KENDRIYA VIDYALAYA SANGATHAN

STUDY MATERIAL

CLASS VI MATHEMATICS (TERM-II)

CHAPTER 7: FRACTIONS: -

Important Concepts:

- When an object or **a group of objects is divided into equal parts**, then each individual part is a fraction.
  for example:$\frac{4}{5}$ here 4 is numerator and 5 is denominator.

Types of Fraction

Fractions are of three types.
a. Proper Fraction: If the numerator is less than the denominator then it is called **proper fraction**. If we represent a proper fraction on the number line than it will always lie between 0 and 1. Examples: $\frac{3}{5},\frac{5}{8},\frac{1}{2}$ etc.

b. Improper Fraction: When the numerator is greater than the denominator of a fraction then it is called an **Improper fraction.**

c. Mixed Fraction: The fraction made by the combination of whole and a part is called **mixed fraction.**

Like Fractions

Fractions, whose denominators are same, are called like fractions.
For example: $\frac{1}{9}$,, $\frac{4}{9}$, $\frac{7}{9}$ are all like fractions whereas $\frac{1}{19}$ a nd $\frac{1}{20}$ are called unlike fractions. The latter are called unlike fractions as their denominators are different.

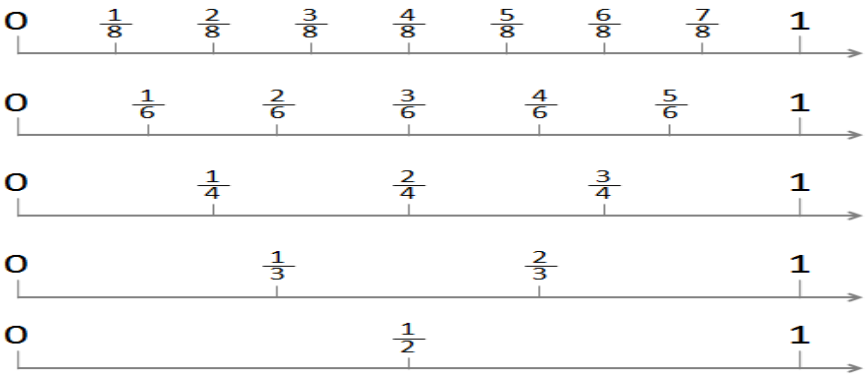
Representation of fraction on Number line

Example

Mark $\frac{1}{2}$, $\frac{1}{3},\frac{1}{4},\frac{1}{6},\frac{1}{8}$ on the different no lines.

- Draw a number line.

- We know that ½ is less than 1 and greater than 0, so we have to divide the gap between 0 and 1 into two equal parts and then mark the middle point as ½.
- For 1/3, divide into 3 equal parts.
- For ¼, divide into 4 equal parts and so on.



Convert Mixed fraction into Improper fraction

A mixed fraction is in the form of

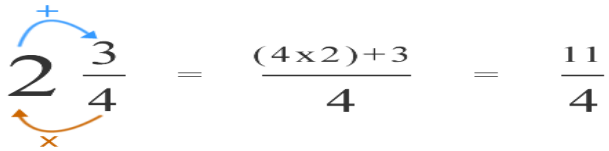
$$\text{Quotient}\,\frac{\text{Remainder}}{\text{Divisor}}$$

We can convert it in the form of an improper fraction by

$$\frac{\text{Quotient} \times \text{Divisor} + \text{Remainder}}{\text{Divisor}}$$

Example

Convert $2\frac{3}{4}$ into improper fraction.



Simplest form:

- A fraction is said to be in its simplest form if there are no common factors amongst the denominator and the numerator of the fraction.
- The easiest way to take a fraction into its simplest form is to cancel the common factors from the numerator and denominator one after the other.
- Example : The simplest form of 12/60 is 1/5

Equivalent/Equal fractions:

If we multiply or divide the numerator and denominator of a fraction with the same number, we get equivalent/equal fractions. E.g. ¼ = (1×2) / (4×2) = 2/8 . As simplest form, they too represent the same quantity.

Like and Unlike fractions:

Fractions with the same denominators are called like fractions; else they are called like fractions. For example $\frac{1}{7}, \frac{2}{7}, \frac{4}{7}$ etc are like fractions, whereas $\frac{22}{7}, \frac{12}{24}, \frac{2}{3}$ etc are unlike fractions.

Comparing Fractions

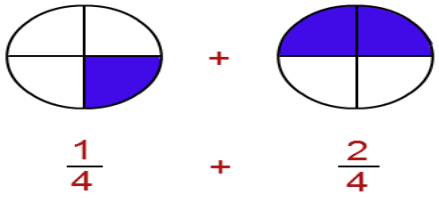
- We can compare fractions just like we compare integers. To compare like fractions, we just need to check the numerator. So $\frac{2}{3} < \frac{3}{3}$ etc.
- To compare unlike fractions, we need to make the denominators of the fractions equal. We do this, by taking the L.C.M. of the denominators as the common denominator and then adjust the numerators.

Addition and Subtraction

- Just like we add and subtract integers, we can add and subtract fractions also.
- To do so, we need to take the fractions into their equivalent forms, that is make their denominators equal.
- Thus the fractions would be reduced to like fractions and then we can add or subtract the numerators.
- We shall learn how to multiply and divide fractions later on.

Addition of fractions having same denominator:

- Adding two fractions with same denominators is just like adding the numerators of both fractions, then keeping the same denominator as the denominator of the sum.



$\frac{1}{4} + \frac{2}{4}$

$= \frac{3}{4}$

<u>Addition of fractions having different denominator</u>.

If we have to add the unlike fractions, first we have to find the equivalent fraction of the given fractions with the same denominator then add them.

Steps to add unlike fractions-

a. Take the LCM of the denominators of the given fractions.

b. Find the equivalent fractions of both fractions with LCM as the denominator.

c. Add them as the like fractions.

Example

Find the value of $\frac{4}{5} + \frac{3}{8}$

solution

Take the LCM of 5 and 8, which is 40.

$\frac{4}{5} \times \frac{8}{8} = \frac{32}{40}$

$\frac{3}{8} \times \frac{5}{5} = \frac{15}{40}$

$\frac{4}{5} + \frac{3}{8} = \frac{32}{40} + \frac{15}{40}$

$= \frac{47}{40}$

$= 1\frac{7}{40}$

Subtracting like fractions

Steps to subtract the like fractions-

a. Subtract the small numerator from the bigger one.

b. Leave the common denominator same.

For example:

Subtract $\frac{11}{18}$ from $\frac{17}{18}$.

Solution:

$\frac{17}{18} - \frac{11}{18} = \frac{17-11}{18}$

$= \frac{6}{18}$

Subtracting unlike fractions:

Steps to Subtract unlike fractions:

Take the LCM of the denominator of the given fractions.

b. Find the equivalent fractions of both fractions with LCM as the denominator.

c. Subtract them as the like fractions.

Example: Find: $\frac{3}{4} - \frac{1}{5}$.

Solution:

LCM of 4 and 5 is 20.

$\frac{3}{4} \times \frac{5}{5} = \frac{15}{20}$

$\frac{1}{5} \times \frac{4}{4} = \frac{4}{20}$

$\frac{3}{4} - \frac{1}{5} = \frac{15}{20} - \frac{4}{20}$

$= \frac{11}{20}$

QUESTIONS:

Q1. What fraction of a day is 8 hours?

(a) $\frac{4}{3}$

(b) $\frac{3}{4}$

(c) $\frac{1}{3}$

(d) $\frac{4}{5}$

Q2 which one of the following is a proper fraction?

(a) $\frac{5}{6}$

(b) $\frac{7}{3}$

(c) $\frac{4}{3}$

(d) $\frac{8}{5}$

Q3. State whether true or false:

i) Like fractions are the fractions with same numerator.

ii) $\frac{5}{8}$ and $\frac{9}{8}$ represents like fractions

a) Statement i is true but ii is false.

b) Statement I is false, ii is true.

c) Both statement I and ii are true

d) Both I and ii are false

Q 4: An improper fraction can be represented by Quotient $\frac{\text{Remainder}}{\text{Divisor}}$ for mixed fractions.

a) True
b) False

Q5 Assertion: Least fraction out of the fractions $\frac{1}{8}, \frac{2}{8}, \frac{5}{8}, \frac{7}{8}$ is $\frac{1}{8}$.

Reason: In case of like fractions, number with least numerator is least.

a) Both Assertion and reason are true and reason is correct explanation of assertion.
b) Both Assertion and reason are true and reason is not correct explanation of assertion.
c) Assertion is correct but reason is incorrect
d) Assertion is incorrect but reason is correct

Q6 Assertion: Each proper and improper fraction has many equivalent/equal fractions.

Reason: An equivalent/equal fraction is a fraction, which we get by multiplying both numerator and denominator by same number.

a) Both Assertion and reason are true and reason is correct explanation of assertion.
b) Both Assertion and reason are true and reason is not correct explanation of assertion.
c) Assertion is correct but reason is incorrect
d) Assertion is incorrect but reason is correct

The Fish Market:

Have you been to a fish market? If you have, then you might know why a very noisy place is sometimes called a "Fish Market". Many boats have brought a good catch. The fisherwomen are shouting out their prices to the buyers.

Mini – "Come here, come here, Take Sardines at Rs. 40 a kg".

Gracy – "Never so cheap, Get Sword fish for Rs 60 a kg".

Floramma sells Prawns fish for Rs. 150 a kg.

Karuthamma sells Squid fish for Rs. 50 a kg.

Look, Fazila can hardly carry this big Kingfish. She says – “This fish weighs 8 kg. I will sell the whole for Rs 1200”.

Q7 - If Fazila sell the $\frac{1}{8}$ part of kingfish what part will be left with her?

a) $\frac{9}{8}$ b) $\frac{7}{8}$ c) $-\frac{1}{8}$ d) none of these

Q8. What will be the cost of remaining part of kingfish with her?

a) 800 b) 1050 c) 950 d) none of these

Q 9. Gracy sold all 50 kg sword fish. She earned Rs.600 as profit .what fraction of selling she earned as profit?

a) $\frac{2}{5}$ b) $\frac{1}{6}$ c) $\frac{1}{5}$ d) none of these

Q 10 – Basheer has Rs. 100. He spends one-fourth of the money on squid and another three-fourth on Prawns. Then how many kilograms of squid did he buy?

a) 1000 gm

b) 500 gm

c) 1 kg

d) 1500 gm

ANSWERS:

1. C
2. A
3. B
4. A
5. A
6. A
7. B
8. B

9. C
10. B

Chapter 8-DECIMALS

INTRODUCTION:

We don't give value to the zeros added to the left of integers, in the same way zeros added to the right of decimals have no value!

