aligned} &= 8 \times \text{reciprocal of } \left(\frac{7}{3}\right) \\ &= 8 \times \left(\frac{3}{7}\right) \\ &= \left(\frac{24}{7}\right) \end{aligned}$$

**(iv)  $4 \div \left(\frac{8}{3}\right)$**

**Solution:-**

We have,

$$\begin{aligned} &= 4 \times \text{reciprocal of } \left(\frac{8}{3}\right) \\ &= 4 \times \left(\frac{3}{8}\right) \\ &= 1 \times \left(\frac{3}{2}\right) \\ &= \frac{3}{2} \end{aligned}$$

**(v)  $3 \div 2\frac{1}{3}$**

**Solution:-**

While dividing a whole number by a mixed fraction, first convert the mixed fraction into

improper fraction

We have,

$$= 2\frac{1}{3} = 7/3$$

Then,

$$= 3 \div (7/3)$$

$$= 3 \times \text{reciprocal of } (7/3)$$

$$= 3 \times (3/7)$$

$$= 9/7$$

(vi)  $5 \div 3\frac{4}{7}$

**Solution:-**

While dividing a whole number by a mixed fraction, first convert the mixed fraction into improper fraction

We have,

Then,

$$= 3\frac{4}{7} \div 25/7$$

$$= 5 \div (25/7)$$

$$= 5 \times \text{reciprocal of } (25/7)$$

$$= 5 \times (7/25)$$

$$= 1 \times (7/5)$$

$$= 7/5$$

**2. Find the reciprocal of each of the following fractions. Classify the reciprocals as proper fractions, improper fractions and whole numbers.**

**(i)  $3/7$**

**Solution:-**

Reciprocal of  $(3/7)$  is  $(7/3)$   $[\because ((3/7) \times (7/3)) = 1]$

So, it is an improper fraction.

Improper fraction is that fraction in which numerator is greater than its denominator.

**(ii)  $5/8$**

**Solution:-**

Reciprocal of  $(5/8)$  is  $(8/5)$   $[\because ((5/8) \times (8/5)) = 1]$

So, it is an improper fraction.

Improper fraction is that fraction in which numerator is greater than its denominator

**(iii) 9/7**

**Solution:-**

Reciprocal of  $(9/7)$  is  $(7/9)$   $[\because ((9/7) \times (7/9)) = 1]$

So, it is a proper fraction.

A proper fraction is that fraction in which denominator is greater than the numerator of the fraction.

**(iv) 6/5**

**Solution:-**

Reciprocal of  $(6/5)$  is  $(5/6)$   $[\because ((6/5) \times (5/6)) = 1]$

So, it is a proper fraction.

A proper fraction is that fraction in which denominator is greater than the numerator of the fraction.

**(v) 12/7**

**Solution:-**

Reciprocal of  $(12/7)$  is  $(7/12)$   $[\because ((12/7) \times (7/12)) = 1]$

So, it is a proper fraction.

A proper fraction is that fraction in which denominator is greater than the numerator of the fraction.

**(vi) 1/8**

**Solution:-**

Reciprocal of  $(1/8)$  is  $(8/1)$  or 8  $[\because ((1/8) \times (8/1)) = 1]$

So, it is a whole number.

Whole numbers are collection of all positive integers including 0.

**(vii) 1/11**

**Solution:-**

Reciprocal of  $(1/11)$  is  $(11/1)$  or 11  $[\because ((1/11) \times (11/1)) = 1]$

So, it is a whole number.

Whole numbers are collection of all positive integers including 0.

**3. Find:**

**(i)  $(7/3) \div 2$**

**Solution:-**

We have,

$$\begin{aligned} &= (7/3) \times \text{reciprocal of } 2 \\ &= (7/3) \times (1/2) \\ &= (7 \times 1) / (3 \times 2) \\ &= 7/6 \\ &= 1\frac{1}{6} \end{aligned}$$

**(ii)  $(4/9) \div 5$**

**Solution:-**

We have,

$$\begin{aligned} &= (4/9) \times \text{reciprocal of } 5 \\ &= (4/9) \times (1/5) \\ &= (4 \times 1) / (9 \times 5) \\ &= 4/45 \end{aligned}$$

**(iii)  $(6/13) \div 7$**

**Solution:-**

We have,

$$\begin{aligned} &= (6/13) \times \text{reciprocal of } 7 \\ &= (6/13) \times (1/7) \\ &= (6 \times 1) / (13 \times 7) \\ &= 6/91 \end{aligned}$$

**(iv)  $4\frac{1}{3} \div 3$**

**Solution:-**

First convert the mixed fraction into improper fraction.

We have,

$$= 4\frac{1}{3} = 13/3$$

Then,

$$\begin{aligned} &= (13/3) \times \text{reciprocal of } 3 \\ &= (13/3) \times (1/3) \\ &= (13 \times 1) / (3 \times 3) \\ &= 13/9 \end{aligned}$$

**(iv)  $3\frac{1}{2} \div 4$**

**Solution:-**

First convert the mixed fraction into improper fraction.

We have,

$$= 3 \frac{1}{2} = \frac{7}{2}$$

Then,

$$= (\frac{7}{2}) \times \text{reciprocal of } 4$$

$$= (\frac{7}{2}) \times (\frac{1}{4})$$

$$= (7 \times 1) / (2 \times 4)$$

$$= \frac{7}{8}$$

**(iv)**  $4\frac{3}{7} \div 7$

**Solution:-**

First convert the mixed fraction into improper fraction.

We have,

$$= 4\frac{3}{7} = \frac{31}{7}$$

Then,

$$= (\frac{31}{7}) \times \text{reciprocal of } 7$$

$$= (\frac{31}{7}) \times (\frac{1}{7})$$

$$= (31 \times 1) / (7 \times 7)$$

$$= \frac{31}{49}$$

**4. Find:**

**(i)**  $(\frac{2}{5}) \div (\frac{1}{2})$

**Solution:-**

We have,

$$= (\frac{2}{5}) \times \text{reciprocal of } \frac{1}{2}$$

$$= (\frac{2}{5}) \times (\frac{2}{1})$$

$$= (2 \times 2) / (5 \times 1)$$

$$= \frac{4}{5}$$

**(ii)**  $(\frac{4}{9}) \div (\frac{2}{3})$

**Solution:-**

We have,

$$= (\frac{4}{9}) \times \text{reciprocal of } (\frac{2}{3})$$

$$= (\frac{4}{9}) \times (\frac{3}{2})$$

$$= (4 \times 3) / (9 \times 2)$$

$$= (2 \times 1) / (3 \times 1)$$

$$= 2/3$$

**(iii)  $(3/7) \div (8/7)$**

**Solution:-**

We have,

$$\begin{aligned} &= (3/7) \times \text{reciprocal of } (8/7) \\ &= (3/7) \times (7/8) \\ &= (3 \times 7) / (7 \times 8) \\ &= (3 \times 1) / (1 \times 8) \\ &= 3/8 \end{aligned}$$

**(iv)  $2\frac{1}{3} \div (3/5)$**

**Solution:-**

First convert the mixed fraction into improper fraction.

We have,

$$= 2\frac{1}{3} = 7/3$$

Then,

$$\begin{aligned} &= (7/3) \times \text{reciprocal of } (3/5) \\ &= (7/3) \times (5/3) \\ &= (7 \times 5) / (3 \times 3) \\ &= 35/9 \end{aligned}$$

**(v)  $3\frac{1}{2} \div (8/3)$**

**Solution:-**

First convert the mixed fraction into improper fraction.

We have,

$$= 3\frac{1}{2} = 7/2$$

Then,

$$\begin{aligned} &= (7/2) \times \text{reciprocal of } (8/3) \\ &= (7/2) \times (3/8) \\ &= (7 \times 3) / (2 \times 8) \\ &= 21/16 \end{aligned}$$

**(vi)  $(2/5) \div 1\frac{1}{2}$**

**Solution:-**

First convert the mixed fraction into improper fraction.

We have,

$$= 1 \frac{1}{2} = \frac{3}{2}$$

Then,

$$= \left(\frac{2}{5}\right) \times \text{reciprocal of } \left(\frac{3}{2}\right)$$

$$= \left(\frac{2}{5}\right) \times \left(\frac{2}{3}\right)$$

$$= \left(\frac{2 \times 2}{5 \times 3}\right)$$

$$= \frac{4}{15}$$

(vii)  $3\frac{1}{5} \div 1\frac{2}{3}$

**Solution:-**

First convert the mixed fraction into improper fraction.

We have,

$$= 3\frac{1}{5} = \frac{16}{5}$$

$$= 1\frac{2}{3} = \frac{5}{3}$$

Then,

$$= \left(\frac{16}{5}\right) \times \text{reciprocal of } \left(\frac{5}{3}\right)$$

$$= \left(\frac{16}{5}\right) \times \left(\frac{3}{5}\right)$$

$$= \left(\frac{16 \times 3}{5 \times 5}\right)$$

$$= \frac{48}{25}$$

(viii)  $2\frac{1}{5} \div 1\frac{1}{5}$

**Solution:-**

First convert the mixed fraction into improper fraction.

We have,

$$= 2\frac{1}{5} = \frac{11}{5}$$

$$= 1\frac{1}{5} = \frac{6}{5}$$

Then,

$$= \left(\frac{11}{5}\right) \times \text{reciprocal of } \left(\frac{6}{5}\right)$$

$$= \left(\frac{11}{5}\right) \times \left(\frac{5}{6}\right)$$

$$= \left(\frac{11 \times 5}{5 \times 6}\right)$$

$$= \left(\frac{11 \times 1}{1 \times 6}\right)$$

$$= \frac{11}{6}$$

## Exercise 2.5

### 1. Which is greater?

(i) 0.5 or 0.05

**Solution:-**

By comparing whole number,  $0 = 0$

By comparing the tenths place digit,  $5 > 0$

$\therefore 0.5 > 0.05$

(ii) 0.7 or 0.5

**Solution:-**

By comparing whole number,  $0 = 0$

By comparing the tenths place digit,  $7 > 5$

$\therefore 0.7 > 0.5$

(iii) 7 or 0.7

**Solution:-**

By comparing whole number,  $7 > 0$

$\therefore 7 > 0.7$

(iv) 1.37 or 1.49

**Solution:-**

By comparing whole number,  $1 = 1$

By comparing the tenths place digit,  $3 < 4$

$\therefore 1.37 < 1.49$

(v) 2.03 or 2.30

**Solution:-**

By comparing whole number,  $2 = 2$

By comparing the tenths place digit,  $0 < 3$

$\therefore 2.03 < 2.30$

(vi) 0.8 or 0.88

**Solution:-**

By comparing whole number,  $0 = 0$

By comparing the tenths place digit,  $8 = 8$

By comparing the hundredths place digit,  $0 < 8$

$$\therefore 0.8 < 0.88$$

## 2. Express as rupees as decimals:

### (i) 7 paise

**Solution:-**

We know that,

$$= ₹ 1 = 100 \text{ paise}$$

$$= 1 \text{ paise} = ₹ (1/100)$$

$$\therefore 7 \text{ paise} = ₹ (7/100)$$

$$= ₹ 0.07$$

### (ii) 7 rupees 7 paise

**Solution:-**

We know that,

$$= ₹ 1 = 100 \text{ paise}$$

$$= 1 \text{ paise} = ₹ (1/100)$$

$$\therefore 7 \text{ rupees } 7 \text{ paise} = ₹ 7 + ₹ (7/100)$$

$$= ₹ 7 + ₹ 0.07$$

$$= ₹ 7.07$$

### (iii) 77 rupees 77 paise

**Solution:-**

We know that,

$$= ₹ 1 = 100 \text{ paise}$$

$$= 1 \text{ paise} = ₹ (1/100)$$

$$\therefore 77 \text{ rupees } 77 \text{ paise} = ₹ 77 + ₹ (77/100)$$

$$= ₹ 77 + ₹ 0.77$$

$$= ₹ 77.77$$

### (iv) 50 paise

**Solution:-**

We know that,

$$= ₹ 1 = 100 \text{ paise}$$

$$= 1 \text{ paise} = ₹ (1/100)$$

$$\therefore 50 \text{ paise} = ₹ (50/100)$$

$$= ₹ 0.50$$

**(v) 235 paise**

**Solution:-**

We know that,

$$= ₹ 1 = 100 \text{ paise}$$

$$= 1 \text{ paise} = ₹ (1/100)$$

$$\therefore 235 \text{ paise} = ₹ (235/100)$$

$$= ₹ 2.35$$

**3. (i) Express 5 cm in meter and kilometer**

**Solution:-**

We know that,

$$= 1 \text{ meter} = 100 \text{ cm}$$

Then,

$$= 1 \text{ cm} = (1/100) \text{ m}$$

$$= 5 \text{ cm} = (5/100)$$

$$= 0.05 \text{ m}$$

Now,

$$= 1 \text{ km} = 1000 \text{ m}$$

Then,

$$= 1 \text{ m} = (1/1000) \text{ km}$$

$$= 0.05 \text{ m} = (0.05/1000)$$

$$= 0.00005 \text{ km}$$

**(i) Express 35 mm in cm, m and km**

**Solution:-**

We know that,

$$= 1 \text{ cm} = 10 \text{ mm}$$

Then,

$$= 1 \text{ mm} = (1/10) \text{ cm}$$

$$= 35 \text{ mm} = (35/10) \text{ cm}$$

$$= 3.5 \text{ cm}$$

And,

$$= 1 \text{ meter} = 100 \text{ cm}$$

Then,

$$= 1 \text{ cm} = (1/100) \text{ m}$$

$$= 3.5 \text{ cm} = (3.5/100) \text{ m}$$

$$= (35/1000) \text{ m}$$

$$= 0.035 \text{ m}$$

Now,

$$= 1 \text{ km} = 1000 \text{ m}$$

Then,

$$= 1 \text{ m} = (1/1000) \text{ km}$$

$$= 0.035 \text{ m} = (0.035/1000)$$

$$= 0.000035 \text{ km}$$

#### **4. Express in kg:**

**(i) 200 g**

**Solution:-**

We know that,

$$= 1 \text{ kg} = 1000 \text{ g}$$

Then,

$$= 1 \text{ g} = (1/1000) \text{ kg}$$

$$= 200 \text{ g} = (200/1000) \text{ kg}$$

$$= (2/10)$$

$$= 0.2 \text{ kg}$$

**(ii) 3470 g**

**Solution:-**

We know that,

$$= 1 \text{ kg} = 1000 \text{ g}$$

Then,

$$= 1 \text{ g} = (1/1000) \text{ kg}$$

$$= 3470 \text{ g} = (3470/1000) \text{ kg}$$

$$= (3470/100)$$

$$= 3.470 \text{ kg}$$

**(ii) 4 kg 8 g**

**Solution:-**

We know that,

$$= 1 \text{ kg} = 1000 \text{ g}$$

Then,

$$= 1 \text{ g} = (1/1000) \text{ kg}$$

$$= 4 \text{ kg } 8 \text{ g} = 4 \text{ kg} + (8/1000) \text{ kg}$$

$$= 4 \text{ kg} + 0.008$$

$$= 4.008 \text{ kg}$$

**5. Write the following decimal numbers in the expanded form:**

**(i) 20.03**

**Solution:-**

We have,

$$20.03 = (2 \times 10) + (0 \times 1) + (0 \times (1/10)) + (3 \times (1/100))$$