● Example, 0.1=0.10=0.100=..... 0.10000000....

● But Zeros added immediately after the decimal point before the nonzero digit are

to be given importance.

● For example, 0.1 is not same as 0.01!

Number Line

● Like integers and fractions, decimals can also be represented in the number line.

● We first decide into how many parts should we divide the successive distance between the numbers in the number line.

● If there are 2 digits after the decimal point, we make 100 divisions, if there are 3 digits then we make 1000 divisions and so on.

● We can go on magnifying the number line to get more and more decimals.

Fractions as decimals

● It is clear that each fraction can be written as a decimal and vice versa.

For example, 4/10 can be written in its decimal form, by moving decimal dot one place, on 4, from right to left (since there is only one zero in denominator) i.e. 4/10= 0.4.

Similarly, 23/100 can be converted into decimal form, by moving the decimal dot two places (Since 100 has two zeros) on numerator from right to left. Moving the decimal dot once, on 23, from right to left makes it 2.3, and if we move another time, it ends up as 0.23. Hence 23/100=0.23.

Decimals to Fractions:

- We can also convert decimals into fractions, by removing the decimal dot, and adding as many zeroes in the denominator after 1, equal to the number of decimal digits after the dot. For example, 0.456 can be converted into fraction, by removing the dot in the numerator, and adding 3 zeros after 1 in the denominator.

- i.e. 0.456 = 456/1000, similarly 0.5456 = 5456/10000.

Comparing Decimals

- Like integers and fractions, we can compare decimals also.
- For comparison we first compare the whole parts and then the decimal parts.
- For example, 3.14>2.71 and 35.1< 35.2 etc.

Addition of decimals

Like integers and fractions, we can add and subtract decimals also. For this we first do the decimal part operation and then move on to the whole parts. So line up the numbers and proceed.

QUESTIONS

Q1. Decimal's representation of "Thirty and one-tenth" is:

a) 301 b) 3.01 c) 30.1 d) none of these

Q 2. 32.549 > 32.458 because

a) Tenth part is more b) Hundredth is more

c) Thousandth is more d) Whole part of both numbers are equal

State whether true or false:

a) Statement I is true but statement ii is false.
b) Statement I is false, statement ii is true.
c) Both statement I and ii are true
d) Both I and ii are false

Q3 Statement 1: There is only one form of fraction for 0.16.

Statement 2: All fractions cannot be expressed in form of decimal.

Q4. Assertion: Decimal points comes between one's place and tenths place in a

decimal number.

Reason: decimal form of 3/4 is 0.075.

a) Both Assertion and reason are true and reason is correct explanation of assertion.

b) Assertion and reason are true and reason is not correct explanation of assertion

c) Assertion is correct but reason is incorrect

d) Assertion is incorrect but reason is correct

Q 5. Assertion: In the place value table, as we go from left to right, the multiplying factor becomes 1/10 of the previous factor.

Reason: Every decimal can be written as a fraction.

a) Both Assertion and reason are true and reason is correct explanation of assertion.

b) Both Assertion and reason are true and reason is not correct explanation of assertion.

c) Assertion is correct but reason is incorrect

d) Assertion is incorrect but reason is correct

CCT BASED:

Money from different countries

Ram bank has a chart to show us how many Indian rupees we can get when we change the money of different countries.

Country	**Money**	**Changed into Indian Rupees**
Israell	Shekel	20.85
Sri Lanka	Rupee	0.39
Malasia	Ringgit	17.26
Singapore	Dollar	51.45
Japan	Yen	0.65
China	Yuan	10.21
Russia	Ruble	1.11
U.S.A.	Dollar	71.45
Germany	Euro	78.25
England	Pound	92.16
Saudi Arab	Riyal	19.06

(Rate on Feb 09, 2020)

Q 6– The money of which country will cost the most Indian Rupees?

a) Germany
b) England
c) U.S.A.
d) Sri Lanka

Q 7– Ravi's uncle in America had sent him 100 USA dollars as gift. Ravi used 1245 rupees for a school trip. How much money was left with him?

a) 7145
b) 6000
c) 5900
d) 5000

ANSWERS:

1.c , 2.a, 3. d, 4.c, 5. b, 6.b., 7.c

CHAPTER 9- DATA HANDLING

INTRODUCTION

- In this chapter we shall learn how to make a given data easily understandable.
- By data, we mean a collection of numbers gathered to give some specific information. For example the number of runs scored in a cricket match, the number of pens in your table, etc.
- One of the major part of mathematics, deals with organizing and analyzing various data.
- It is also useful in other subjects like statistics, physics, economics, etc.

REPRESENTING DATA

- The major goal of this chapter is to learn ways of representing data in a coherent manner.
- We **can** do this by using a variety of techniques to be discussed now.
- First and foremost we can use simple tally table (shown below) to represent the frequency with which a particular event is occurring .

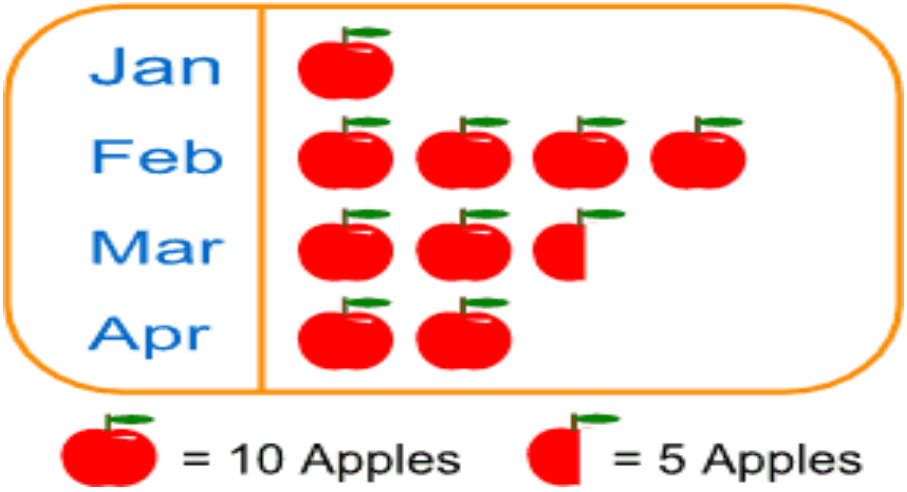
1	I	6	𝍸 I
2	II	7	𝍸 II
3	III	8	𝍸 III
4	IIII	9	𝍸 IIII
5	𝍸	10	𝍸 𝍸

PICTOGRAPH

- We can use a pictograph to represent data.
- A **pictograph** is nothing but representing a particular set of data using pictures of objects.
- It is widely used in newspapers and other forms of media.

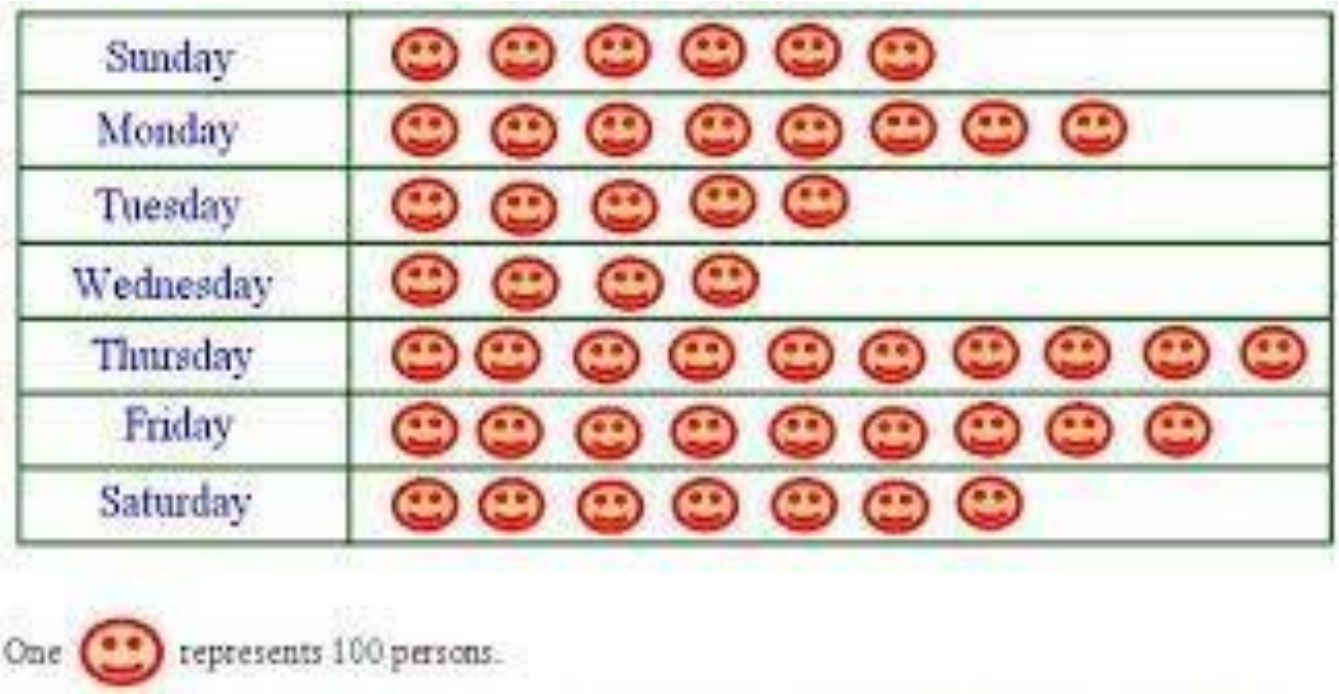
PICTOGRAPH

- For example, the pictograph depicted below shows the number of apples sold in January, February, March and April.



Example of Pictograph

- Number of persons attended the Trade Fair in a particular week.