**(ii) 2.03**

**Solution:-**

We have,

$$2.03 = (2 \times 1) + (0 \times (1/10)) + (3 \times (1/100))$$

**(iii) 200.03**

**Solution:-**

We have,

$$200.03 = (2 \times 100) + (0 \times 10) + (0 \times 1) + (0 \times (1/10)) + (3 \times (1/100))$$

**(iv) 2.034**

**Solution:-**

We have,

$$2.034 = (2 \times 1) + (0 \times (1/10)) + (3 \times (1/100)) + (4 \times (1/1000))$$

**6. Write the place value of 2 in the following decimal numbers:**

**(i) 2.56**

**Solution:-**

From the question, we observe that,

The place value of 2 in 2.56 is ones

**(ii) 21.37**

**Solution:-**

From the question, we observe that,

The place value of 2 in 21.37 is tens

**(iii) 10.25**

**Solution:-**

From the question, we observe that,

The place value of 2 in 10.25 is tenths.

**(iv) 9.42**

**Solution:-**

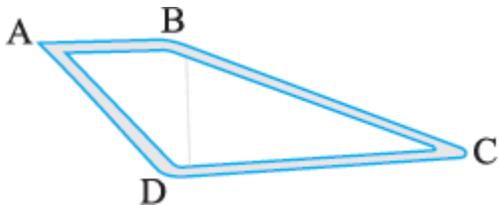
From the question, we observe that,  
The place value of 2 in 9.42 is hundredth.

**(v) 63.352**

**Solution:-**

From the question, we observe that,  
The place value of 2 in 63.352 is thousandth.

**7. Dinesh went from place A to place B and from there to place C. A is 7.5 km from B and B is 12.7 km from C. Ayub went from place A to place D and from there to place C. D is 9.3 km from A and C is 11.8 km from D. Who travelled more and by how much?**



**Solution:-**

From the question, it is given that,  
Distance travelled by Dinesh = AB + BC  
 $= 7.5 + 12.7$   
 $= 20.2$  km

∴ Dinesh travelled 20.2 km

Distance travelled by Ayub = AD + DC  
 $= 9.3 + 11.8$   
 $= 21.1$  km

∴ Ayub travelled 21.1 km

Clearly, Ayub travelled more distance by =  $(21.1 - 20.2)$   
 $= 0.9$  km

∴ Ayub travelled 0.9 km more than Dinesh.

**8. Shyama bought 5 kg 300 g apples and 3 kg 250 g mangoes. Sarala bought 4 kg 800 g oranges and 4 kg 150 g bananas. Who bought more fruits?**

**Solution:-**

From the question, it is given that,

$$\begin{aligned}\text{Fruits bought by Shyama} &= 5 \text{ kg } 300 \text{ g} \\ &= 5 \text{ kg} + (300/1000) \text{ kg} \\ &= 5 \text{ kg} + 0.3 \text{ kg} \\ &= 5.3 \text{ kg}\end{aligned}$$

$$\begin{aligned}\text{Fruits bought by Sarala} &= 4 \text{ kg } 800 \text{ g} + 4 \text{ kg } 150 \text{ g} \\ &= (4 + (800/1000)) + (4 + (150/1000)) \\ &= (4 + 0.8) \text{ kg} + (4 + .150) \text{ kg} \\ &= 4.8 \text{ kg} + 4.150 \text{ kg} \\ &= 8.950 \text{ kg}\end{aligned}$$

So, Sarala bought more fruits.

**9. How much less is 28 km than 42.6 km?****Solution:-**

Now, we have to find the difference of 42.6 km and 28 km

42.6

-28.0

14.6

∴ 14.6 km less is 28 km than 42.6 km.

## Exercise 2.6

**FIND:**

**(i)  $0.2 \times 6$**

**Solution:-**

We have,

$$\begin{aligned} &= (2/10) \times 6 \\ &= (12/10) \end{aligned}$$

On dividing a decimal by 10, the decimal point is shifted to the left by one place.

Then,

$$= 1.2$$

**(ii)  $8 \times 4.6$**

**Solution:-**

We have,

$$\begin{aligned} &= (8) \times (46/10) \\ &= (368/10) \end{aligned}$$

On dividing a decimal by 10, the decimal point is shifted to the left by one place.

Then,

$$= 36.8$$

**(iii)  $2.71 \times 5$**

**Solution:-**

We have,

$$\begin{aligned} &= (271/100) \times 5 \\ &= (1355/100) \end{aligned}$$

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

Then,

$$= 13.55$$

**(iv)  $20.1 \times 4$**

**Solution:-**

We have,

$$\begin{aligned} &= (201/10) \times 4 \\ &= (804/10) \end{aligned}$$

On dividing a decimal by 10, the decimal point is shifted to the left by one place.

Then,

$$= 80.4$$

**(v)  $0.05 \times 7$**

**Solution:-**

We have,

$$= (5/100) \times 7$$

$$= (35/100)$$

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

Then,

$$= 0.35$$

**(vi)  $211.02 \times 4$**

**Solution:-**

We have,

$$= (21102/100) \times 4$$

$$= (84408/100)$$

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

Then,

$$= 844.08$$

**(vii)  $2 \times 0.86$**

**Solution:-**

We have,

$$= (2) \times (86/100)$$

$$= (172/100)$$

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

Then,

$$= 1.72$$

**2. Find the area of rectangle whose length is 5.7cm and breadth is 3 cm.**

**Solution:-**

From the question, it is given that,

Length of the rectangle = 5.7 cm

Breadth of the rectangle = 3 cm

Then,

Area of the rectangle = length  $\times$  Breadth

$$= 5.7 \times 3$$

$$= 17.1 \text{ cm}^2$$

**3. Find:**

**(i)  $1.3 \times 10$**

**Solution:-**

On multiplying a decimal by 10, the decimal point is shifted to the right by one place.

We have,

$$= 1.3 \times 10 = 13$$

**(ii)  $36.8 \times 10$**

**Solution:-**

On multiplying a decimal by 10, the decimal point is shifted to the right by one place.

We have,

$$= 36.8 \times 10 = 368$$

**(iii)  $153.7 \times 10$**

**Solution:-**

On multiplying a decimal by 10, the decimal point is shifted to the right by one place.

We have,

$$= 153.7 \times 10 = 1537$$

**(iv)  $168.07 \times 10$**

**Solution:-**

On multiplying a decimal by 10, the decimal point is shifted to the right by one place.

We have,

$$= 168.07 \times 10 = 1680.7$$

**(v)  $31.1 \times 100$**

**Solution:-**

On multiplying a decimal by 100, the decimal point is shifted to the right by two places.

We have,

$$= 31.1 \times 100 = 3110$$

**(vi)  $156.1 \times 100$**

**Solution:-**

On multiplying a decimal by 100, the decimal point is shifted to the right by two places.

We have,

$$= 156.1 \times 100 = 15610$$

**(vii)  $3.62 \times 100$**

**Solution:-**

On multiplying a decimal by 100, the decimal point is shifted to the right by two places.

We have,

$$= 3.62 \times 100 = 362$$

**(viii)  $43.07 \times 100$**

**Solution:-**

On multiplying a decimal by 100, the decimal point is shifted to the right by two places.

We have,

$$= 43.07 \times 100 = 4307$$

**(ix)  $0.5 \times 10$**

**Solution:-**

On multiplying a decimal by 10, the decimal point is shifted to the right by one place.

We have,

$$= 0.5 \times 10 = 5$$

**(x)  $0.08 \times 10$**

**Solution:-**

On multiplying a decimal by 10, the decimal point is shifted to the right by one place.

We have,

$$= 0.08 \times 10 = 0.8$$

**(xi)  $0.9 \times 100$**

**Solution:-**

On multiplying a decimal by 100, the decimal point is shifted to the right by two places.

We have,

$$= 0.9 \times 100 = 90$$

**(xii)  $0.03 \times 1000$**

**Solution:-**

On multiplying a decimal by 1000, the decimal point is shifted to the right by three places.

We have,

$$= 0.03 \times 1000 = 30$$

**4. A two-wheeler covers a distance of 55.3 km in one litre of petrol. How much distance will it cover in 10 litres of petrol?**

**Solution:-**

From the question, it is given that,

Distance covered by two-wheeler in 1L of petrol = 55.3 km

Then,

$$\begin{aligned} \text{Distance covered by two wheeler in 10L of petrol} &= (10 \times 55.3) \\ &= 553 \text{ km} \end{aligned}$$

∴ Two-wheeler covers a distance in 10L of petrol is 553 km.

**5. Find:**

**(i)  $2.5 \times 0.3$**

**Solution:-**

We have,

$$\begin{aligned} &= (25/10) \times (3/10) \\ &= (75/100) \end{aligned}$$

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

Then,

$$= 0.75$$

**(ii)  $0.1 \times 51.7$**

**Solution:-**

We have,

$$\begin{aligned} &= (1/10) \times (517/10) \\ &= (517/100) \end{aligned}$$

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

Then,

$$= 5.17$$

**(iii)  $0.2 \times 316.8$**

**Solution:-**

We have,

$$\begin{aligned} &= (2/10) \times (3168/10) \\ &= (6336/100) \end{aligned}$$

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

Then,  
= 63.36

**(iv)  $1.3 \times 3.1$**

**Solution:-**

We have,  
=  $(13/10) \times (31/10)$   
=  $(403/100)$

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

Then,  
= 4.03

**(v)  $0.5 \times 0.05$**

**Solution:-**

We have,  
=  $(5/10) \times (5/100)$   
=  $(25/1000)$

On dividing a decimal by 1000, the decimal point is shifted to the left by three places.

Then,  
= 0.025

**(vi)  $11.2 \times 0.15$**

**Solution:-**

We have,  
=  $(112/10) \times (15/100)$   
=  $(1680/1000)$

On dividing a decimal by 1000, the decimal point is shifted to the left by three places.

Then,  
= 1.680

**(vii)  $1.07 \times 0.02$**

**Solution:-**

We have,  
=  $(107/100) \times (2/100)$   
=  $(214/10000)$

On dividing a decimal by 10000, the decimal point is shifted to the left by four places.

Then,

$$= 0.0214$$

**(viii)  $10.05 \times 1.05$**

**Solution:-**

We have,

$$\begin{aligned} &= (1005/100) \times (105/100) \\ &= (105525/10000) \end{aligned}$$

On dividing a decimal by 10000, the decimal point is shifted to the left by four places.

Then,

$$= 10.5525$$

**(ix)  $101.01 \times 0.01$**

**Solution:-**

We have,

$$\begin{aligned} &= (10101/100) \times (1/100) \\ &= (10101/10000) \end{aligned}$$

On dividing a decimal by 10000, the decimal point is shifted to the left by four places.

Then,

$$= 1.0101$$

**(x)  $100.01 \times 1.1$**

**Solution:-**

We have,

$$\begin{aligned} &= (10001/100) \times (11/10) \\ &= (110011/1000) \end{aligned}$$

On dividing a decimal by 1000, the decimal point is shifted to the left by three places.

Then,

$$= 110.011$$

## Exercise 2.7

### 1. Find:

(i)  $0.4 \div 2$

**Solution:-**

We have,

$$= (4/10) \div 2$$

Then,

$$= (4/10) \times (1/2)$$

$$= (2/10) \times (1/1)$$

$$= (2/10)$$

On dividing a decimal by 10, the decimal point is shifted to the left by one place.

Then,

$$= 0.2$$

(ii)  $0.35 \div 5$

**Solution:-**

We have,

$$= (35/100) \div 5$$

Then,

$$= (35/100) \times (1/5)$$

$$= (7/100) \times (1/1)$$

$$= (7/100)$$

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

Then,

$$= 0.07$$

(iii)  $2.48 \div 4$

**Solution:-**

We have,

$$= (248/100) \div 4$$

Then,

$$= (248/100) \times (1/4)$$

$$= (62/100) \times (1/1)$$

$$= (62/100)$$

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

Then,

$$= 0.62$$

**(iv)  $65.4 \div 6$**

**Solution:-**

We have,

$$= (654/10) \div 6$$

Then,

$$= (654/10) \times (1/6)$$

$$= (109/10) \times (1/1)$$

$$= (109/10)$$

On dividing a decimal by 10, the decimal point is shifted to the left by one place.