EXAMPLE OF PICTOGRAPH

Number of cars sold from Monday to Thursday

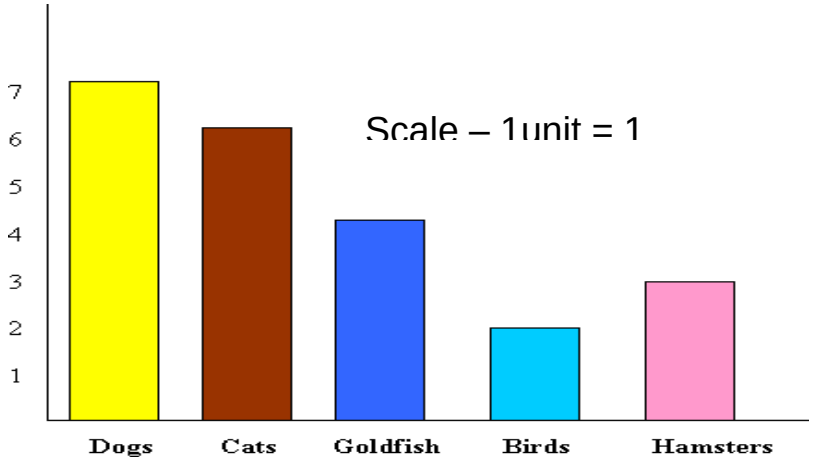
Bar Graph

- One of the most widely used methods of representing data is via **bar-graphs**.

- These are horizontal or vertical bars at a fixed distance representing certain specific information.

- This form of data representation is widely used in televisions

- For example, Bar graph, depicted below shows the availability of animals over some given area. The advantage with Bar graphs is that they directly, give us some indication of measure between the entities. For example, we can directly say, the number of Birds is half the number of Goldfish



QUESTIONS:

1. What is the vertical line in the graph called?

(A) Y-axis
(B) X-axis
(C) Ray
(D) None of these

2. If * represents 5 balloons, then number of such symbols to be drawn to represent 60 balloons is

(A) 5
(B) 60
(C) 10
(D) 12

STATE WHETHER TRUE OR FALSE

3. In a bar graph the width of bars are unequal.
4. In the pictograph lines are used to represent the graphs.

ASSERTION AND REASONING

5. Assertion: A data is a collection of some numbers gathered to give some meaningful information.

Reason: The data can't be arranged in a tabular form using tally marks.

a) Both Assertion and reason are true and reason is correct explanation of assertion.

b) Assertion and reason are true and reason is not correct explanation of assertion

c) Assertion is correct but reason is incorrect

d) Assertion is incorrect but reason is correct.

6. Assertion: In a bar graph the gap between two consecutive bars may not be the same

Reason: in a bar graph the width of the bars are equal.

a) Both Assertion and reason are true and reason is correct explanation of assertion.

b) Assertion and reason are true and reason is not correct explanation of assertion

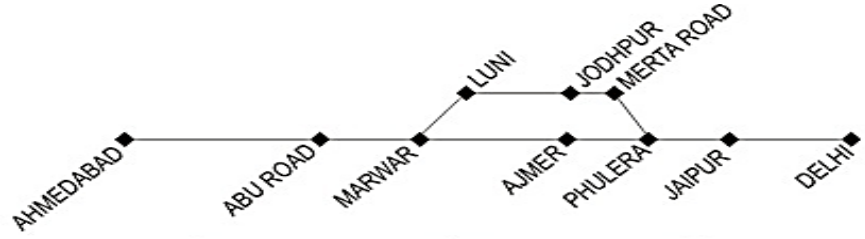
c) Assertion is correct but reason is incorrect

d) Assertion is incorrect but reason is correct.

CCT BASED

Q7: Here is a table given for different routes of trains from different places:

See the railway route map and time table below and answer the questions..



TRAIN NAME		AHMEDABAD DELHI MAIL	AHMEDABAD JAMMU TAWI EXPRESS	AHMEDABAD NEW DELHI RAJDHANI EXPRESS	AHMEDABAD DELHI ASHRAM EXPRESS
Days of departure at originating station		Daily	Daily	TUE, THU, SUN	Daily
AHMEDABAD	a				
	d	10.00	11.00	17.25	17.45
ABU ROAD	a	14.05	15.10	20.25	21.00
	d	14.20	15.25	20.35	21.20
JODHPUR	a		20.15		
	d		20.35		
AJMER	a	20.05		00.35	01.40
	d	20.28		00.45	01.55
JAIPUR	a	23.25		02.35	04.30
	d	23.40		02.45	04.50
DELHI	a				
	d	05.20			10.20
NEW DELHI	a				
	d			07.50	

Q7. Which of the following is NOT on the direct route between Ahmedabad and Delhi?

a) Ajmer
b) Jodhpur
c) Phulera
d) Abu road

Q8. On the basis of above table: by which train one can arrive Jodhpur?

(a) Ahemdabad Delhi mail
(b) Ahmedabad Jammu tawi express
(c) Ahemdabad delhi rajdhani express
(d) Ahemdabad Delhi Ashram Express

ANSWERS:

1. A
2. D
3. FALSE
4. FALSE
5. C
6. D
7. B
8. B

CHAPTER 10-MENSURATION

.

INTRODUCTION

Mensuration is the branch of mathematics that deals with the measurement of length, area or volume of various geometric shapes.

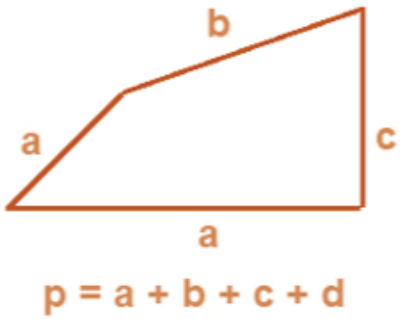
Shapes

A shape is the form of an object.

Examples of two-dimensional shapes are square, rectangle and triangle, and of three-dimensional shapes are cube, cuboid and sphere.

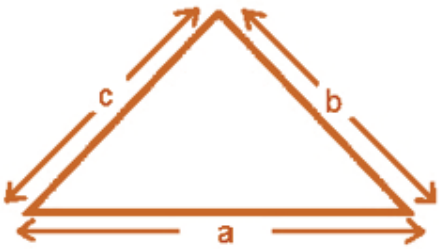
Perimeter

Perimeter is the total length or total distance covered along the boundary of a closed shape.



Perimeter of a circle is also called as the circumference of the circle.

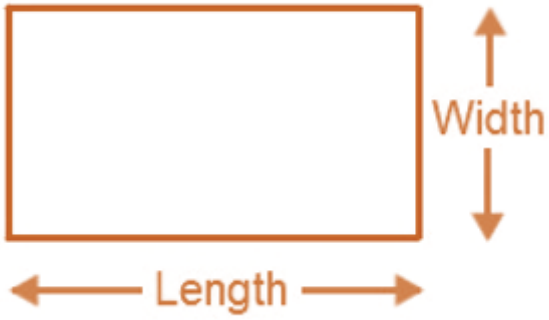
Perimeter of a Triangle



Perimeter of triangle = Sum of lengths of all sides = a + b + c.

If the given triangle is equilateral that is if all the sides are equal (a = b = c),
then its perimeter is equal to 3 × length of one side of the triangle.

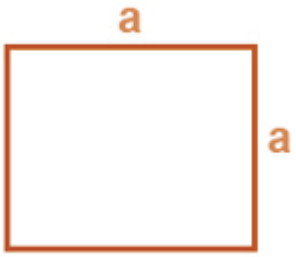
Perimeter of a Rectangle



Perimeter of the rectangle = length (l) + length (l) + width (w) + width (w)

= 2× [length (l) + width (w)]

Perimeter of a Square

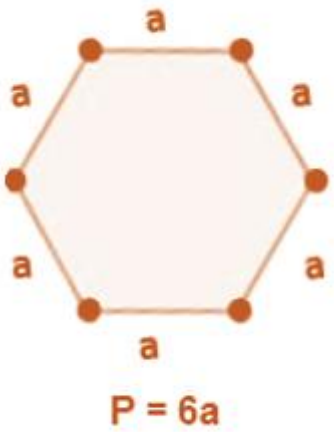


Perimeter of square = 4 × length of a side = 4a

Perimeter of a ‘n’ sided polygon

- A polygon is a closed shape made up of line segments.
- Perimeter of n sided regular polygon = n× length of one side.
- Example: Length of each side of a hexagon is a cm, then:

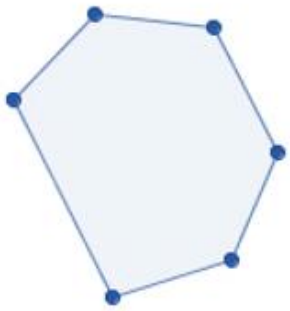
Perimeter of the hexagon = 6a cm



Perimeter of irregular shapes

- Irregular shapes are the shapes which do not have all sides and angles equal.

• The perimeter of irregular shapes is equal to total length along the boundary of the shape.
In the figure given below, perimeter is the sum of all sides.



Irregular Hexagon

Area

• Area is the total amount of surface enclosed by a closed figure.

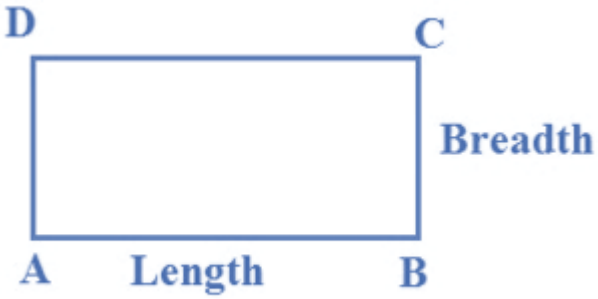
Area of Square

- Area of a square = Side × Side =Side^2=a^2, where a is the

length of each side.

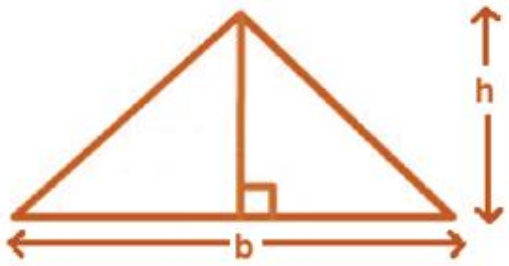
Area of Rectangle

- Area = length (l) × breadth (b)



Area of a triangle

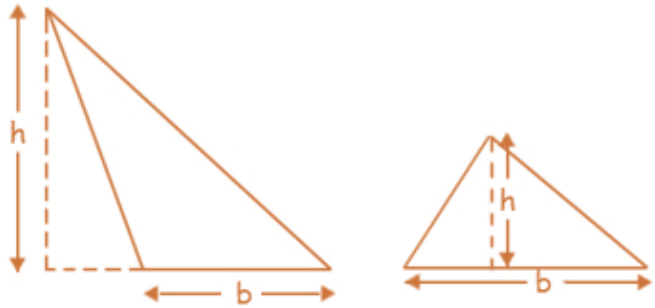
Area of triangle = $(\frac{1}{2})$ × base × height = $(\frac{1}{2})$ × b × h



Areas of different types of triangles

- Consider an acute and an obtuse triangle.

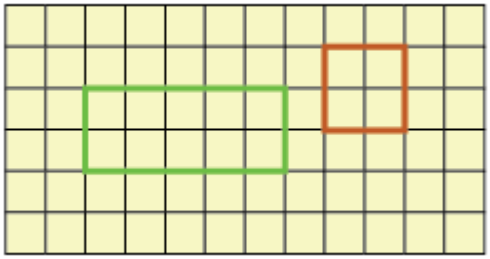
Area of each triangle = $(\frac{1}{2})$ × base × height = $(\frac{1}{2})$ × b × h



Visualisation of Area

- In the given graph, if the area of each small square is 1 cm^2, then

Area of rectangle = l×b = 5×2 = 10cm^2
Area of square = a×a = 2×2 =4cm^2



QUESTIONS

Q.1 The perimeter of an equilateral triangle of side 7cm is?

A. 14 cm

B. 21cm

C 28 cm

D. None of these

Q.2 The amount of surface enclosed by a closed figure is called?

A area

B. perimeter

C. volume

D. none of these

STATE TRUE OR FALSE

Q. 3 A farmer who wants to fence his field, must find the perimeter of the field.

Q. 4 An engineer who plans to build a compound wall on all the sides of a house must find the area of the compound.

Q5. Assertion: Length of a rectangle is three times its breadth. If perimeter of the rectangle is 40 cm, then its length is 15 cm.

Reason: Perimeter of rectangle = 2 (L + B)

a) Both Assertion and reason are true and reason is correct explanation of assertion.

b) Assertion and reason are true and reason is not correct explanation of assertion

c) Assertion is correct but reason is incorrect

d) Assertion is incorrect but reason is correct

Q6. Assertion: Perimeter of rectangle is 90cm and each angle is of 60 degree. Then it will be called as regular hexagon.

Reason: A regular polygon have all the sides and angles equal.

a) Both Assertion and reason are true and reason is correct explanation of

assertion.

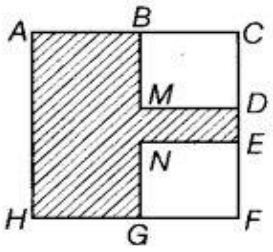
b) Assertion and reason are true and reason is not correct explanation of assertion

c) Assertion is correct but reason is incorrect

d) Assertion is incorrect but reason is correct

CCT BASE

Q. 7 Perimeter of the shaded portion in the given figure is



$AB + \_ + \_ + \_ + \_ + \_ + \_ + HA$

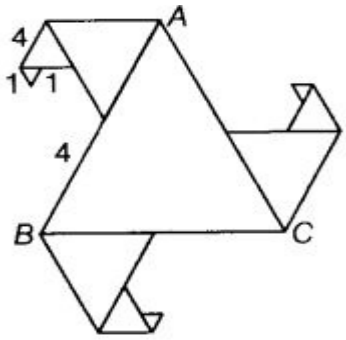
(a) AB+ BM + MD + DE + EN + NG + GH + HA

(b) AB+ BM + MD + DF + EN + NG + FH + HA

(c) AH+ BC + MD + DE + EN + NG + GF+ HF

(d) None of these

Q. 8 In the given figure, all triangles are equilateral and AB = 8 units. Other triangles have been formed by taking the mid-points of the sides. What is the perimeter of the figure?



(a) 41.

(b) 43.

(c)45.

(d) 47

ANSWERS:

1. B
2. A
3. TRUE
4. FALSE
5. A
6. D
7. A
8. C

Chapter 11: Algebra

Important concepts:

***Algebra**: Algebra is a branch of mathematics in which symbols represent unknown numbers in mathematical equation. Algebra allows basic operation of arithmetic, such as addition, subtraction, multiplication and division to be performed without using specific number.

We use algebra in our everyday life. For example, to calculate how much flour you need to bake a certain number of cookies or how long it will take to travel by car at a certain speed to cover a certain distance.

***Variable and Constants**: Variable- A quantity which takes on various numerical values is called a variable. For example, the letters A, x, a, P, S etc. represent variables

Constant- A quantity which takes a fixed numerical value is called a constant. For example, 5,7, -3/2 are constants.

Use of variable in common rules:

***Rules from geometry:**

1. P*erimeter of equilateral triangle*- we know that the perimeter of a triangle is the sum of length of its side. Let the side of the triangle be 'l'

Then perimeter = l+l+l=3l

2. *Perimeter of the rectangle*- the perimeter of a rectangle with length 'l' and breadth 'b' is given by p= 2(l+b).

3. *Perimeter of square*- the perimeter of a square is sum of lengths of all its side p= l+l+l+l=4l where 'l' is the length of the side of square.

***Rules from arithmetic:**

1. *Commutative property*: If a and b are two variables which can take any numerical value then we have,

a+b=b+a (commutative property of addition)

axb=bxa (commutative property of multiplication)

2. *Distributive property*:

a(b+c) = a x b+a x c.

Algebraic expressions A combination of variables, constants and basic fundamental operations is called algebraic expression, eg. 2x+3, a-2b+c.

Algebraic equation: A mathematical statement in which one expression is equal to another, i.e, two quantities are joined by an "equal to" sign is called an equation.

eg. 3x+5=9, x/2+5=3.

Solution or root of the equation:

A number which when substituted for the variable in the equation makes its LHS equal to RHS, is said to satisfy the equation and is called a solution or a root of the equation

IMPORTANT QUESTIONS

MCQS

In each of the following questions four options are given. Choose the correct answer.

1. The branch of mathematics in which we studied numbers is
   i) Arithmetic
   ii) Algebra
   iii) Geometry
   iv) Trigonometry

Ans: (i) Arithmetic

2. Which of the following values sastify the equation x+4=2?
   i) -2
   ii) 0
   iii) 2
   iv) 4

Ans: (i) -2

True/False

state whether the following statements are true (T) or false (F)

1. 0 is a solution of the equation x+1=0

Ans: False

2.The additive inverse of an integer x is 2x

Ans: False

Fill in the blanks

Fill in the blanks to make the statements true.

1.The distance(in km) travelled in h hour at a constant speed of 40 km per hour is ____

Ans:40h km

2.The solution of the equation 3x+7= -20 is_____

Ans: -9

Long answer type questions

1. Translate each of the following statements into an equation:

(a) The perimeter (p) of an equilateral triangle is three times of its side (a).
(b) The diameter (d) of a circle is twice its radius (r).
(c) The selling price (s) of an item is equal to the sum of the cost price (c) of an item and the profit (p) earned.
(d) Amount (a) is equal to the sum of principal (p) and interest (i).

Sol.
(a) Side of a equilateral triangle = a
According to question, p = 3a
(b) Diameter of circle = d
Radius of circle = r
According to question, d = 2r
(c) Selling price=s, cost price = c and profit = p
According to question, s = c + p
(d) Amount = a, Principal = p and Interest = i
According to question, a = p + i .

2. Translate each of the following statements into an equation, using x as the variable:

(a) 13 subtracted from twice a number gives 3

(b) One fifth of a number is 5 less than that number.

(c) Two-third of a number is 12.

(d) 9 added to twice a number gives 13.

(e) 1 subtracted from one-third of a number gives 1.

Sol. (a) Let the number be x

Twice of number = 2x

According to question, 2x - 13 = 3

(b) Let the number be x

One- fifth of number = x/5

According to question, x/5 = x - 5

(c) Let the number be x

Two-third of number = (2x)/3

According to question, (2x)/3 = 12

(d) Let the number x

Twice a number = 2x

According to question, 2x + 9 = 13

(e) Let the number be x

One-third of number = 1/3 x

According to question, x/3 - 1 = 1

Assertion and Reason questions

1. In the following question, Assertion (A) and Reason (R) have been put forward. Read both the statements carefully and choose the appropriate answer.

Assertion (A) : 2x+3 and 2x-3 are algebraic expressions

Reason (R) : An algebraic expression is a combination of variables, constants and one or more fundamental operations

(a)Both A and R are correct, R is not correct explanation of A

(b) Both A and R are correct, R is correct explanation of A

(c)A is correct B is incorrect

(d)Both A and B are incorrect

Ans: (b) Both A and R are correct, R is correct explanation of A

2. In the following question, Assertion (A) and Reason (R) have been put forward. Read both the statements carefully and choose the appropriate answer.

Assertion (A) : The perimeter of an equilateral triangle whose side is l is 3l

Reason (R) : Perimeter of an equilateral triangle is sum of its 3 sides.

(a)Both A and R are correct, R is not correct explanation of A

(b) Both A and R are correct, R is correct explanation of A

(c)A is correct B is incorrect

(d)Both A and B are incorrect

Ans: (b) Both A and R are correct, R is correct explanation of A

CCT and Case study based questions

1. Length and breadth of a bulletin board are *r* cm and *t* cm, respectively.

(i) What will be the length (in cm) of the aluminium strip required to frame the board, if 10cm extra strip is required to fix it properly.

(a) 2r + 2t + 10
(b) 2r + 2t + 5
(c) 2r + 2t
(d) 2r + 2t + 1
Ans: (a) 2r + 2t + 10

(ii) If *x* nails are used to repair one board, how many nails will be required to repair 15 such boards?

(a) 15x
(b) 5x
(c) 10x
(d) 20x
Ans: (a) 15x

(iii) If 500sqcm extra cloth per board is required to cover the edges, what will be the total area of the cloth required to cover 8 such
boards?

(a) (rt + 500)
(b) 8(rt + 500)
(c) 4(rt + 500)
(d) 8(rt + 1000)
Ans: (b) 8(rt + 500)

(iv) What will be the expenditure for making 23 boards, if the carpenter charges Rs *x* per board

(a) 20x
(b) 21x
(c) 25x
(d) 23x
Ans: (d) 23x

2. Mother has made x laddus. She went to an orphanage with his son Arun and distributed half of them to the orphans.

(a) How many laddus did she distribute to the orphans?

(a) x/2
(b) x/4
(c) x/8

(d) x/5
Ans: (a) x/2
(b) After returning home, Arun and his sister ate 2 laddus, how many still remain?
(a) x/2 - 2
(b) x/2 - 4
(c) x/2 - 8
(d) x/4 - 2
Ans: (a) x/2 - 2
(c) If she distributed 15 laddus to the orphans, how many laddus did mother make?
(a) 10
(b) 15
(c) 20
(d) 30

Ans: (d) 30

Chapter 12-Ratio and Proportion

Important concepts:

***Ratio**

When we compare two quantities of the same kind by division, we say that we have formed a ratio of the two quantities

We can say that ratio of breadth of two copies is 40 ÷30 or 40/30

The symbol':' is used to express a ratio. So the above ratio is written as 40:30 and is read as '40 is to 30'or '40 to 30'

In general the ratio of two numbers (measures/magnitudes) a and b is a÷b (or a/b) and is denoted a:b, a and b are called the terms of the ratio.