Then,

$$= 10.9$$

**(v)  $651.2 \div 4$**

**Solution:-**

We have,

$$= (6512/10) \div 4$$

Then,

$$= (6512/10) \times (1/4)$$

$$= (1628/10) \times (1/1)$$

$$= (1628/10)$$

On dividing a decimal by 10, the decimal point is shifted to the left by one place.

Then,

$$= 162.8$$

**(vi)  $14.49 \div 7$**

**Solution:-**

We have,

$$= (1449/100) \div 7$$

Then,

$$= (1449/100) \times (1/7)$$

$$= (207/100) \times (1/1)$$

$$= (207/100)$$

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

Then,

$$= 2.07$$

**(vii)  $3.96 \div 4$**

**Solution:-**

We have,

$$= (396/100) \div 4$$

Then,

$$= (396/100) \times (1/4)$$

$$= (99/100) \times (1/1)$$

$$= (99/100)$$

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

Then,

$$= 0.99$$

**(viii)  $0.80 \div 5$**

**Solution:-**

We have,

$$= (80/100) \div 5$$

Then,

$$= (80/100) \times (1/5)$$

$$= (16/100) \times (1/1)$$

$$= (16/100)$$

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

Then,

$$= 0.16$$

**2. Find:**

**(i)  $4.8 \div 10$**

**Solution:-**

On dividing a decimal by 10, the decimal point is shifted to the left by one place.

We have,

$$= 4.8 \div 10$$

$$= (4.8/10)$$

$$= 0.48$$

**(ii)  $52.5 \div 10$**

**Solution:-**

On dividing a decimal by 10, the decimal point is shifted to the left by one place.

We have,

$$\begin{aligned} &= 52.5 \div 10 \\ &= (52.5/10) \\ &= 5.25 \end{aligned}$$

**(iii)  $0.7 \div 10$**

**Solution:-**

On dividing a decimal by 10, the decimal point is shifted to the left by one place.

We have,

$$\begin{aligned} &= 0.7 \div 10 \\ &= (0.7/10) \\ &= 0.07 \end{aligned}$$

**(iv)  $33.1 \div 10$**

**Solution:-**

On dividing a decimal by 10, the decimal point is shifted to the left by one place.

We have,

$$\begin{aligned} &= 33.1 \div 10 \\ &= (33.1/10) \\ &= 3.31 \end{aligned}$$

**(v)  $272.23 \div 10$**

**Solution:-**

On dividing a decimal by 10, the decimal point is shifted to the left by one place.

We have,

$$\begin{aligned} &= 272.23 \div 10 \\ &= (272.23/10) \\ &= 27.223 \end{aligned}$$

**(vi)  $0.56 \div 10$**

**Solution:-**

On dividing a decimal by 10, the decimal point is shifted to the left by one place.

We have,

$$\begin{aligned} &= 0.56 \div 10 \\ &= (0.56/10) \\ &= 0.056 \end{aligned}$$

**(vii)  $3.97 \div 10$**

**Solution:-**

On dividing a decimal by 10, the decimal point is shifted to the left by one place.

We have,

$$= 3.97 \div 10$$

$$= (3.97/10)$$

$$= 0.397$$

**3. Find:**

**(i)  $2.7 \div 100$**

**Solution:-**

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

We have,

$$= 2.7 \div 100$$

$$= (2.7/100)$$

$$= 0.027$$

**(ii)  $0.3 \div 100$**

**Solution:-**

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

We have,

$$= 0.3 \div 100$$

$$= (0.3/100)$$

$$= 0.003$$

**(iii)  $0.78 \div 100$**

**Solution:-**

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

We have,

$$= 0.78 \div 100$$

$$= (0.78/100)$$

$$= 0.0078$$

**(iv)  $432.6 \div 100$**

**Solution:-**

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

We have,

$$\begin{aligned} &= 432.6 \div 100 \\ &= (432.6/100) \\ &= 4.326 \end{aligned}$$

**(v) 23.6 ÷ 100**

**Solution:-**

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

We have,

$$\begin{aligned} &= 23.6 \div 100 \\ &= (23.6/100) \\ &= 0.236 \end{aligned}$$

**(vi) 98.53 ÷ 100**

**Solution:-**

On dividing a decimal by 100, the decimal point is shifted to the left by two places.

We have,

$$\begin{aligned} &= 98.53 \div 100 \\ &= (98.53/100) \\ &= 0.9853 \end{aligned}$$

**4. Find:**

**(i) 7.9 ÷ 1000**

**Solution:-**

On dividing a decimal by 1000, the decimal point is shifted to the left by three places.

We have,

$$\begin{aligned} &= 7.9 \div 1000 \\ &= (7.9/1000) \\ &= 0.0079 \end{aligned}$$

**(ii) 26.3 ÷ 1000**

**Solution:-**

On dividing a decimal by 1000, the decimal point is shifted to the left by three places.

We have,

$$\begin{aligned} &= 26.3 \div 1000 \\ &= (26.3/1000) \\ &= 0.0263 \end{aligned}$$

**(iii)  $38.53 \div 1000$**

**Solution:-**

On dividing a decimal by 1000, the decimal point is shifted to the left by three places.

We have,

$$= 38.53 \div 1000$$

$$= (38.53/1000)$$

$$= 0.03853$$

**(iv)  $128.9 \div 1000$**

**Solution:-**

On dividing a decimal by 1000, the decimal point is shifted to the left by three places.

We have,

$$= 128.9 \div 1000$$

$$= (128.9/1000)$$

$$= 0.1289$$

**(v)  $0.5 \div 1000$**

**Solution:-**

On dividing a decimal by 1000, the decimal point is shifted to the left by three places.

We have,

$$= 0.5 \div 1000$$

$$= (0.5/1000)$$

$$= 0.0005$$

**5. Find:**

**(i)  $7 \div 3.5$**

**Solution:-**

We have,

$$= 7 \div (35/10)$$

$$= 7 \times (10/35)$$

$$= 1 \times (10/5)$$

$$= 2$$

**(ii)  $36 \div 0.2$**

**Solution:-**

We have,

$$= 36 \div (2/10)$$

$$\begin{aligned} &= 36 \times (10/2) \\ &= 18 \times 10 \\ &= 180 \end{aligned}$$

**(iii)  $3.25 \div 0.5$**

**Solution:-**

We have,

$$\begin{aligned} &= (325/100) \div (5/10) \\ &= (325/100) \times (10/5) \\ &= (325 \times 10) / (100 \times 5) \\ &= (65 \times 1) / (10 \times 1) \\ &= 65/10 \\ &= 6.5 \end{aligned}$$

**(iv)  $30.94 \div 0.7$**

**Solution:-**

We have,

$$\begin{aligned} &= (3094/100) \div (7/10) \\ &= (3094/100) \times (10/7) \\ &= (3094 \times 10) / (100 \times 7) \\ &= (442 \times 1) / (10 \times 1) \\ &= 442/10 \\ &= 44.2 \end{aligned}$$

**(v)  $0.5 \div 0.25$**

**Solution:-**

We have,

$$\begin{aligned} &= (5/10) \div (25/100) \\ &= (5/10) \times (100/25) \\ &= (5 \times 100) / (10 \times 25) \\ &= (1 \times 10) / (1 \times 5) \\ &= 10/5 \\ &= 2 \end{aligned}$$

**(vi)  $7.75 \div 0.25$**

**Solution:-**

We have,

$$\begin{aligned}
&= (775/100) \div (25/100) \\
&= (775/100) \times (100/25) \\
&= (775 \times 100) / (100 \times 25) \\
&= (155 \times 1) / (1 \times 5) \\
&= (31 \times 1) / (1 \times 1) \\
&= 31
\end{aligned}$$

**(vii) 76.5 ÷ 0.15**

**Solution:-**

We have,

$$\begin{aligned}
&= (765/10) \div (15/100) \\
&= (765/10) \times (100/15) \\
&= (765 \times 100) / (10 \times 15) \\
&= (51 \times 10) / (1 \times 1) \\
&= 510
\end{aligned}$$

**(viii) 37.8 ÷ 1.4**

**Solution:-**

We have,

$$\begin{aligned}
&= (378/10) \div (14/10) \\
&= (378/10) \times (10/14) \\
&= (378 \times 10) / (10 \times 14) \\
&= (27 \times 1) / (1 \times 1) \\
&= 27
\end{aligned}$$

**(ix) 2.73 ÷ 1.3**

**Solution:-**

We have,

$$\begin{aligned}
&= (273/100) \div (13/10) \\
&= (273/100) \times (10/13) \\
&= (273 \times 10) / (100 \times 13) \\
&= (21 \times 1) / (10 \times 1) \\
&= 21/10 \\
&= 2.1
\end{aligned}$$

**6. A vehicle covers a distance of 43.2 km in 2.4 litres of petrol. How much distance will**

**it cover in one  
litre of petrol?**

**Solution:-**

From the question, it is given that,

Total distance covered by vehicle in 2.4 litres of petrol

= 43.2 km Then,

Distance covered in 1 litre of petrol =  $43.2 \div 2.4$

$$= (432/10) \div (24/10)$$

$$= (432/10) \times (10/24)$$

$$= (432 \times 10) / (10 \times 24)$$

$$= (36 \times 1) / (1 \times 2)$$

$$= (18 \times 1) / (1 \times 1)$$

$$= 18 \text{ km}$$

∴ Total distance covered in 1 liter of petrol is 18 km.

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**CH.2 FRACTIONS AND DECIMALS**

**MIND MAP**

**This chapter consists of three different topics. The most probable questions from the examination point of view are given below.**

**TYPE: 1 OPERATIONS ON FRACTIONS:**

1.  $(3\frac{1}{3} - 7)$
2.  $4\frac{4}{5} \times \frac{15}{8}$
3.  $\frac{12}{7} \div \frac{6}{21}$

**TYPE: 2 OPERATIONS ON DECIMALS:**

1.  $0.2 \times 0.38$
2.  $0.232 \times 1000$
3.  $0.267 \div 0.35$

**TYPE: 3 WORD PROBLEMS:**

1. Savita is dividing  $7\frac{1}{6}$  kg of sweets equally among her seven friends. How much does each friend receive?
2. Ramu finishes  $\frac{1}{3}$  part of a work in 1 hour. How much  $2\frac{1}{5}$  part of the work will be finished in hours?
3. Three boys earned a total of ₹ 235.50. What was the average amount earned per boy?
4. Harmeet purchased 3.5kg of potatoes at the rate of ₹ 13.75per kg. How much money should she pay in nearest rupees?



# NCERT Solutions for Class 7 Maths Chapter 7

## Congruence of Triangles Class 7

Chapter 7 Congruence of Triangles Exercise 7.1, 7.2 Solutions

Exercise 7.1 : Solutions of Questions on Page Number : 137

Q1 :

Complete the following statements:

- (a) Two line segments are congruent if \_\_\_\_\_.
- (b) Among two congruent angles, one has a measure of  $70^\circ$ ; the measure of the other angle is \_\_\_\_\_.
- (c) When we write  $\angle A = \angle B$ , we actually mean \_\_\_\_\_.

Answer :

- (a) They have the same length
- (b)  $70^\circ$
- (c)  $m \angle A = m \angle B$

Q2 :

Give any two real-life examples for congruent shapes.

Answer :

- (i) Sheets of same letter pad (ii)  
Biscuits in the same packet

Q3 :

If  $\triangle ABC \cong \triangle FED$  under the correspondence  $ABC \leftrightarrow FED$ , write all the Corresponding congruent parts of the triangles.

Answer :

If these triangles are congruent, then the corresponding angles and sides will be equal to each other.

$$\angle A \leftrightarrow \angle F$$

$$\angle B \leftrightarrow \angle E$$

$$\angle C \leftrightarrow \angle D$$

$$\overline{AB} \leftrightarrow \overline{FE}$$

$$\overline{BC} \leftrightarrow \overline{ED}$$

$$\overline{CA} \leftrightarrow \overline{DF}$$

Q4 :

If  $\triangle DEF \cong \triangle BCA$ , write the part(s) of  $\triangle BCA$  that correspond to

(i)  $\overline{EF}$ , (ii)  $\angle F$ , (iii)  $\angle C$ , (iv)  $\overline{DF}$

Answer :

(i)  $\angle C$

$\overline{CA}$  (ii)

(iii)  $\angle A$

$\overline{BA}$  (iv)

Exercise 7.2 : Solutions of Questions on Page Number : 149

Q1 :

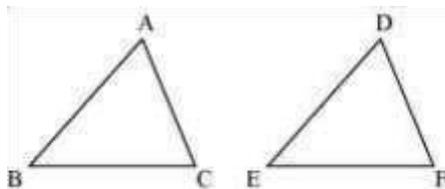
Which congruence criterion do you use in the following?