*A ratio is always expressed in the simplest from.

*To express a ratio in its simplest form, we need to convert the two quantities to same units. Then we keep on cancelling them by common factors until the two quantities become co-prime. Thus we get the required ratio in simplest form.

***Proportion (Samanupat)**

An equality of two ratios is called a proportion.

The numbers a, b, c, d are in proportion if the ratio of the first two is equal to the ratio of the last two, i.e.,

a: b = c : d or a: b:: c:d

This is read as 'a is to b as c is to d'or' a to b as c to d’.

a:b::c:d

a, b, c and d are the I, II, III and IV terms of a proportion.

I and IV term of a proportion are extreme term or extremes.

II and III terms are called the middle terms or means.

a:b=c:b

or

I:II=III:IV

Moreover, if the four numbers are in proportion, then the product of the extreme terms is equal to the product of the middle terms.

In other words: if a:b=c:d

Then, ad=bc

***Mean Proportion**

If the middle terms are repeated then each of the middle terms is called the mean proportion. i.e., a: b=b:c or b^2 = ac, where b is called the mean proportion of a and c.

UNITARY METHOD

It is the method in which first we find the value of one unit of quantity from the value of the given quantities and then find the value of the required units of quantity.

***Direct Variation**

If the value of one quantity increases or decreases in the same ratio as the increase or decrease in the value of other quantity, then the two quantities are said to be in Direct Variation.

IMPORTANT QUESTIONS

MCQS

In each of the following questions four options are given. Choose the correct answer.

1. 35 pens are divided between Sheela and Sangeeta in the ratio 3:2. The number of pens Sheela will get

(a) 21

(b) 14

(c) 15

(d) 10

Ans: (a) 21

2. The cost of 8 m of cloth is 448, the cost of 5 m of cloth will be

(a) Rs56

(b) Rs275

(c) Rs280

(d) Rs716

Ans: (c) Rs 280

Fill in the blank

fill in the blanks to make the statements true.

1. A ratio is a form of comparison by_____

Ans: division

2. If two ratios are equal, then they are in_____

Ans: proportion

True/false

State whether the statements are true (T) or false (F)

1. The ratio 5:4 is different from the ratio 4:5.

Ans: True

2. A ratio will always be more than 1.

Ans: False

Long answer type question

1. The students of a school belong to different religious backgrounds. The number of Hindu students is 288, the number of Muslim students is 252, the number of Sikh students is 144 and the number of Christian students is 72. Find the ratio of

(a) the number of Hindu students to the number of Christian students.

(b) the number of Muslim students to the total number of students.

Sol. (a) Number of Hindu students in school = 288

Number of Christian students in school = 72

Ratio = Hindu students /Christian student =288 /72 =4 /1 or 4:1

Thus, the ratio of Hindu students to Christian students is 4:1.

(b) Number of Hindu students = 288

Number of Muslim students = 252

Number of Sikh students = 144

Number of Christian students = 72

Total number of students = 288+252 + 144 + 72 = 756

Ratio = Number of Muslim Students /Total Number of Students=252 /756 =1/ 3 = or 1:3

Thus, ratio of Muslim students to the total number of students is 1:3.

2. Bachhu Manjhi earns Rs.24000 in 8 months. At this rate

(a) How much does he earn in one year?

(b) In how many months does he earn Rs.42000?

Sol.

(a) Earning of Bachhu Manjhi in 8 months= 24000

Earning of Bachhu Manjhi in 1 month=24000/8

Earning of Bachhu Manjhi in one year/ 12 months=24000/8×12 = 36000

Thus, Bachhu Manjhi earns Rs.36000 in a year.

(b) Bacchu Manjhi earns Rs.24000 = 8 months

Bachhu Manjhi earns Rs.1 = 8/24000 months

Bachhu Manjhi earns Rs.42000 = 8/24000x42000

= 14 months

Thus, Bachhu Manjhi earns Rs.42000 in 14 months.

Assertion and Reason questions

1. In the following question, Assertion (A) and Reason (R) have been put forward. Read both the statements carefully and choose the appropriate answer.

Assertion (A) : 1:5 and 3:15 are in proportion

Reason (R) : the numbers a,b,c, d are in proportion if the ratio of the first two is equal to the ratio of last two.

(a)Both A and R are correct, R is not correct explanation of A

(b) Both A and R are correct, R is correct explanation of A

(c)A is correct R is incorrect

(d)Both A and R are incorrect

Ans: (b) Both A and R are correct, R is correct explanation of A

2. In the following question, Assertion (A) and Reason (R) have been put forward. Read both the statements carefully and choose the appropriate answer.

Assertion (A) : Isha's weight is 25kg and her father's weight is 75kg. the ratio of father's weight to Isha's weight is 3:1

Reason (R) : When two quantities are compared by division method a ratio is formed.

(a)Both A and R are correct, R is not correct explanation of A

(b) Both A and R are correct, R is correct explanation of A

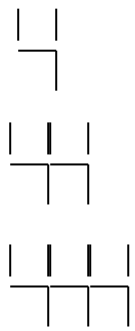
(c)A is correct R is incorrect

(d)Both A and R are incorrect

Ans: (b) Both A and R are correct, R is correct explanation of A

CCT and Case study based questions

1. On Christmas day, Adil's father gifted him a digital watch. It was 4 pm. Adil was fascinated with the unique way in which the digits were formed. He showed it to his friends. His friend Evan got an idea and he started forming the digit 4 in the same way using matchsticks on a sheet of paper.



Find the number of matchsticks used in forming

(i) One digit 4

(a) 8
(b) 2
(c) 4
(d) 6

Ans: (c) 4

(ii) Three digits 4

(a) 10
(b) 5
(c) 2
(d) 12

Ans: (b) 10

(iii) Five digits 4

(a) 4
(b) 8
(c) 16
(d) 10

Ans: (c) 16

(iv) N digits 4.

(a) 3n + 3
(b) 2n + 1
(c) n + 3
(d) 3n + 1

Ans: (d) 3n + 1

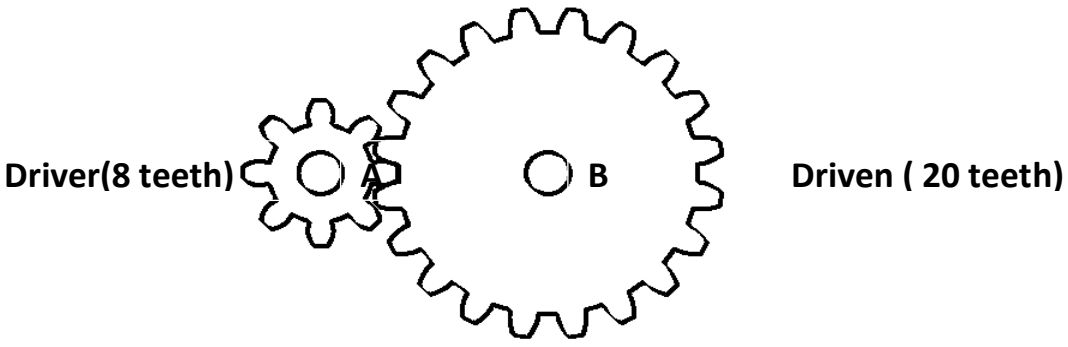
2. Gears are practically everywhere. They're in cars, both in the transmission and in the windshield wipers. They're in bicycles, in such kitchen utensils as the egg beater and even in watches. A gear is basically a set of toothed wheels coupled together to increase or decrease the speed of rotation of a motor drive shaft.

The gear system can alter rotational speed depending upon the relative sizes of the gear wheels, and it's known as the gear ratio.

The gear ratio is a simple formula which basically count the number of teeth on the driven wheel and divide that by the number of teeth on the driver wheel, which is the one attached to the motor.

When two gears are coupled their relative sizes determine how fast each will spin. If the driver wheel is smaller than the driven wheel, it will spin more often than the larger one. If the driver wheel is larger, the driven wheel will spin faster.

1. Find the gear ratio for given system of gears.



(a) 5:2

(b) 5:4
(c) 5:1
(d) 5:3

Ans: (a) 5:2

2. How many rotations will gear A (driver) make for 2 complete revolution made by gear B (driven).

   (a) 3
   (b) 6
   (c) 5
   (d) 7

Ans: (c) 5

3. How many teeth will gear B should have for gear ratio 3:1 if gear A has 6 teeth.

   (a) 24
   (b) 26
   (c) 20
   (d) 18

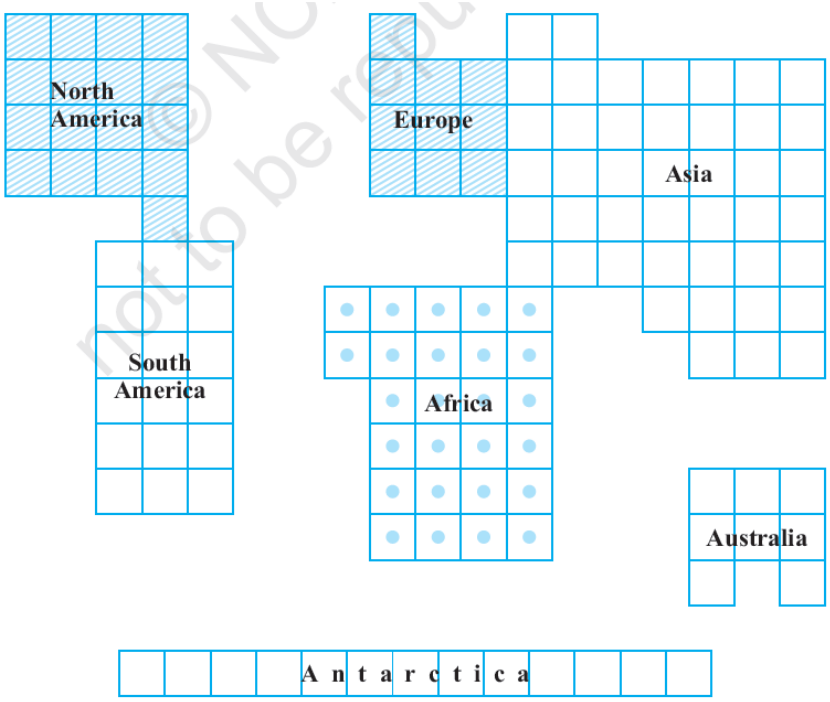
Ans: 18

4. What will be the direction of rotation of gear B if gear A is rotating clock wise.

   i) Clock wise
   ii) Anti-clock wise

Ans: (ii) Anti-clock wise

3. In the given figure, the comparative areas of the continents are given:



(Comparative areas of the continents)

What is the ratio of the areas of

(a) Africa to Europe

(i) 26/10

(ii) 20/5

(iii) 20/10

(iv)26/5

Ans: (a) (i) 26/10

(b) Asia to Australia

(i) 44/8

(ii)44/4

(iii)22/4

(iv)22/8

Ans: (i) 44/8

(c) Antarctica to Combined area of North America and South America.

(i) 13/30

(ii)13/20

(iii) 11/35

(iii)13/35

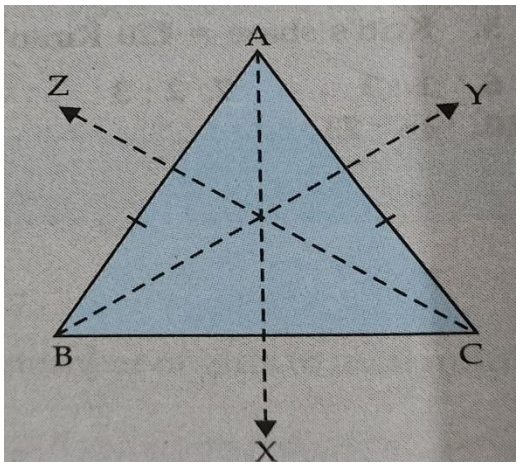
Ans: (iv) 13/35

Chapter 13-Symmetry

Important concepts:

LINE OF SYMMETRY

A figure is said to have a line symmetry if on folding the figure about this line, the two parts of the figure coincide. Example: Take an isosceles triangle ABC in which AB = AC. If this triangle is folded about AX, the bisector of angle A, the two parts of the triangle exactly coincide. But if the same figure is folded about BY or CZ the two parts do not coincide.



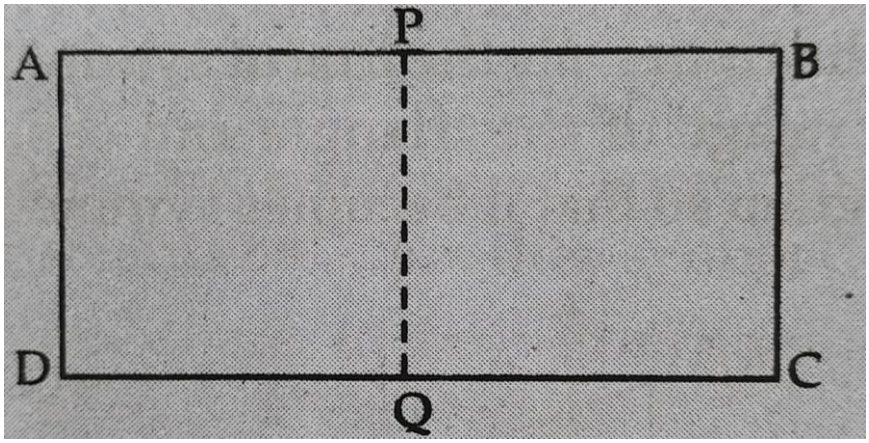
So we conclude that the given figure has exactly one line of symmetry.

Remark: A line of symmetry is also known as the mirror line or an axis of symmetry.

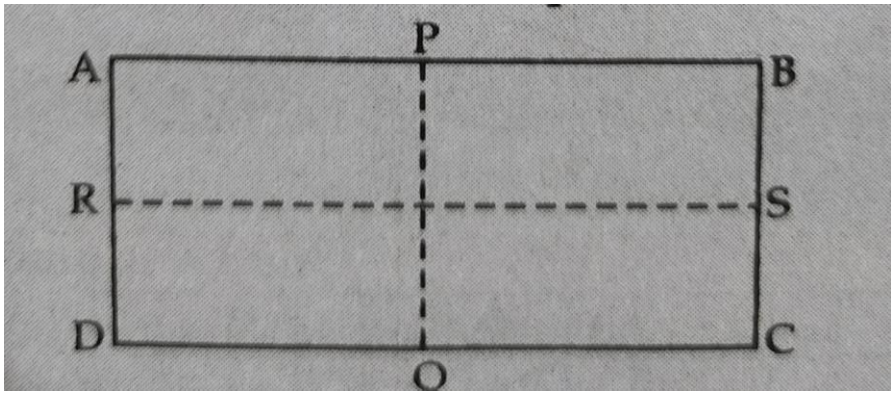
LINES OF SYMMETRY-TWO OR MORE THAN TWO

*Two Lines of Symmetry

Take a rectangle ABCD when it is folded about PQ (the perpendicular bisectors of AB and CD), the two parts exactly coincide.



Similarly, when folded about RS, the two parts coincide exactly. But if we try to fold it about any other line, we find that the two parts do not coincide.



So we can say that a rectangle has two lines of symmetry. Similarly, we can discuss more figures having two lines of symmetry.

***Multiple Lines of Symmetry**

We come across some figures which have more than two lines of symmetry. For Example: A square has four lines of symmetry. An equilateral triangle has three lines of symmetry. A circle has infinite lines of symmetry.

REFLECTION AND SYMMETRY

The object and its image are symmetrical with reference to the mirror line. The image of the object is the reflection of the object in the mirror line. When an object is reflected, there is no change in lengths and angles i.e., the lengths and angles of the object and the corresponding lengths and angles of the image are the same.

IMPORTANT QUESTIONS

MCQS

In each of the following questions four options are given. Choose the correct answer.

1. How many lines of symmetry a quadrilateral has?

(a) one

(c) three

(b) two

(d) none

Ans: (d) none

2. The number of lines of symmetry for a regular pentagon will be

(a) one

(b) two

(c) three

(d) five

Ans: (d) five

Fill in the blank

fill in the blanks to make the statements true .

1. The number of lines of symmetry of an isosceles triangle is _____

Ans 1

2. The digit 3 has _____ line of symmetry

Ans: Horizontal

True/False

State whether the statements are true (T) or false (F)

1. A kite has two lines of symmetry.

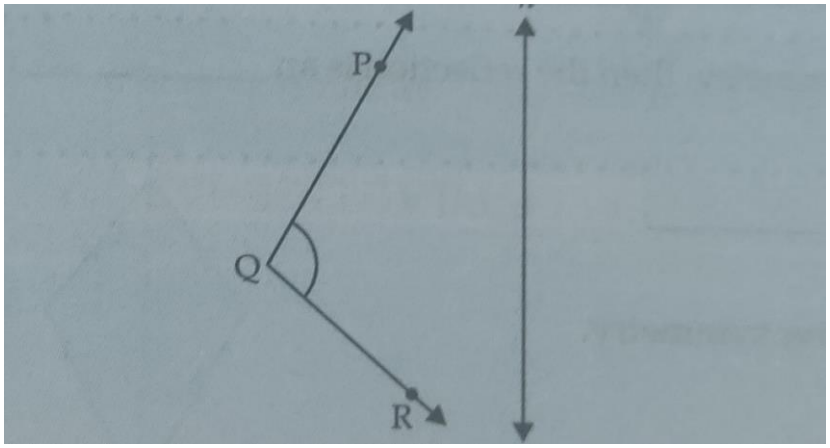
Ans: True

2. A square has two lines of symmetry.

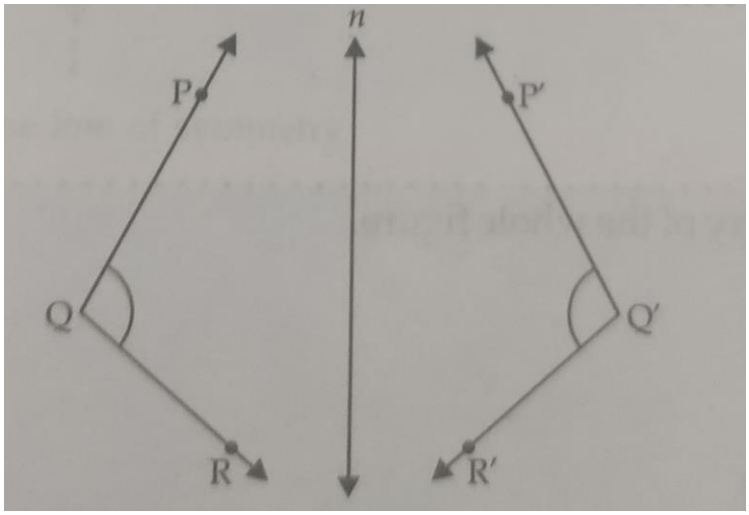
Ans: False

Long answer type question

1. Draw the images P', Q' and R' of the points, P, Q and R, respectively in the line n (Fig.). Join P'Q' and Q'R' to form an angle P'Q'R'. Measure ∠PQR and ∠P' Q' R'. Are the two angles equal?



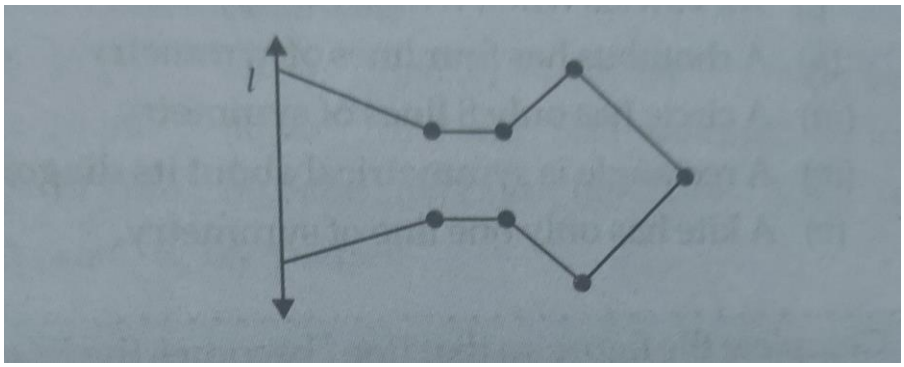
Ans:



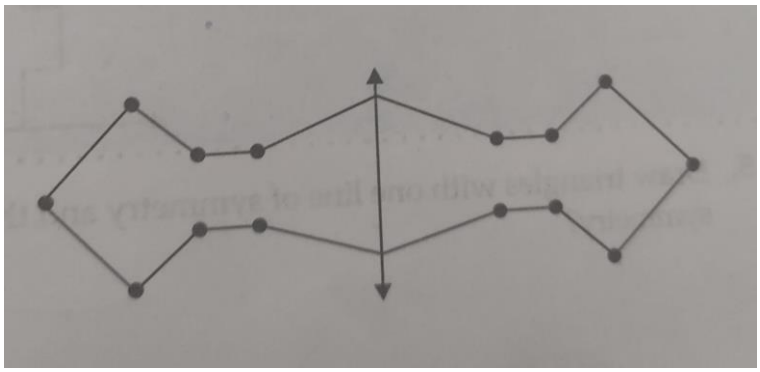
∠PQR = ∠P' Q'R'

i.e., two angles are equal.