(a) Given:  $AC = DF$

$AB = DE$

$BC = EF$

So,  $\triangle ABC \cong \triangle DEF$

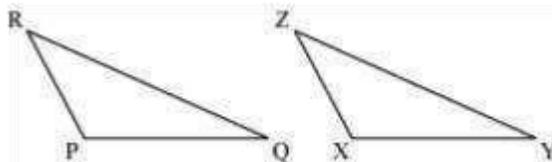


(b) Given:  $ZX = RP$

$RQ = ZY$

$\angle PRQ = \angle XZY$

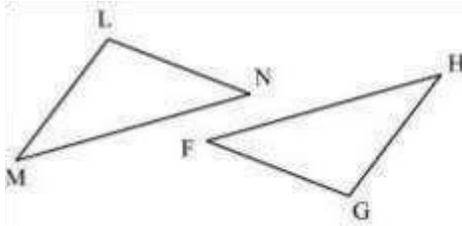
So,  $\triangle PQR \cong \triangle XYZ$



(c) Given:  $\angle MLN = \angle FGH$ ,  $\angle NML = \angle GFH$

$ML = FG$

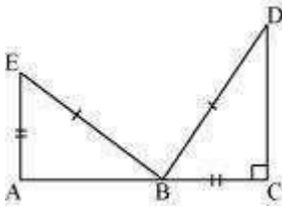
So,  $\triangle LMN \cong \triangle GFH$



(d) Given:  $EB = DB$   $AE = BC$

$$\angle A = \angle C = 90^\circ$$

So,  $\triangle ABE \cong \triangle CDB$



Answer :

- (a) SSS, as the sides of  $\triangle ABC$  are equal to the sides of  $\triangle DEF$ .  
 (b) SAS, as two sides and the angle included between these sides of  $\triangle PQR$  are equal to two sides and the angle included between these sides of  $\triangle XYZ$ . (c) ASA, as two angles and the side included between these angles of  $\triangle LMN$  are equal to two angles and the side included between these angles of  $\triangle GFH$ .  
 (d) RHS, as in the given two right-angled triangles, one side and the hypotenuse are respectively equal.

Q2 :

You want to show that  $\triangle ART \cong \triangle PEN$ ,

(a) If you have to use SSS criterion, then you need to show

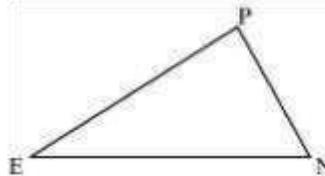
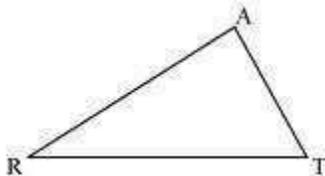
(i)  $AR =$  (ii)  $RT =$  (iii)  $AT =$

(b) If it is given that  $\angle R = \angle N$  and you are to use SAS criterion, you need to have

(i)  $RT =$  and (ii)  $PN =$

(c) If it is given that  $AT = PN$  and you are to use ASA criterion, you need to have

(i) ? (ii) ?



Answer :

- (a)  
 (i)  $AR = PE$

(ii)  $RT = EN$

(iii)  $AT = PN$

(b)

(i)  $RT = EN$

(ii)  $PN = AT$

(c)

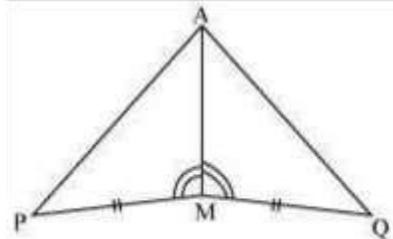
(i)  $\triangle ATR = \triangle PNE$  (ii)  $\triangle RAT = \triangle EPN$

**Q3 :**

You have to show that  $\triangle AMP \cong \triangle AMQ$ .

In the following proof, supply the missing reasons.

-	Steps	-	Reasons
(i)	$PM = QM$	(i)	...
(ii)	$\angle PMA = \angle QMA$	(ii)	...
(iii)	$AM = AM$	(iii)	...
(iv)	$\triangle AMP \cong \triangle AMQ$	(iv)	...



**Answer :**

(i) Given

(ii) Given

(iii) Common

(iv) SAS, as the two sides and the angle included between these sides of  $\triangle AMP$  are equal to two sides and the angle included between these sides of  $\triangle AMQ$ .

**Q4 :**

In  $\triangle ABC$ ,  $\angle A = 30^\circ$ ,  $B = 40^\circ$  and  $C = 110^\circ$

In  $\triangle PQR$ ,  $\angle P = 30^\circ$ ,  $Q = 40^\circ$  and  $R = 110^\circ$  A student says that  $\triangle ABC \cong \triangle PQR$  by AAA congruence criterion. Is he justified? Why or why not?

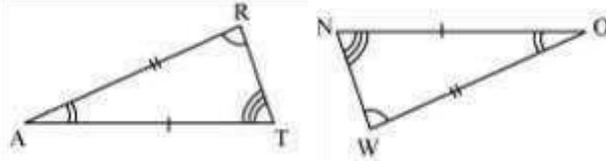
**Answer :**

No. This property represents that these triangles have their respective angles of equal measure. However, this gives no information about their sides. The sides of these triangles have a ratio somewhat different than 1:1. Therefore, AAA property does not prove the two triangles congruent.

**Q5 :**

In the figure, the two triangles are congruent.

The corresponding parts are marked. We can write  $\Delta RAT \cong ?$



**Answer :**

It can be observed that,

$$\angle RAT = \angle WON$$

$$\begin{aligned} \angle ART &= \angle ONW \\ RA &= ON \\ AT &= WO \end{aligned}$$

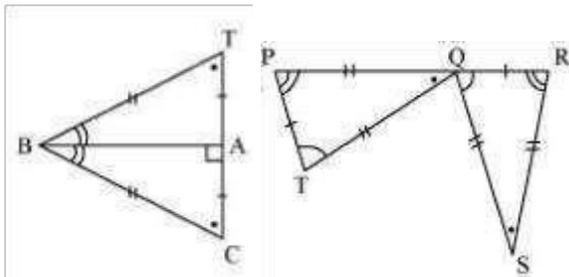
Therefore,  $\Delta RAT \cong \Delta WON$ , by ASA criterion.

**Q6 :**

Complete the congruence statement:

$\Delta BCA \cong ?$

$\Delta QRS \cong ?$



**Answer :**

Given that,  $BC = BT$

$TA = CA$

$BA$  is common.

Therefore,  $\Delta BCA \cong \Delta BTA$

Similarly,  $PQ = RS$

$TQ = QS$

$PT = RQ$

Therefore,  $\Delta QRS \cong \Delta TPQ$

Q7 :

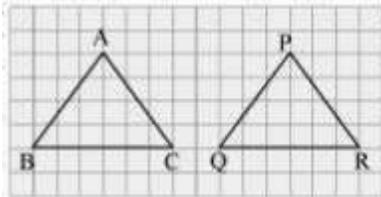
In a squared sheet, draw two triangles of equal areas such that (i)  
The triangles are congruent.

(ii) The triangles are not congruent.

What can you say about their perimeters?

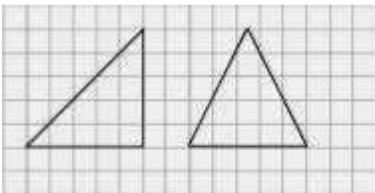
Answer :

(i)



Here,  $\triangle ABC$  and  $\triangle PQR$  have the same area and are congruent to each other also. Also, the perimeter of both the triangles will be the same.

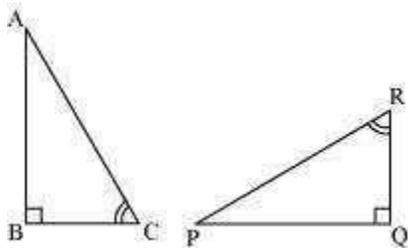
(ii)



Here, the two triangles have the same height and base. Thus, their areas are equal. However, these triangles are not congruent to each other. Also, the perimeter of both the triangles will not be the same.

Q8 :

If  $\triangle ABC$  and  $\triangle PQR$  are to be congruent, name one additional pair of corresponding parts. What criterion did you use?



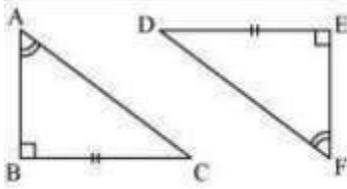
Answer :

$BC = QR$

$\triangle ABC \cong \triangle PQR$  (ASA criterion)

Q9 : Explain,  
why

$\triangle ABC \cong \triangle FED$



**Answer :**

Given that,  $\angle ABC = \angle FED$  (1)  $\angle BAC =$

$\angle EFD$  (2)

The two angles of  $\triangle ABC$  are equal to the two respective angles of  $\triangle FED$ . Also, the sum of all interior angles of a triangle is  $180^\circ$ .

Therefore, third angle of both triangles will also be equal in measure.  $\angle BCA = \angle EDF$  (3)

Also, given that,  $BC = ED$  (4)

By using equation (1), (3), and (4), we obtain

$\triangle ABC \cong \triangle FED$  (ASA criterion)

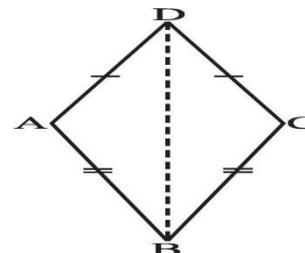
**DELHI PUBLIC SCHOOL, GANDHINAGAR**  
**CHAPTER – 7 CONGRUENCE OF TRIANGLES**

**MIND MAP**

This chapter consists of four different topics. The most probable questions from examination point of view are given below.

**TYPE: 1 SSS CONGRUENCE CONDITION OF TRIANGLES.**

Q.1 In Fig  $AD = CD$  and  $AB = CB$ .



- (i) State the three pairs of equal parts in  $\triangle ABD$  and  $\triangle CBD$ .
- (ii) Is  $\triangle ABD \cong \triangle CBD$ ? Why or why not?
- (iii) Does  $BD$  bisect  $\angle ABC$ ? Give reasons.

Q.2 In  $\triangle ABC$  and  $\triangle PQR$ ,  $AB=4\text{cm}$ ,  $BC=5\text{ cm}$ ,  $AC=6\text{ cm}$  and  $PQ=4\text{cm}$ ,  $QR=5\text{ cm}$ ,  $PR=6\text{ cm}$ , then which of the following is true-

- |   |   |
|---|---|
| (a) $\triangle ABC \cong \triangle QRP$ | (c) $\triangle ABC \cong \triangle PQR$ |
| (c) $\triangle ABC \cong \triangle PRQ$ | (d) $\triangle ABC \cong \triangle QPR$ |

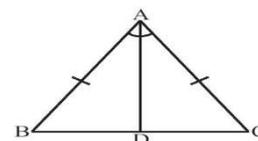
**TYPE: 2. SAS CONGRUENCE CONDITION OF TRIANGLES.**

Q.1 In triangles  $ABC$  and  $DEF$ ,  $AB = 7\text{ cm}$ ,  $BC = 5\text{ cm}$ ,  $\angle B = 50^\circ$   $DE = 5\text{ cm}$ ,  $EF = 7\text{ cm}$ ,  $\angle E = 50^\circ$  By which congruence rule the triangles are congruent?

- (a) SAS                      (b) RHS                      (c) ASA                      (d) SSS

Q.2 In the above sided Fig,  $AB = AC$  and  $AD$  is the bisector of  $\angle BAC$ .

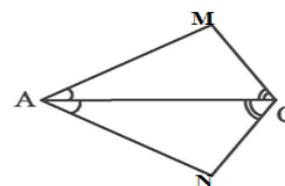
- (i) State three pairs of equal parts in triangles  $ADB$  and  $ADC$ .
- (ii) Is  $\triangle ADB \cong \triangle ADC$ ? Give reasons.
- (iii) Is  $BD = DC$ ? Give reasons.



**TYPE : 3 ASA CONGRUENCE CONDITION OF TRIANGLES.**

Q.1 In the above sided Fig,  $AC$  bisects  $\angle MAN$  as well as  $\angle MCN$ .

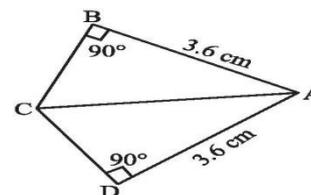
- (i) State the three pairs of equal parts in triangles  $NAC$  and  $MAC$ .
- (ii) Is  $\triangle NAC \cong \triangle MAC$ ? Give reasons.
- (iii) Is  $AN = AM$ ? Justify your answer.



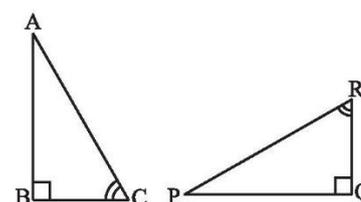
**TYPE : 4 RHS CONGRUENCE CONDITION OF TRIANGLES.**

Q.1. In the adjoining figure, by which congruence rule the triangles are congruent?

- (a) SAS                      (b) RHS                      (c) ASA                      (d) SSS



Q.2. If  $\triangle ABC$  and  $\triangle PQR$  are to be congruent, name one additional pair of corresponding parts. What criterion did you use?