2. Complete fig., so that l is the line of symmetry of the completed figure.



Ans:



The figure can be completed as shown in fig., by drawing the points symmetric to different corners (points) with respect to line l.

Assertion and Reason questions

1. In the following question, Assertion (A) and Reason (R) have been put forward. Read both the statements carefully and choose the appropriate answer.

Assertion (A) : Wall clock, photo frame, kite are symmetrical

Reason (R) : A figure is said to have a line of symmetry if on folding the figure about this line , the two parts of the figure coincide.

(a)Both A and R are correct, R is not correct explanation of A

(b) Both A and R are correct, R is correct explanation of A

(c)A is correct R is incorrect

(d)Both A and R are incorrect

Ans: (b) Both A and R are correct, R is correct explanation of A

2. In the following question, Assertion (A) and Reason (R) have been put forward. Read both the statements carefully and choose the appropriate answer.

Assertion (A) : A circle has five lines of symmetry

Reason (R) : A circle has finite number of lines of symmetry

(a)Both A and R are correct, R is not correct explanation of A

(b) Both A and R are correct, R is correct explanation of A

(c)A is correct R is incorrect

(d)Both A and R are incorrect

Ans: (d)Both A and R are incorrect

CCT and Case study based questions

1. A magic mirror enlarges the things 2 times. A triangle of side 3 cm, 4 cm, 5 cm is put in front of the mirror.

(i)Find the length of the largest side of the image of the triangle.

(a) 10cm
(b) 15cm
(c) 5cm
(d) 20cm

And: (a) 10cm

(ii) Find the length of the smallest side of the image of the triangle.

(a) 8cm
(b) 3cm
(c) 2cm
(d) 6cm

Ans: (d) 6cm

(iii) Does the enlarged triangle follow the property of triangle?

(a) Yes
(b) No

Ans: (a) Yes

(iv) Find the ratio of perimeter of first triangle and enlarged triangle.

(a) 1:4
(b) 1:2
(c) 1:8
(d) 1:3

Ans: (a) 1:2

2. Open your geometry box. There are some drawing tools. Observe them and write the number of lines of symmetry.

(i) The Divider _____
(a) 1
(b) 2
(c) 0
(d) 3

Ans: (a) 1

(ii) The Compasses _____
(a) 0
(b) 2
(c) 1
(d) 3

Ans: (a)

(iii)The Protactor _____
(a) 1
(b) 3
(c) 0
(d) 2

Ans: (a) 1

(iv)Triangular piece with two equal sides _____
(a) 2
(b) 0
(c) 3
(d) 1

Ans: (d) 1

(v) Triangular piece with unequal sides _____
(a) 3
(b) 0
(c) 1
(d) 2

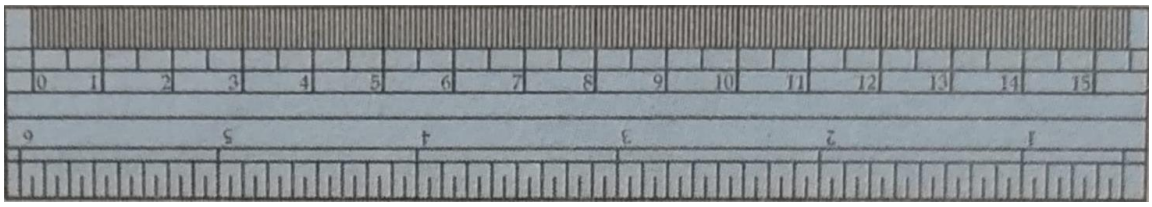
Ans: (b)0

Chapter 14-Practical Geometry

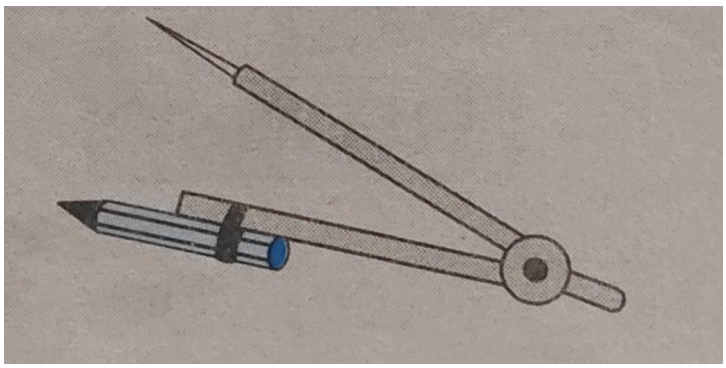
Important concepts:

Geometric tools

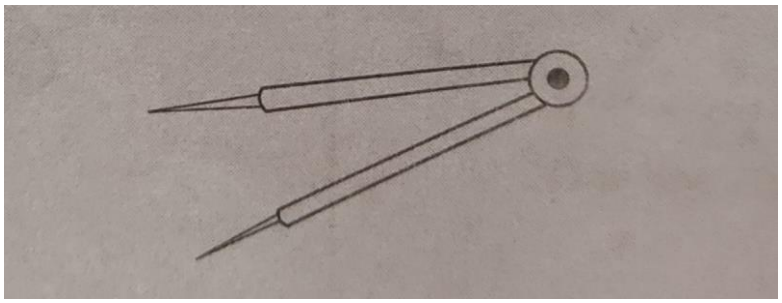
The Ruler: It is a straight strip generally made of wood or plastic. It is graduated into centimetres along one edge and into inches along the other edge. It is used to draw line segments and to measure their lengths.



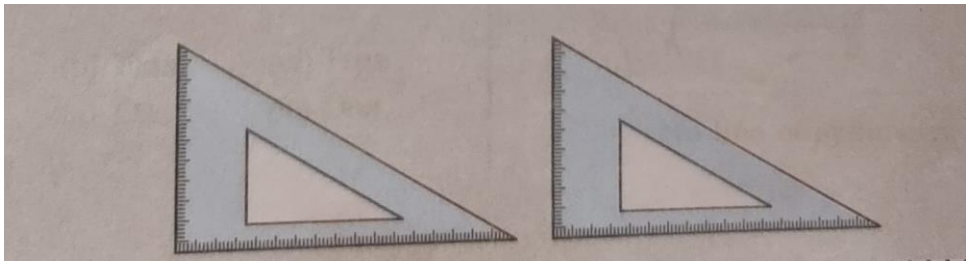
The Compass: It is a V-shaped instrument having a pointer on one end and a pencil on the other. It is used to draw circles and mark off equal lengths



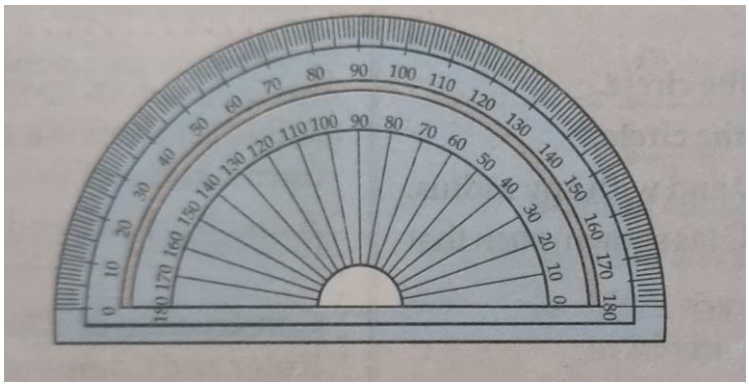
The Divider: Its shape is same as that of a compass but it has pointer on both the ends. It is used to compare the lengths.



Set Squares: These are right angled triangular scales. One of them has the angles 30-60-90 and the other has the angle 45-45-90. It is used to draw perpendiculars and parallels

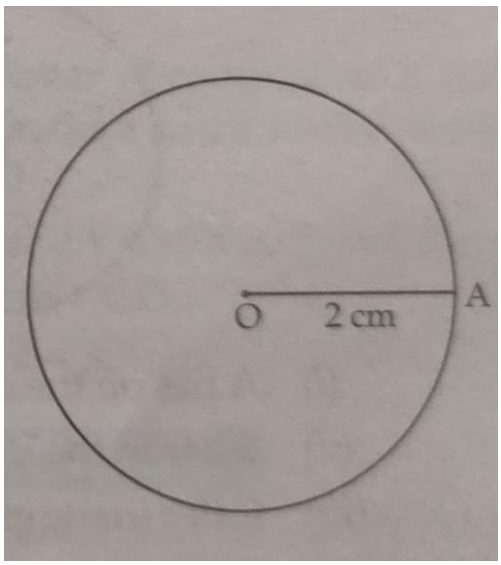


The Protractor. It is a semicircular device graduated into 180 degree parts. The measure starts from 0 on the right hand side and ends with 180 on the left hand side and vice-versa. It is used to draw and measure angles



***Circles**

. Circle: Circle is a closed plane figure consisting of all those points of the plane, which are at a constant distance from a fixed point. The fixed point is called the centre of the circle and the constant distance is called the radius of the circle. . To draw a circle whose radius is given Suppose we want to draw a circle with radius 2 cm.



. Steps of construction: Take a point Con the page of your notebook and draw CA = 2 cm. Keep the pointer of the compass at C and pencil end at A Now rotate the pencil end of the compass at a constant distance of 2 cm till it returns to the starting point A

Constructing a line segment

A line segment is a portion of a line or a straight path from A to B.

A and B are two end points of segment AB.

Construction of a line segment of a given length (using Ruler and Compass):

Suppose we want to draw a line segment AB of length 5 cm.

Step 1: Draw a line 1 and make a point A on it.

Step 2: Place the pointer of the compass on zero mark of the ruler and open it to place the pencil point up to the 5 cm mark.

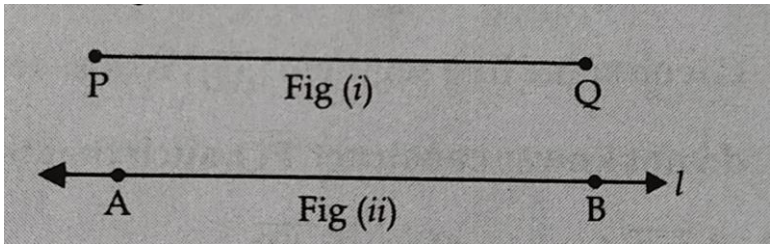
Step 3: Without changing the opening of the compass, place the pointer on A and swing the arc to cut the line 1 at B.

Step 4: AB is a line segment of required length (5 cm).

Constructing a copy of given line segment

To cut a line segment equal to a given line segment Let a line 'l' and a line segment PQ be given. We have to cut a line segment AB on l equal to segment PQ.

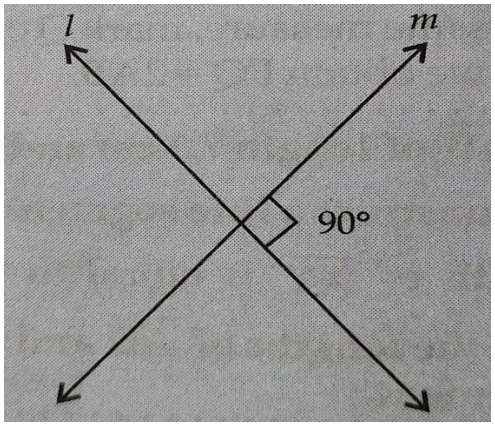
Step 1: Open the compass so that the pointer is at P and pencil end at Q.



Step 2: With the same measure, place the pointer at A as shown in Fig. (ii)

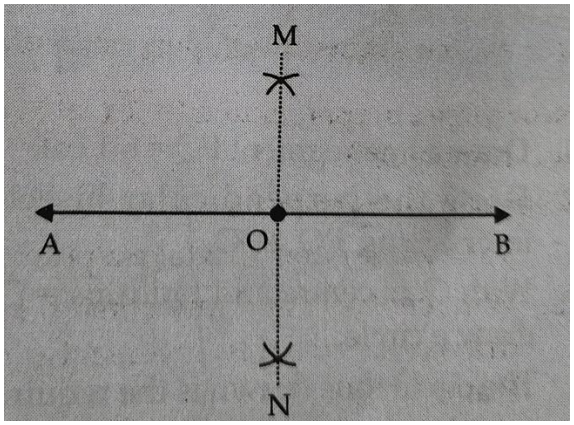
Step 3: With the pencil point, make a stroke on the line "l' and name it the point B. The line segment AB so obtained is equal to PQ.

Constructing perpendicular lines



Two lines are said to be perpendicular if they intersect each other at right angles. In the figure, l and m are perpendicular to each other.

Constructing perpendicular bisector



A perpendicular bisector is a line which bisect a line segment at 90° angle in two equal parts.

IMPORTANT QUESTIONS

MCQS

In each of the following questions four options are given. Choose the correct answer.

1. The instrument to measure an angle is a

(a) Ruler

(b) Protractor

(c) Divider

(d) Compasses

Ans: (b) Protractor

2. The instrument to draw a circle is

(a) Ruler

(b) Protractor

(c) Divider

(d) Compasses

Ans: (d) Compasses

Fill in the blanks

fill in the blanks to make the statements true.

1. The common properties in the two set-squares of a geometry box are that they have a (i) _____ angle and they are of the shape of a(ii)_____

Ans: (i) right

(ii) triangle

True/False

State whether the statements are true (T) or false (F)

1. With ruler and compasses, we can bisect any given line segment.

Ans: True

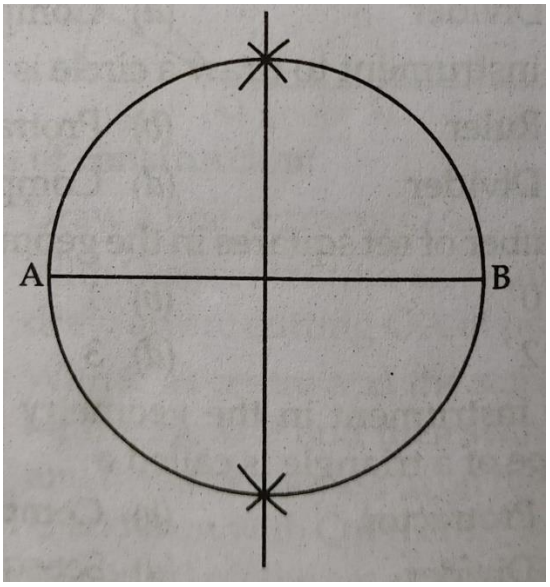
2. Only one perpendicular bisector can be drawn to a given line segment.

Ans: True

Long answer type question

1. Draw a circle of radius 6 cm using ruler and compasses. Draw one of its diameters. Draw the perpendicular bisector of this diameter of the circle?

Ans:



Steps of construction:

(1) First we draw a circle of radius 6 cm with the help of compasses.

(ii) Draw AB as one of its diameter.

(iii) Taking A as centre and radius more than 1/2AB draw two arcs on opposite sides of AB.

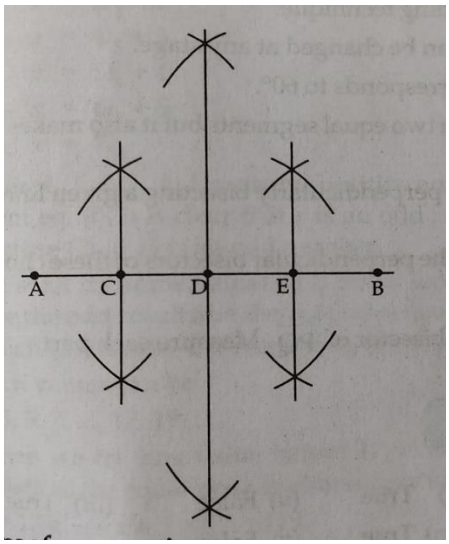
(iv) Taking B as centre and same radius draw two arcs intersecting the arcs drawn previously at M and N.

(v) Join MN to get the perpendicular bisector.

(v) On extending the perpendicular bisector we get another diameter of the circle.

2. Draw a line segment of length 10 cm. Divide it into four equal parts. Measure each of these parts.

Ans:



Steps of construction:

(i) Draw a line segment AB of length 10 cm.

(ii) Draw the perpendicular bisector of AB intersecting AB at D

(iii) Draw the perpendicular bisector of AD intersecting AD at C.

(iv) Draw the perpendicular bisector of BD intersecting BD at E.

(v) Now line segment AB is divided into four equal parts. Such AC = CD = DE = EB=2.5cm

Assertion and Reasoning questions

1. In the following question, Assertion (A) and Reason (R) have been put forward. Read both the statements carefully and choose the appropriate answer.

Assertion (A) : The bisector of an angle passes between the two arms of the angle

Reason (R) : Each point on the bisector of an angle is equidistant from the arms of an angle

(a)Both A and R are correct, R is not correct explanation of A

(b) Both A and R are correct, R is correct explanation of A

(c)A is correct R is incorrect

(d)Both A and R are incorrect

Ans: (a)Both A and R are correct, R is not correct explanation of A

2. In the following question, Assertion (A) and Reason (R) have been put forward. Read both the statements carefully and choose the appropriate answer.

Assertion (A) : 70° cannot be constructed by rulers and compass only.

Reason (R) :30°,60°,75° can be constructed by ruler and compass only

(a)Both A and R are correct, R is not correct explanation of A

(b) Both A and R are correct, R is correct explanation of A

(d)Both A and R are incorrect

Ans: (a)Both A and R are correct, R is not correct explanation of A

CCT based questions

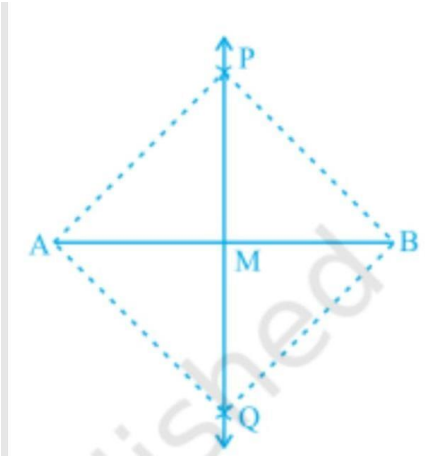
1. A group of student of class VI have to draw the angles using compasses only and not to use protractor.
(i) Put a tick against angle which can be drawn with compasses only.
(a) 5^0

(b) 30^0
(c) 37^0
(d) 45^0
(e) 120^0
(f) 135^0
(g) 200^0
(h) $22\frac{1}{2}^0$
Ans: (b) 30^0
(d) 45^0
(e) 120^0
(f) 135^0
(h) $22\frac{1}{2}^0$
(ii) Which property is used to draw these angles :
(a) Perpendicular bisector
(b) Angle bisector
Ans: (b) Angle bisector
(iii)Write four more examples of angles which cannot be drawn by using compasses only.
Ans:10,20,40,50
2. Two friends Vipul and Sam decided to study together at Vipul's house. They started studying the concept of drawing perpendicular bisector. Answer the questions given below
(i) Fill in the blanks: _____ of line segment means to draw perpendicular which passes through the mid point of line segment.
(a) mid point
(b)bisection
(c)congruent
(d)right bisector
Ans: (d)right bisector
(ii) Any point equidistant from the end points of the line segment lies on---------:
(a) median
(b) right bisector
(c) altitude
(d) angle bisector
Ans: (b)right bisector
(iii) Fill in the blank: Any point on the_____ of a line segment is equidistant from its end points.
(a) median
(b) right bisector
(c) altitude
(d) angle bisector
Ans: (b)right bisector
(iv) Fill in the blanks: Bisection means to divide into_____ equal parts
(a) two
(b) three

(c) four
(d) Five

Ans: (a) two

3. A boy was constructing the perpendicular bisector of a given line segment AB=10cm answer the question given below



(i) What is value of angle PMB ?
(a) 60º
(b)70º
(c)80º
(d)90º
Ans: (d)90º

(ii) State true or false ; M is the mid point line AB?
(a) TRUE
(b) FALSE

Ans: TRUE

(iii) State true or false; M is the mid point line PQ?
(a) TRUE
(b) FALSE

Ans: TRUE

(iv) State true or false Line PQ divides line AB into two equal parts
(a) TRUE
(b) FALSE

Ans: TRUE

****