## EXERCISE 9.1

PAGE: 182

### 1. List five rational numbers between:

(i) -1 and 0

**Solution:-**

The five rational numbers between -1 and 0 are,

$$-1 < (-2/3) < (-3/4) < (-4/5) < (-5/6) < (-6/7) < 0$$

(ii) -2 and -1

**Solution:-**

The five rational numbers between -2 and -1 are,

$$-2 < (-8/7) < (-9/8) < (-10/9) < (-11/10) < (-12/11) < -1$$

(iii)  $-4/5$  and  $-2/3$

**Solution:-**

The five rational numbers between  $-4/5$  and  $-2/3$  are,

$$-4/5 < (-13/12) < (-14/13) < (-15/14) < (-16/15) < (-17/16) < -2/3$$

(iv)  $-1/2$  and  $2/3$

**Solution:-**

The five rational numbers between  $-1/2$  and  $2/3$  are,

$$-1/2 < (-1/6) < (0) < (1/3) < (1/2) < (20/36) < 2/3$$

### 2. Write four more rational numbers in each of the following patterns:

(i)  $-3/5, -6/10, -9/15, -12/20, \dots$

**Solution:-**

In the above question, we can observe that the numerator and denominator are the multiples of 3 and 5.

$$= (-3 \times 1)/(5 \times 1), (-3 \times 2)/(5 \times 2), (-3 \times 3)/(5 \times 3), (-3 \times 4)/(5 \times 4)$$

Then, next four rational numbers in this pattern are,

$$= (-3 \times 5)/(5 \times 5), (-3 \times 6)/(5 \times 6), (-3 \times 7)/(5 \times 7), (-3 \times 8)/(5 \times 8) \\ = -15/25, -18/30, -21/35, -24/40 \dots$$

(ii)  $-1/4, -2/8, -3/12, \dots$

**Solution:-**

In the above question, we can observe that the numerator and denominator are the multiples of 1 and 4.

$$= (-1 \times 1)/(4 \times 1), (-1 \times 2)/(4 \times 2), (-1 \times 3)/(4 \times 3)$$

Then, next four rational numbers in this pattern are,

$$= (-1 \times 4)/(4 \times 4), (-1 \times 5)/(4 \times 5), (-1 \times 6)/(4 \times 6), (-1 \times 7)/(4 \times 7) \\ = -4/16, -5/20, -6/24, -7/28 \dots$$

**(iii)  $-1/6, 2/-12, 3/-18, 4/-24 \dots$**

**Solution:-**

In the above question, we can observe that the numerator and denominator are the multiples of 1 and 6.

$$= (-1 \times 1)/(6 \times 1), (1 \times 2)/(-6 \times 2), (1 \times 3)/(-6 \times 3), (1 \times 4)/(-6 \times 4)$$

Then, next four rational numbers in this pattern are,

$$= (1 \times 5)/(-6 \times 5), (1 \times 6)/(-6 \times 6), (1 \times 7)/(-6 \times 7), (1 \times 8)/(-6 \times 8) \\ = 1/-30, 6/-36, 7/-42, 8/-48 \dots$$

**(iv)  $-2/3, 2/-3, 4/-6, 6/-9 \dots$**

**Solution:-**

In the above question, we can observe that the numerator and denominator are the multiples of 2 and 3.

$$= (-2 \times 1)/(3 \times 1), (2 \times 1)/(-3 \times 1), (2 \times 2)/(-3 \times 2), (2 \times 3)/(-3 \times 3)$$

Then, next four rational numbers in this pattern are,

$$= (2 \times 4)/(-3 \times 4), (2 \times 5)/(-3 \times 5), (2 \times 6)/(-3 \times 6), (2 \times 7)/(-3 \times 7) \\ = 8/-12, 10/-15, 12/-18, 14/-21 \dots$$

**3. Give four rational numbers equivalent to:**

**(i)  $-2/7$**

**Solution:-**

The four rational numbers equivalent to  $-2/7$  are,

$$= (-2 \times 2)/(7 \times 2), (-2 \times 3)/(7 \times 3), (-2 \times 4)/(7 \times 4), (-2 \times 5)/(7 \times 5) \\ = -4/14, -6/21, -8/28, -10/35$$

**(ii)  $5/-3$**

**Solution:-**

The four rational numbers equivalent to  $5/-3$  are,

$$= (5 \times 2)/(-3 \times 2), (5 \times 3)/(-3 \times 3), (5 \times 4)/(-3 \times 4), (5 \times 5)/(-3 \times 5) \\ = 10/-6, 15/-9, 20/-12, 25/-15$$

**(iii)  $4/9$**

**Solution:-**

The four rational numbers equivalent to  $5/-3$  are,

$$= (4 \times 2)/(9 \times 2), (4 \times 3)/(9 \times 3), (4 \times 4)/(9 \times 4), (4 \times 5)/(9 \times 5) \\ = 8/18, 12/27, 16/36, 20/45$$

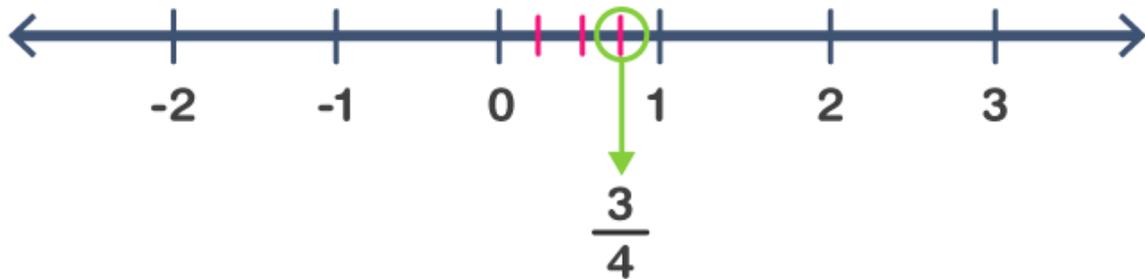
**4. Draw the number line and represent the following rational numbers on it:**

(i)  $3/4$

**Solution:-**

We know that  $3/4$  is greater than 0 and less than 1.

$\therefore$  it lies between 0 and 1. It can be represented on number line as,



(ii)  $-5/8$

**Solution:-**

We know that  $-5/8$  is less than 0 and greater than -1.

$\therefore$  it lies between 0 and -1. It can be represented on number line as,



(iii)  $-7/4$

**Solution:-**

Now above question can be written as,

$$= (-7/4) = -1\frac{3}{4}$$

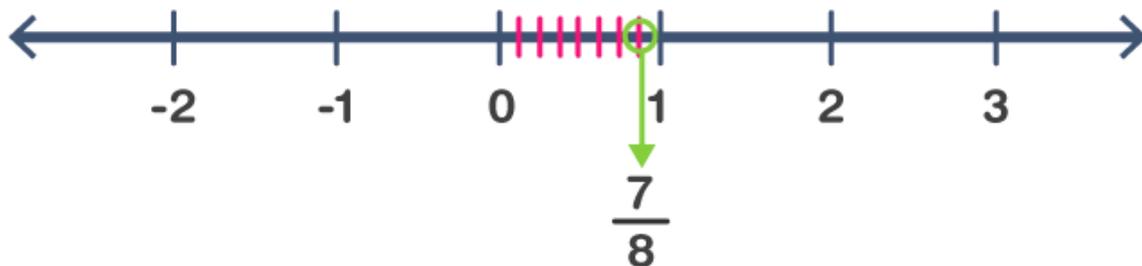
We know that  $(-7/4)$  is Less than  $-1$  and greater than  $-2$ .  
∴ it lies between  $-1$  and  $-2$ . It can be represented on number line as,



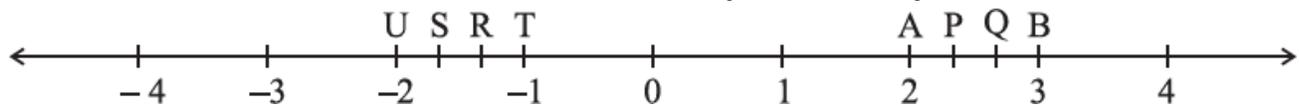
(iv)  $7/8$

**Solution:-**

We know that  $7/8$  is greater than  $0$  and less than  $1$ .  
∴ it lies between  $0$  and  $1$ . It can be represented on number line as,



5. The points  $P, Q, R, S, T, U, A$  and  $B$  on the number line are such that,  $TR = RS = SU$  and  $AP = PQ = QB$ . Name the rational numbers represented by  $P, Q, R$  and  $S$ .



**Solution:-**

By observing the figure, we can say that,

The distance between  $A$  and  $B = 1$  unit

And it is divided into 3 equal parts =  $AP = PQ = QB = 1/3$

$P = 2 + (1/3)$

$$= (6 + 1)/3$$

$$= 7/3$$

$$Q = 2 + (2/3)$$

$$= (6 + 2)/3$$

$$= 8/3$$

Similarly,

The distance between U and T = 1 unit

And it is divided into 3 equal parts = TR = RS = SU = 1/3

$$R = -1 - (1/3)$$

$$= (-3 - 1)/3$$

$$= -4/3$$

$$S = -1 - (2/3)$$

$$= (-3 - 2)/3$$

$$= -5/3$$

**6. Which of the following pairs represent the same rational number?**

**(i)  $(-7/21)$  and  $(3/9)$**

**Solution:-**

We have to check the given pair represents the same rational number.

Then,

$$-7/21 = 3/9$$

$$-1/3 = 1/3$$

$$\therefore -1/3 \neq 1/3$$

$$\therefore -7/21 \neq 3/9$$

So, the given pair is not represents the same rational number.

**(ii)  $(-16/20)$  and  $(20/-25)$**

**Solution:-**

We have to check the given pair represents the same rational number.

Then,

$$-16/20 = 20/-25$$

$$-4/5 = 4/-5$$

$$\therefore -4/5 = -4/5$$

$$\therefore -16/20 = 20/-25$$

So, the given pair is represents the same rational number.

**(iii)  $(-2/-3)$  and  $(2/3)$**

**Solution:-**

We have to check the given pair represents the same rational number.

Then,

$$-2/-3 = 2/3$$

$$2/3 = 2/3$$

$$\therefore 2/3 = 2/3$$

$$\therefore -2/-3 = 2/3$$

So, the given pair is represents the same rational number.

**(iv) (-3/5) and (-12/20)**

**Solution:-**

We have to check the given pair represents the same rational number.

Then,

$$-3/5 = -12/20$$

$$-3/5 = -3/5$$

$$\therefore -3/5 = -3/5$$

$$\therefore -3/5 = -12/20$$

So, the given pair is represents the same rational number.

**(v) (8/-5) and (-24/15)**

**Solution:-**

We have to check the given pair represents the same rational number.

Then,

$$8/-5 = -24/15$$

$$8/-5 = -8/5$$

$$\therefore -8/5 = -8/5$$

$$\therefore 8/-5 = -24/15$$

So, the given pair is represents the same rational number.

**(vi) (1/3) and (-1/9)**

**Solution:-**

We have to check the given pair represents the same rational number.

Then,

$$1/3 = -1/9$$

$$\therefore 1/3 \neq -1/9$$

$$\therefore 1/3 \neq -1/9$$

So, the given pair is not represents the same rational number.

**(vii)  $(-5/-9)$  and  $(5/-9)$**

**Solution:-**

We have to check the given pair represents the same rational number.

Then,

$$-5/-9 = 5/-9$$

$$\therefore 5/9 \neq -5/9$$

$$\therefore -5/-9 \neq 5/-9$$

So, the given pair is not represents the same rational number.

**7. Rewrite the following rational numbers in the simplest form:**

**(i)  $-8/6$**

**Solution:-**

The given rational numbers can be simplified further,

Then,

$$= -4/3 \quad \dots [\because \text{Divide both numerator and denominator by 2}]$$

**(ii)  $25/45$**

**Solution:-**

The given rational numbers can be simplified further,

Then,

$$= 5/9 \quad \dots [\because \text{Divide both numerator and denominator by 5}]$$

**(iii)  $-44/72$**

**Solution:-**

The given rational numbers can be simplified further,

Then,

$$= -11/18 \quad \dots [\because \text{Divide both numerator and denominator by 4}]$$

**(iv)  $-8/10$**

**Solution:-**

The given rational numbers can be simplified further,

Then,

$$= -4/5 \quad \dots [\because \text{Divide both numerator and denominator by 2}]$$

**8. Fill in the boxes with the correct symbol out of  $>$ ,  $<$ , and  $=$ .**

**(i)  $-5/7$  [ ]  $2/3$**

**Solution:-**

The LCM of the denominators 7 and 3 is 21

$$\therefore (-5/7) = [(-5 \times 3) / (7 \times 3)] = (-15/21)$$

$$\text{And } (2/3) = [(2 \times 7) / (3 \times 7)] = (14/21)$$

Now,

$$-15 < 14$$

$$\text{So, } (-15/21) < (14/21)$$

$$\text{Hence, } -5/7 < 2/3$$

**(ii)  $-4/5$  [ ]  $-5/7$**

**Solution:-**

The LCM of the denominators 5 and 7 is 35

$$\therefore (-4/5) = [(-4 \times 7) / (5 \times 7)] = (-28/35)$$

$$\text{And } (-5/7) = [(-5 \times 5) / (7 \times 5)] = (-25/35)$$

Now,

$$-28 < -25$$

$$\text{So, } (-28/35) < (-25/35)$$

$$\text{Hence, } -4/5 < -5/7$$

**(iii)  $-7/8$  [ ]  $14/-16$**

**Solution:-**

$14/-16$  can be simplified further,

Then,

$$7/-8 \quad \dots [\because \text{Divide both numerator and denominator by 2}]$$

$$\text{So, } (-7/8) = (-7/8)$$

$$\text{Hence, } -7/8 [=] 14/-16$$

**(iv)  $-8/5$  [ ]  $-7/4$**

**Solution:-**

The LCM of the denominators 5 and 4 is 20

$$\therefore (-8/5) = [(-8 \times 4) / (5 \times 4)] = (-32/20)$$

$$\text{And } (-7/4) = [(-7 \times 5) / (4 \times 5)] = (-35/20)$$

Now,

$$-32 > -35$$

$$\text{So, } (-32/20) > (-35/20)$$

$$\text{Hence, } -8/5 > -7/4$$

**(v)  $1/-3$  [ ]  $-1/4$**

**Solution:-**

The LCM of the denominators 3 and 4 is 12

$$\therefore (-1/3) = [(-1 \times 4) / (3 \times 4)] = (-4/12)$$

$$\text{And } (-1/4) = [(-1 \times 3) / (4 \times 3)] = (-3/12)$$

Now,

$$-4 < -3$$

$$\text{So, } (-4/12) < (-3/12)$$

$$\text{Hence, } 1/3 < 1/4$$

**(vi)  $5/-11$  [ ]  $-5/11$**

**Solution:-**

$$\text{Since, } (-5/11) = (-5/11)$$

$$\text{Hence, } 5/-11 [=] -5/11$$

**(vii)  $0$  [ ]  $-7/6$**

**Solution:-**

Since every negative rational number is less than 0.

We have:

$$0 > -7/6$$

**9. Which is greater in each of the following:**

**(i)  $2/3$ ,  $5/2$**

**Solution:-**

The LCM of the denominators 3 and 2 is 6

$$(2/3) = [(2 \times 2) / (3 \times 2)] = (4/6)$$

$$\text{And } (5/2) = [(5 \times 3) / (2 \times 3)] = (15/6)$$

Now,

$$4 < 15$$

$$\text{So, } (4/6) < (15/6)$$

$$\therefore 2/3 < 5/2$$

Hence,  $5/2$  is greater.

**(ii)  $-5/6$ ,  $-4/3$**

**Solution:-**

The LCM of the denominators 6 and 3 is 6

$$\therefore (-5/6) = [(-5 \times 1) / (6 \times 1)] = (-5/6)$$

$$\text{And } (-4/3) = [(-4 \times 2) / (3 \times 2)] = (-8/3)$$

Now,

$$-5 > -12$$

So,  $(-5/6) > (-12/6)$

$$\therefore -5/6 > -12/6$$

Hence,  $-5/6$  is greater.

**(iii)  $-3/4, 2/-3$**

**Solution:-**

The LCM of the denominators 4 and 3 is 12

$$\therefore (-3/4) = [(-3 \times 3)/(4 \times 3)] = (-9/12)$$

$$\text{And } (-2/3) = [(-2 \times 4)/(3 \times 4)] = (-8/12)$$

Now,

$$-9 < -8$$

So,  $(-9/12) < (-8/12)$

$$\therefore -3/4 < 2/-3$$

Hence,  $2/-3$  is greater.

**(iv)  $-1/4, 1/4$**

**Solution:-**

The given fraction is like fraction,

$$\text{So, } -1/4 < 1/4$$

Hence  $1/4$  is greater,

$$\text{(v) } -3\frac{2}{7}, -3\frac{4}{5}$$

**Solution:-**

First we have to convert mixed fraction into improper fraction,

$$-3\frac{2}{7} = -23/7$$

$$-3\frac{4}{5} = -19/5$$

Then,

The LCM of the denominators 7 and 5 is 35

$$\therefore (-23/7) = [(-23 \times 5)/(7 \times 5)] = (-115/35)$$

$$\text{And } (-19/5) = [(-19 \times 7)/(5 \times 7)] = (-133/35)$$

Now,

$$-115 > -133$$

So,  $(-115/35) > (-133/35)$

$$\therefore -3\frac{2}{7} > -3\frac{4}{5}$$

Hence,  $-3\frac{2}{7}$  is greater.

**10. Write the following rational numbers in ascending order:**

**(i)  $-3/5, -2/5, -1/5$**

**Solution:-**

The given rational numbers are in form of like fraction,  
Hence,

$$(-3/5) < (-2/5) < (-1/5)$$

**(ii)  $-1/3, -2/9, -4/3$**

**Solution:-**

To convert the given rational numbers into like fraction we have to find LCM,  
LCM of 3, 9, and 3 is 9

Now,

$$(-1/3) = [(-1 \times 3) / (3 \times 9)] = (-3/9)$$

$$(-2/9) = [(-2 \times 1) / (9 \times 1)] = (-2/9)$$

$$(-4/3) = [(-4 \times 3) / (3 \times 3)] = (-12/9)$$

Clearly,

$$(-12/9) < (-3/9) < (-2/9)$$

Hence,

$$(-4/3) < (-1/3) < (-2/9)$$

**(iii)  $-3/7, -3/2, -3/4$**

**Solution:-**

To convert the given rational numbers into like fraction we have to find LCM,  
LCM of 7, 2, and 4 is 28

Now,

$$(-3/7) = [(-3 \times 4) / (7 \times 4)] = (-12/28)$$

$$(-3/2) = [(-3 \times 14) / (2 \times 14)] = (-42/28)$$

$$(-3/4) = [(-3 \times 7) / (4 \times 7)] = (-21/28)$$

Clearly,

$$(-42/28) < (-21/28) < (-12/28)$$

Hence,

$$(-3/2) < (-3/4) < (-3/7)$$

## EXERCISE 9.2

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### 1. Find the sum:

(i)  $(\frac{5}{4}) + (-\frac{11}{4})$

**Solution:-**

We have:

$$= (\frac{5}{4}) - (\frac{11}{4})$$

$$= \frac{[5 - 11]}{4}$$

... [ $\because$  denominator is same in both the rational numbers]

$$= (-\frac{6}{4})$$

$$= -\frac{3}{2}$$

... [ $\because$  Divide both numerator and denominator by 2]

(ii)  $(\frac{5}{3}) + (\frac{3}{5})$

**Solution:-**

Take the LCM of the denominators of the given rational numbers.

LCM of 3 and 5 is 15

Express each of the given rational numbers with the above LCM as the common denominator.

Now,

$$(\frac{5}{3}) = \frac{[(5 \times 5)]}{(3 \times 5)} = (\frac{25}{15})$$

$$(\frac{3}{5}) = \frac{[(3 \times 3)]}{(5 \times 3)} = (\frac{9}{15})$$

Then,

$$= (\frac{25}{15}) + (\frac{9}{15}) \dots [\because \text{denominator is same in both the rational numbers}]$$

$$= \frac{(25 + 9)}{15}$$

$$= \frac{34}{15}$$

(iii)  $(-\frac{9}{10}) + (\frac{22}{15})$

**Solution:-**

Take the LCM of the denominators of the given rational numbers.

LCM of 10 and 15 is 30

Express each of the given rational numbers with the above LCM as the common denominator.

Now,

$$(-\frac{9}{10}) = \frac{[(-9 \times 3)]}{(10 \times 3)} = (-\frac{27}{30})$$

$$(\frac{22}{15}) = \frac{[(22 \times 2)]}{(15 \times 2)} = (\frac{44}{30})$$

Then,

$$= (-\frac{27}{30}) + (\frac{44}{30}) \dots [\because \text{denominator is same in both the rational numbers}]$$

$$= \frac{(-27 + 44)}{30}$$

$$= (17/30)$$

**(iv)  $(-3/-11) + (5/9)$**

**Solution:-**

We have,

$$= 3/11 + 5/9$$

Take the LCM of the denominators of the given rational numbers.

LCM of 11 and 9 is 99

Express each of the given rational numbers with the above LCM as the common denominator.

Now,

$$(3/11) = [(3 \times 9) / (11 \times 9)] = (27/99)$$

$$(5/9) = [(5 \times 11) / (9 \times 11)] = (55/99)$$

Then,

$$= (27/99) + (55/99) \quad \dots [\because \text{denominator is same in both the rational numbers}]$$

$$= (27 + 55)/99$$

$$= (82/99)$$

**(v)  $(-8/19) + (-2/57)$**

**Solution:-**

We have

$$= -8/19 - 2/57$$

Take the LCM of the denominators of the given rational numbers.

LCM of 19 and 57 is 57

Express each of the given rational numbers with the above LCM as the common denominator.

Now,

$$(-8/19) = [(-8 \times 3) / (19 \times 3)] = (-24/57)$$

$$(-2/57) = [(-2 \times 1) / (57 \times 1)] = (-2/57)$$

Then,

$$= (-24/57) - (2/57) \quad \dots [\because \text{denominator is same in both the rational numbers}]$$

$$= (-24 - 2)/57$$

$$= (-26/57)$$

**(vi)  $-2/3 + 0$**

**Solution:-**

We know that any number or fraction is added to zero the answer will be the same

number or fraction.

Hence,

$$= -2/3 + 0$$

$$= -2/3$$

(vii)  $-2\frac{1}{3} + 4\frac{3}{5}$

**Solution:-**

First we have to convert mixed fraction into improper fraction.

$$= -2\frac{1}{3} = -7/3$$

$$= 4\frac{3}{5} = 23/5$$

We have,  $-7/3 + 23/5$

Take the LCM of the denominators of the given rational numbers.

LCM of 3 and 5 is 15

Express each of the given rational numbers with the above LCM as the common denominator.

Now,

$$(-7/3) = [(-7 \times 5) / (3 \times 5)] = (-35/15)$$

$$(23/5) = [(23 \times 3) / (5 \times 3)] = (69/15)$$

Then,

$$= (-35/15) + (69/15) \quad \dots [\because \text{denominator is same in both the rational numbers}]$$

$$= (-35 + 69)/15$$

$$= (34/15)$$

## 2. Find

(i)  $7/24 - 17/36$

**Solution:-**

Take the LCM of the denominators of the given rational numbers.

LCM of 24 and 36 is 72

Express each of the given rational numbers with the above LCM as the common denominator.

Now,

$$(7/24) = [(7 \times 3) / (24 \times 3)] = (21/72)$$

$$(17/36) = [(17 \times 2) / (36 \times 2)] = (34/72)$$

Then,

$$= (21/72) - (34/72) \quad \dots [\because \text{denominator is same in both the rational numbers}]$$

$$= (21 - 34)/72$$

$$= (-13/72)$$

**(ii)  $5/63 - (-6/21)$**

**Solution:-**

We can also write  $-6/21 = -2/7$

$$= 5/63 - (-2/7)$$

We have,

$$= 5/63 + 2/7$$

Take the LCM of the denominators of the given rational numbers.

LCM of 63 and 7 is 63

Express each of the given rational numbers with the above LCM as the common denominator.

Now,

$$(5/63) = [(5 \times 1) / (63 \times 1)] = (5/63)$$

$$(2/7) = [(2 \times 9) / (7 \times 9)] = (18/63)$$

Then,

$$= (5/63) + (18/63) \dots [\because \text{denominator is same in both the rational numbers}]$$

$$= (5 + 18)/63$$

$$= 23/63$$

**(iii)  $-6/13 - (-7/15)$**

**Solution:-**

We have,

$$= -6/13 + 7/15$$

LCM of 13 and 15 is 195

Express each of the given rational numbers with the above LCM as the common denominator.

Now,

$$(-6/13) = [(-6 \times 15) / (13 \times 15)] = (-90/195)$$

$$(7/15) = [(7 \times 13) / (15 \times 13)] = (91/195)$$

Then,

$$= (-90/195) + (91/195) \dots [\because \text{denominator is same in both the rational numbers}]$$

$$= (-90 + 91)/195$$

$$= (1/195)$$

**(iv)  $-3/8 - 7/11$**

**Solution:-**

Take the LCM of the denominators of the given rational numbers.

LCM of 8 and 11 is 88

Express each of the given rational numbers with the above LCM as the common denominator.

Now,

$$(-3/8) = [(-3 \times 11) / (8 \times 11)] = (-33/88)$$

$$(7/11) = [(7 \times 8) / (11 \times 8)] = (56/88)$$

Then,

$$= (-33/88) - (56/88) \quad \dots [\because \text{denominator is same in both the rational numbers}]$$

$$= (-33 - 56)/88$$

$$= (-89/88)$$

(v)  $-2\frac{1}{9} - 6$

**Solution:-**

First we have to convert the mixed fraction into improper fraction,

$$-2\frac{1}{9} = -19/9$$

We have,  $-19/9 - 6$

Take the LCM of the denominators of the given rational numbers.

LCM of 9 and 1 is 9

Express each of the given rational numbers with the above LCM as the common denominator.

Now,

$$(-19/9) = [(-19 \times 1) / (9 \times 1)] = (-19/9)$$

$$(6/1) = [(6 \times 9) / (1 \times 9)] = (54/9)$$

Then,

$$= (-19/9) - (54/9) \quad \dots [\because \text{denominator is same in both the rational numbers}]$$

$$= (-19 - 54)/9$$

$$= (-73/9)$$

**3. Find the product:**

(i)  $(9/2) \times (-7/4)$

**Solution:-**

The product of two rational numbers = (product of their numerator) / (product of their denominator)

The above question can be written as  $(9/2) \times (-7/4)$

We have,

$$\begin{aligned} &= (9 \times -7) / (2 \times 4) \\ &= -63/8 \end{aligned}$$

**(ii)  $(3/10) \times (-9)$**

**Solution:-**

The product of two rational numbers = (product of their numerator)/ (product of their denominator)

The above question can be written as  $(3/10) \times (-9/1)$

We have,

$$\begin{aligned} &= (3 \times -9) / (10 \times 1) \\ &= -27/10 \end{aligned}$$

**(iii)  $(-6/5) \times (9/11)$**

**Solution:-**

The product of two rational numbers = (product of their numerator)/ (product of their denominator)

We have,

$$\begin{aligned} &= (-6 \times 9) / (5 \times 11) \\ &= -54/55 \end{aligned}$$

**(iv)  $(3/7) \times (-2/5)$**

**Solution:-**

The product of two rational numbers = (product of their numerator)/ (product of their denominator)

We have,

$$\begin{aligned} &= (3 \times -2) / (7 \times 5) \\ &= -6/35 \end{aligned}$$

**(v)  $(3/11) \times (2/5)$**

**Solution:-**

The product of two rational numbers = (product of their numerator)/ (product of their denominator)

We have,

$$\begin{aligned} &= (3 \times 2) / (11 \times 5) \\ &= 6/55 \end{aligned}$$

**(vi)  $(3/-5) \times (-5/3)$**

**Solution:-**

The product of two rational numbers = (product of their numerator)/ (product of their denominator)

We have,

$$= (3 \times -5) / (-5 \times 3)$$

On simplifying,

$$= (1 \times -1) / (-1 \times 1)$$

$$= -1 / -1$$

$$= 1$$

**4. Find the value of:**

**(i)  $(-4) \div (2/3)$**

**Solution:-**

We have,

$$= (-4/1) \times (3/2)$$

... [ $\because$  reciprocal of  $(2/3)$  is  $(3/2)$ ]

The product of two rational numbers = (product of their numerator)/ (product of their denominator)

$$= (-4 \times 3) / (1 \times 2)$$

$$= (-2 \times 3) / (1 \times 1)$$

$$= -6$$

**(ii)  $(-3/5) \div 2$**

**Solution:-**

We have,

$$= (-3/5) \times (1/2)$$

... [ $\because$  reciprocal of  $(2/1)$  is  $(1/2)$ ]

The product of two rational numbers = (product of their numerator)/ (product of their denominator)

$$= (-3 \times 1) / (5 \times 2)$$

$$= -3/10$$

**(iii)  $(-4/5) \div (-3)$**

**Solution:-**

We have,

$$= (-4/5) \times (1/-3)$$

... [ $\because$  reciprocal of  $(-3)$  is  $(1/-3)$ ]

The product of two rational numbers = (product of their numerator)/ (product of their denominator)

$$\begin{aligned} &= (-4 \times (1)) / (5 \times (-3)) \\ &= -4/-15 \\ &= 4/15 \end{aligned}$$

**(iv)  $(-1/8) \div 3/4$**

**Solution:-**

We have,

$$= (-1/8) \times (4/3) \quad \dots [\because \text{reciprocal of } (3/4) \text{ is } (4/3)]$$

The product of two rational numbers = (product of their numerator)/ (product of their denominator)

$$\begin{aligned} &= (-1 \times 4) / (8 \times 3) \\ &= (-1 \times 1) / (2 \times 3) \\ &= -1/6 \end{aligned}$$

**(v)  $(-2/13) \div 1/7$**

**Solution:-**

We have,

$$= (-2/13) \times (7/1) \quad \dots [\because \text{reciprocal of } (1/7) \text{ is } (7/1)]$$

The product of two rational numbers = (product of their numerator)/ (product of their denominator)

$$\begin{aligned} &= (-2 \times 7) / (13 \times 1) \\ &= -14/13 \end{aligned}$$

**(vi)  $(-7/12) \div (-2/13)$**

**Solution:-**

We have,

$$= (-7/12) \times (13/-2) \quad \dots [\because \text{reciprocal of } (-2/13) \text{ is } (13/-2)]$$

The product of two rational numbers = (product of their numerator)/ (product of their denominator)

$$\begin{aligned} &= (-7 \times 13) / (12 \times (-2)) \\ &= -91/-24 \\ &= 91/24 \end{aligned}$$

**(vii)  $(3/13) \div (-4/65)$**

**Solution:-**

We have,

$$= (3/13) \times (65/-4) \quad \dots [\because \text{reciprocal of } (-4/65) \text{ is } (65/-4)]$$

The product of two rational numbers = (product of their numerator)/ (product of their denominator)

$$= (3 \times 65) / (13 \times (-4))$$

$$= 195 / -52$$

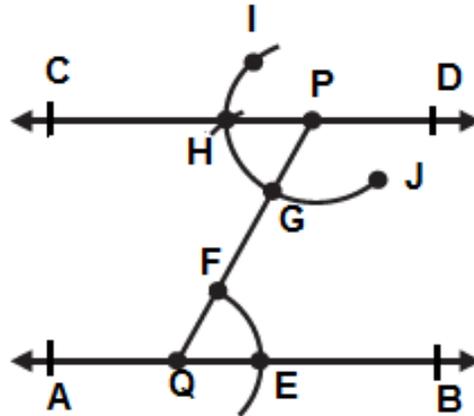
$$= -15/4$$



**EXERCISE 10.1**

**1. Draw a line, say AB, take a point C outside it. Through C, draw a line parallel to AB using ruler and compasses only.**

**Solution:-**

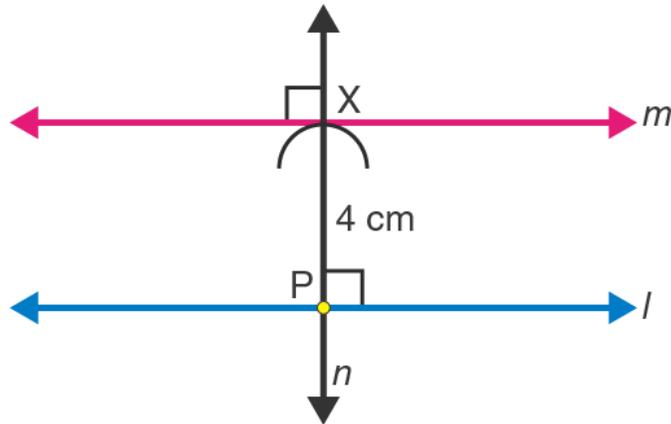


Steps for construction,

1. Draw a line AB.
2. Take any point Q on AB and a point P outside AB and join PQ.
3. With Q as center and any radius draw an arc to cut AB at E and PQ at F.
4. With P as center and same radius draw an arc IJ to cut QP at G.
5. Place the pointed tip of the compass at E and adjust the opening so that the pencil tip is at F.
6. With the same opening as in step 5 and with G as center, draw an arc cutting the arc IJ at H.
7. Now, join PH to draw a line CD.

**2. Draw a line L. Draw a perpendicular to L at any point on L. On this perpendicular choose a point X, 4 cm away from I. Through X, draw a line m parallel to L.**

**Solution:-**

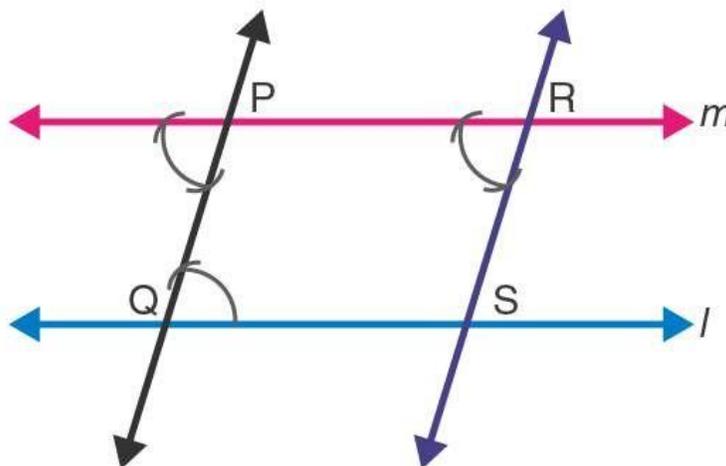


Steps for construction,

1. Draw a line L.
2. Take any point P on line L.
3. At point P, draw a perpendicular line N.
4. Place the pointed tip of the compass at P and adjust the compass up to length of 4 cm, draw an arc to cut this perpendicular at point X.
5. At point X, again draw a perpendicular line M.

**3. Let L be a line and P be a point not on L. Through P, draw a line m parallel to L. Now join P to any point Q on L. Choose any other point R on m. Through R, draw a line parallel to PQ. Let this meet L at S. What shape do the two sets of parallel lines enclose?**

**Solution:-**



Steps for construction,

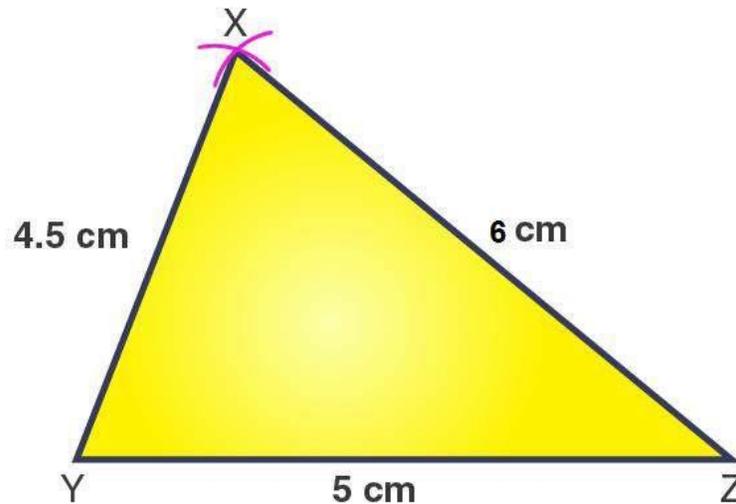
1. Draw a line L.
2. Take any point Q on L and a point P outside L and join PQ.

3. Make sure that angles at point P and point Q are equal i.e.  $\angle Q = \angle P$
4. At point P extend line to get line M which is parallel L.
5. Then take any point R on line M.
6. At point R draw angle such that  $\angle P = \angle R$
7. At point R extend line which intersects line L at S and draw a line RS.

**EXERCISE 10.2**

**1. Construct  $\Delta XYZ$  in which  $XY = 4.5$  cm,  $YZ = 5$  cm and  $ZX = 6$  cm**

**Solution:-**



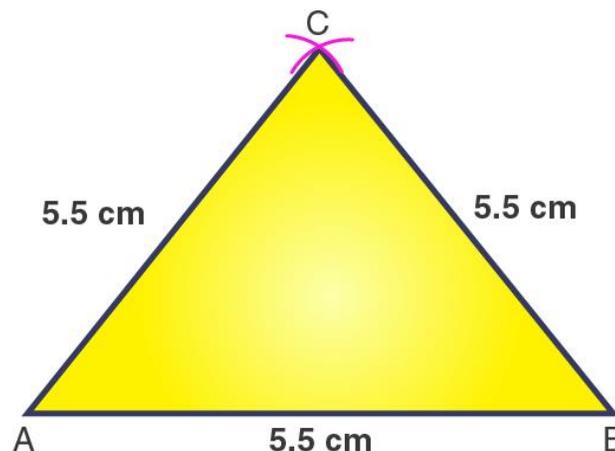
Steps of construction:

1. Draw a line segment  $YZ = 5$  cm.
2. With  $Z$  as a center and radius  $6$  cm, draw an arc.
3. With  $Y$  as a center and radius  $4.5$  cm, draw another arc, cutting the previous arc at  $X$ .
4. Join  $XY$  and  $XZ$ .

Then,  $\Delta XYZ$  is the required triangle.

**2. Construct an equilateral triangle of side  $5.5$  cm.**

**Solution:-**



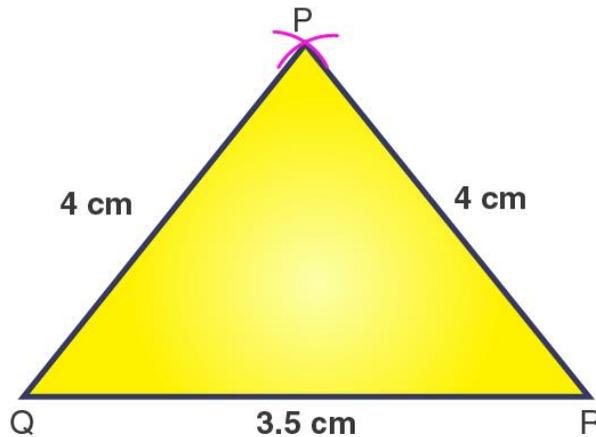
Steps of construction:

1. Draw a line segment  $AB = 5.5$  cm.
2. With A as a center and radius 5.5 cm, draw an arc.
3. With B as a center and radius 5.5 cm, draw another arc, cutting the previous arc at C.
4. Join CA and CB.

Then,  $\triangle ABC$  is the required equilateral triangle.

**3. Draw  $\triangle PQR$  with  $PQ = 4$  cm,  $QR = 3.5$  cm and  $PR = 4$  cm. What type of triangle is this?**

**Solution:-**



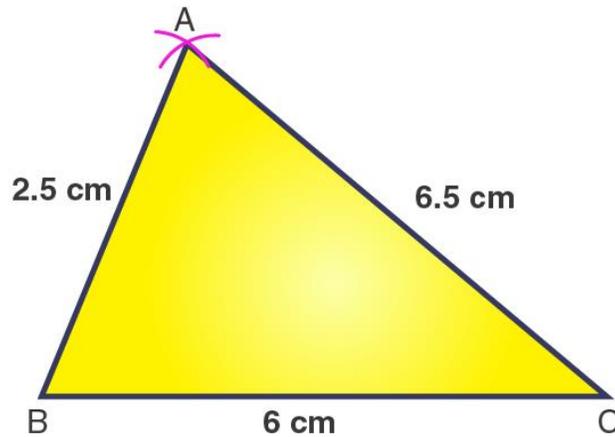
Steps of construction:

1. Draw a line segment  $QR = 3.5$  cm.
2. With Q as a center and radius 4 cm, draw an arc.
3. With R as a center and radius 4 cm, draw another arc, cutting the previous arc at P.
4. Join PQ and PR.

Then,  $\triangle PQR$  is the required isosceles triangle.

**4. Construct  $\triangle ABC$  such that  $AB = 2.5$  cm,  $BC = 6$  cm and  $AC = 6.5$  cm. Measure  $\angle B$ .**

**Solution:-**



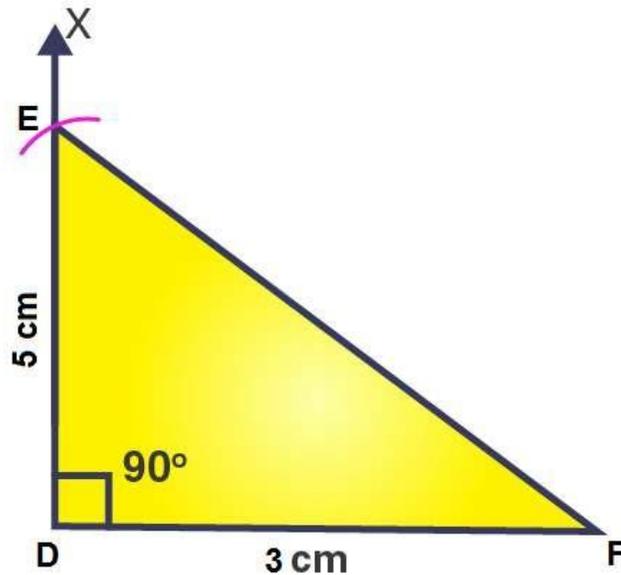
1. Draw a line segment  $BC = 6$  cm.
2. With B as a center and radius 2.5 cm, draw an arc.
3. With C as a center and radius 6.5 cm, draw another arc, cutting the previous arc at A.
4. Join AB and AC.  
Then,  $\triangle ABC$  is the required triangle.
5. When we will measure the angle B of triangle by protractor, then angle is equal to  $\angle B = 80^\circ$

**EXERCISE 10.3**

**PAGE: 200**

**1. Construct  $\triangle DEF$  such that  $DE = 5$  cm,  $DF = 3$  cm and  $m\angle EDF = 90^\circ$ .**

**Solution:-**



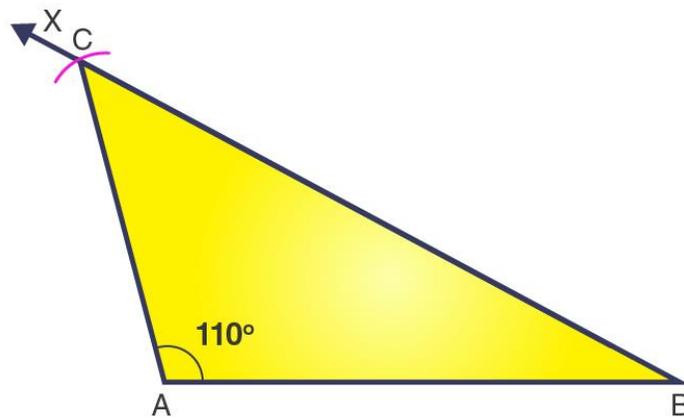
Steps of construction:

1. Draw a line segment  $DF = 3$  cm.
2. At point  $D$ , draw a ray  $DX$  to making an angle of  $90^\circ$  i.e.  $\angle XDF = 90^\circ$ .
3. Along  $DX$ , set off  $DE = 5$ cm.
4. Join  $EF$ .

Then,  $\triangle EDF$  is the required right angled triangle.

**2. Construct an isosceles triangle in which the lengths of each of its equal sides is 6.5 cm and the angle between them is  $110^\circ$ .**

**Solution:-**



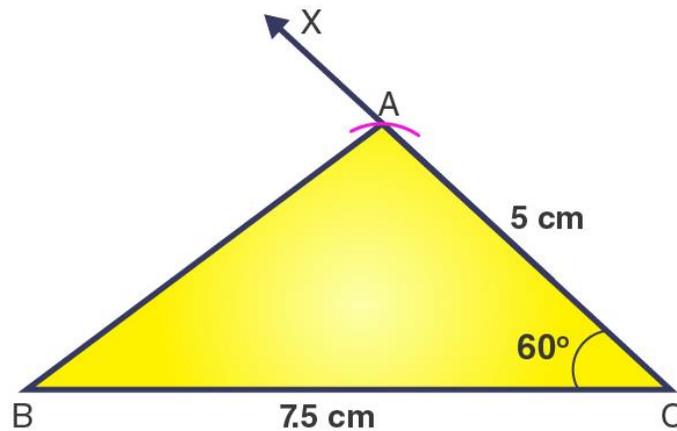
Steps of construction:

1. Draw a line segment  $AB = 6.5$  cm.
2. At point A, draw a ray AX to making an angle of  $110^\circ$  i.e.  $\angle XAB = 110^\circ$ .
3. Along AX, set off  $AC = 6.5$ cm.
4. Join CB.

Then,  $\Delta ABC$  is the required isosceles triangle.

**3. Construct  $\Delta ABC$  with  $BC = 7.5$  cm,  $AC = 5$  cm and  $m\angle C = 60^\circ$ .**

**Solution:-**



Steps of construction:

1. Draw a line segment  $BC = 7.5$  cm.
2. At point C, draw a ray CX to making an angle of  $60^\circ$  i.e.  $\angle XCB = 60^\circ$ .
3. Along CX, set off  $AC = 5$ cm.
4. Join AB.

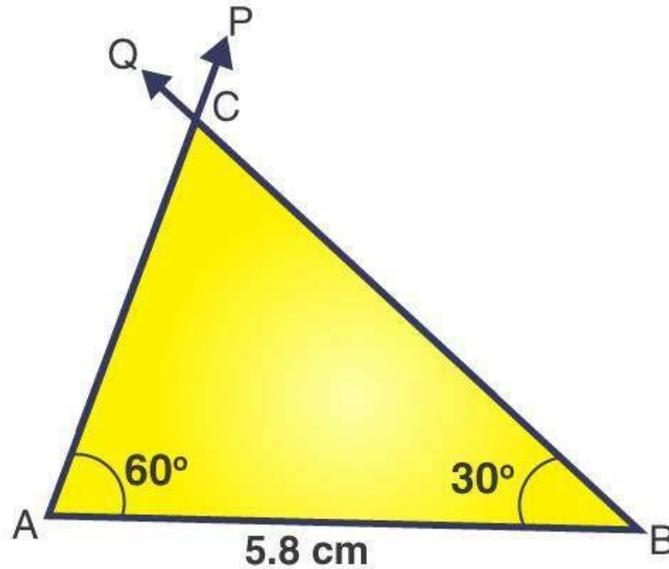
Then,  $\Delta ABC$  is the required triangle.

**EXERCISE 10.4**

**PAGE: 202**

**1. Construct  $\Delta ABC$ , given  $m \angle A = 60^\circ$ ,  $m \angle B = 30^\circ$  and  $AB = 5.8$  cm.**

**Solution:-**



Steps of construction:

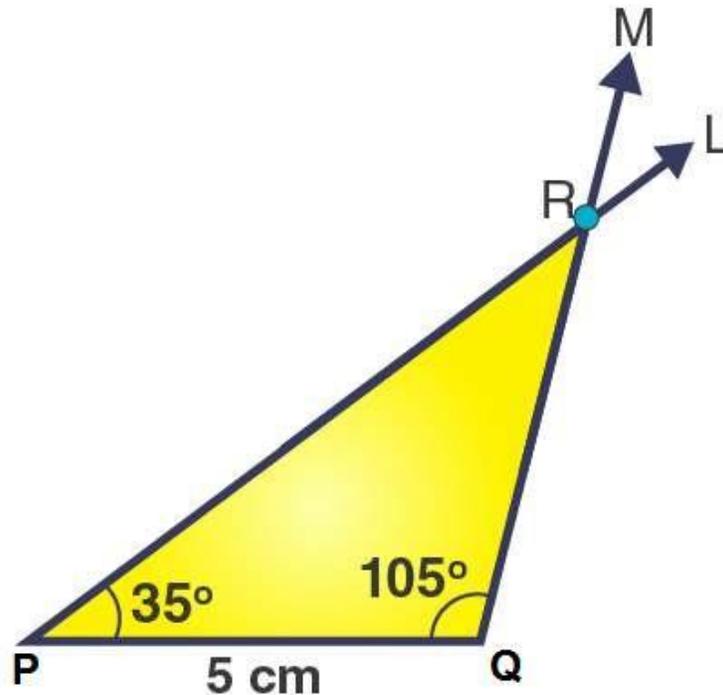
1. Draw a line segment  $AB = 5.8$  cm.
2. At point A, draw a ray P to making an angle of  $60^\circ$  i.e.  $\angle PAB = 60^\circ$ .
3. At point B, draw a ray Q to making an angle of  $30^\circ$  i.e.  $\angle QBA = 30^\circ$ .
4. Now the two rays AP and BQ intersect at the point C.

Then,  $\Delta ABC$  is the required triangle.

**2. Construct  $\Delta PQR$  if  $PQ = 5$  cm,  $m \angle PQR = 105^\circ$  and  $m \angle QRP = 40^\circ$ .**

**(Hint: Recall angle-sum property of a triangle).**

**Solution:-**



We know that the sum of the angles of a triangle is  $180^\circ$ .

$$\begin{aligned}\therefore \angle PQR + \angle QRP + \angle RPQ &= 180^\circ \\ &= 105^\circ + 40^\circ + \angle RPQ = 180^\circ \\ &= 145^\circ + \angle RPQ = 180^\circ \\ &= \angle RPQ = 180^\circ - 145^\circ \\ &= \angle RPQ = 35^\circ\end{aligned}$$

Hence, the measures of  $\angle RPQ$  is  $35^\circ$ .

Steps of construction:

1. Draw a line segment  $PQ = 5$  cm.
2. At point P, draw a ray L to making an angle of  $105^\circ$  i.e.  $\angle LPQ = 105^\circ$ .
3. At point Q, draw a ray M to making an angle of  $40^\circ$  i.e.  $\angle MQP = 40^\circ$ .
4. Now the two rays PL and QM intersect at the point R.

Then,  $\Delta PQR$  is the required triangle.

**3. Examine whether you can construct  $\Delta DEF$  such that  $EF = 7.2$  cm,  $m\angle E = 110^\circ$  and  $m\angle F = 80^\circ$ . Justify your answer.**

**Solution:-**

From the question it is given that,

$$EF = 7.2 \text{ cm}$$

$$\angle E = 110^\circ$$

$$\angle F = 80^\circ$$

Now we have to check whether it is possible to construct  $\triangle DEF$  from the given values. We know that the sum of the angles of a triangle is  $180^\circ$ .

Then,

$$\angle D + \angle E + \angle F = 180^\circ$$

$$\angle D + 110^\circ + 80^\circ = 180^\circ$$

$$\angle D + 190^\circ = 180^\circ$$

$$\angle D = 180^\circ - 190^\circ$$

$$\angle D = -10^\circ$$

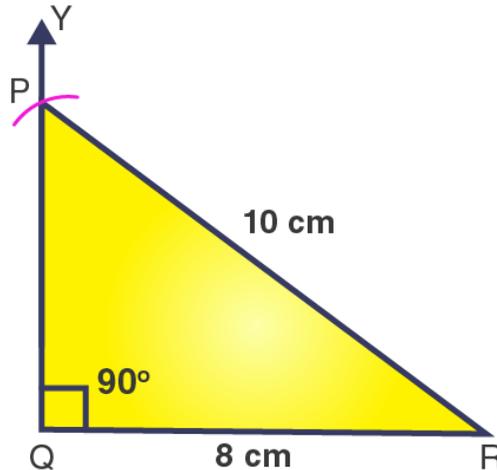
We may observe that the sum of two angles is  $190^\circ$  is greater than  $180^\circ$ . So, it is not possible to construct a triangle.

## EXERCISE 10.5

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1. Construct the right angled  $\Delta PQR$ , where  $m\angle Q = 90^\circ$ ,  $QR = 8\text{cm}$  and  $PR = 10\text{ cm}$ .

Solution:-



Steps of construction:

1. Draw a line segment  $QR = 8\text{ cm}$ .
2. At point  $Q$ , draw a ray  $QY$  to making an angle of  $90^\circ$  i.e.  $\angle YQR = 90^\circ$ .
3. With  $R$  as a center and radius  $10\text{ cm}$ , draw an arc that cuts the ray  $QY$  at  $P$ .
4. Join  $PR$ .

Then,  $\Delta PQR$  is the required right angled triangle.

2. Construct a right-angled triangle whose hypotenuse is  $6\text{ cm}$  long and one of the legs is  $4\text{ cm}$  long

Solution:-

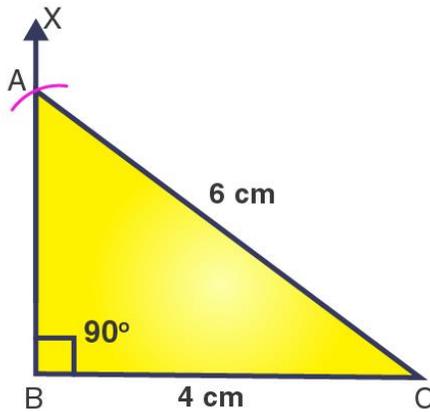
Let us consider  $\Delta ABC$  is a right angled triangle at  $\angle B = 90^\circ$

Then,

$AC$  is hypotenuse =  $6\text{ cm}$  ... [given in the question]

$BC = 4\text{ cm}$

Now, we have to construct the right angled triangle by the above values



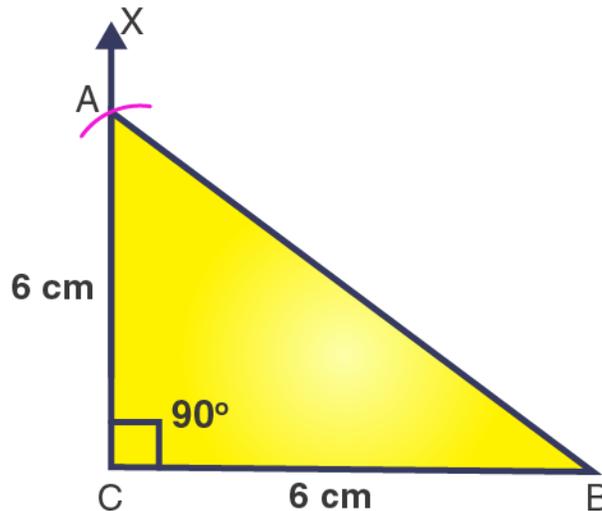
Steps of construction:

1. Draw a line segment  $BC = 4$  cm.
2. At point B, draw a ray BX to making an angle of  $90^\circ$  i.e.  $\angle XBC = 90^\circ$ .
3. With C as a center and radius 6 cm, draw an arc that cuts the ray BX at A.
4. Join AC.

Then,  $\triangle ABC$  is the required right angled triangle.

**3. Construct an isosceles right-angled triangle ABC, where  $m\angle ACB = 90^\circ$  and  $AC = 6$  cm.**

**Solution:-**



Steps of construction:

1. Draw a line segment  $BC = 6$  cm.
2. At point C, draw a ray CX to making an angle of  $90^\circ$  i.e.  $\angle XCB = 90^\circ$ .
3. With C as a center and radius 6 cm, draw an arc that cuts the ray CX at A.

4. Join AB.

Then,  $\Delta ABC$  is the required right angled triangle.