MATHS SAMPLE PAPER

PART-A

Section-I

Section I has 16 questions of 1 mark each.

1. The exponent form of $\sqrt[3]{7}$ is ________.

2. If m and n are two natural numbers and $m^n = 32$, then n^{mn} is ______.

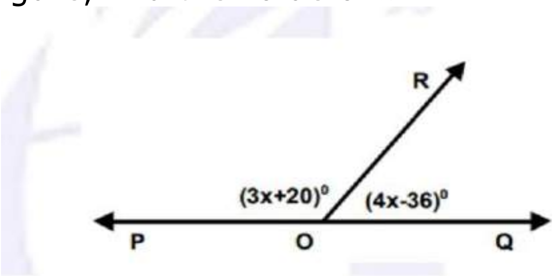
3. If $a = 2$ *and* $b = 3$, *then the value of* $(a^b + b^a)^{-1}$ *is* ________.

OR

Find the value of the polynomial $6t^2 + 7t - 3$ *when* $t = -1$.

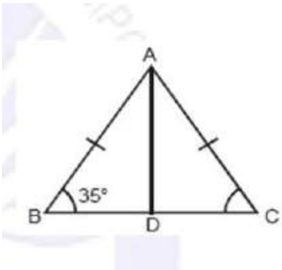
4. Write the degree of the polynomial $\sqrt{2}$.

5. In the adjoining figure, find the value of x



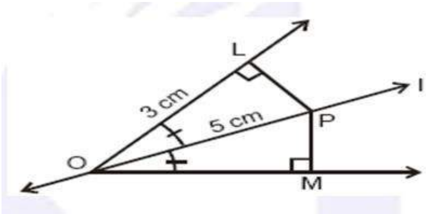
6. Find the semi perimeter of a triangle with sides 9 cm, 12 cm and 30 cm.

7. In the given figure, AD is the median, then find $\angle BCA$.



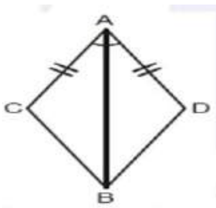
OR

$In\ the\ given\ figure\ \Delta PLO \cong \Delta PMO$, Find the length of PM.



8. The area of a triangle is $48cm^2$. Its base is 12cm, Find its altitude.

9. In the given figure the congruency rule used in providing $\Delta ACB \cong \Delta ADB$ is ________.



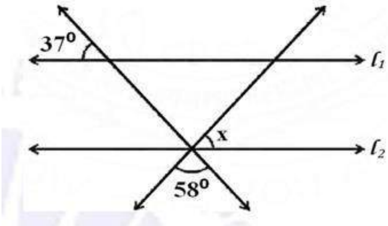
10. There are 5 red and 3 black balls in a bag. Find the probability of drawing a black ball.

11. The two angles measuring $(30^0 - a)$ and $(125^0 + 2a)$ are supplementary to each other, then the value of $'a'$ is ________.

OR

What is the measure of an angle whose measure is 32^0 less than its supplement?

12. In the figure $l_1 \parallel l_2$, what is the value of x?



OR

Angles of a triangle are in the ratio 2 : 4 : 3, Find the smallest angle of the triangle.

13. In parallelogram ABCD, $m\angle A = (5x - 20)°$ and $m\angle C = (3x + 40)°$. $Find$ the value of x.

OR

If the degree measures of the angles of the quadrilateral are $4x$, $7x$, $9x$ and $10x$, What is the measure of the smallest angle and the largest angle?

14. The sum of either pair of opposite angles of a cyclic quadrilateral is ________.

15. The radius of the circle is 5 cm and the distance of the chord from the Centre of the circle is 4 cm then, the length of the chord is ________.

16. What will be the rationalising factor of $\frac{1}{\sqrt{2}-5}$?

Section II

Case-study based questions are compulsory. Attempt any four sub parts of each question. Each subpart carries 1 mark

17. Case study based-1: The Greek mathematicians of Euclid's time thought of geometry as an abstract model of the world in which they lived. The notions of point, line, plane (or surface) and so on were derived from what was seen around them. From studies of the space and solids in the space around them, an abstract geometrical notion of a solid object was developed. A solid has shape, size, position, and can be moved from one place to another. Its boundaries are called surfaces. They separate one part of the space from another, and are said to have no thickness. The boundaries of the surfaces are curves or straight lines. These lines end in points. Consider the three steps from solids to points (solids-surfaces-lines-points). In each step we lose one extension, also called a dimension. So, a solid has three dimensions, a surface has two, a line has one and a point has none. Euclid summarised these statements as definitions. He began his exposition by listing 23 definitions in Book 1 of the 'Elements'

Now let us discuss Euclid's fifth postulate. It is :

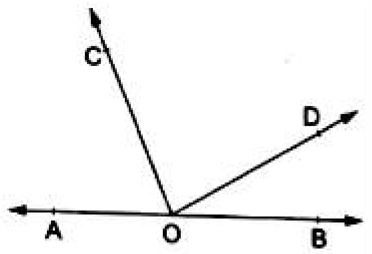
If a straight line falling on two straight lines makes the interior angles on the same side of it taken together less than two right angles, then the two straight lines, if produced indefinitely, meet on that side on which the sum of angles is less than two right angles.

(a) According to the above postulate, if the lines are parallel, then which of the following angles will be supplementary?
(i) corresponding (ii) Alternate interior (iii) Co-interior (iv) Vertically opposite

(b) If two angles are complements of each other then each angle is
(i) An acute angle
(ii) An obtuse angle
(iii) A right angle
(iv) A reflex angle

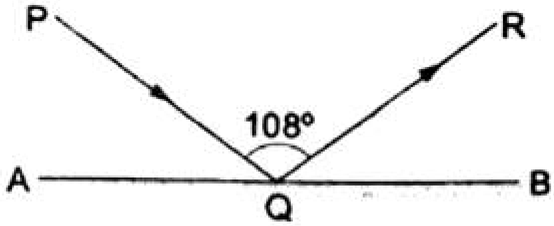
(c) The measure of an angle is 5 times its complement, the angle measures
(i) 25° (ii) 35° (iii) 65° (iv) 75°

(d) In the given figure, AOB is a straight line. If ∠AOC + ∠BOD = 95°, then ∠COD = ?



(i) 95° (ii) 85° (iii) 90° (iv) 55°

(e) In the given figure AB is a mirror, PQ is the incident ray and QR is the reflected ray. If ∠PQR = 108°, then ∠AQP = ?



(i) 72°
(ii) 18°
(iii) 36°
(iv) 54°

18. Case study based – 2: You must have observed that two copies of your photographs of the same size are identical. Similarly, two bangles of the same size, two ATM cards issued by the same bank are identical. You may recall that on placing a one rupee coin on another minted in the same year, they cover each other completely. Do you remember what such figures are called? Indeed they are called congruent figures ('congruent' means equal in all respects or figures whose shapes and sizes are both the same). Now, draw two circles of the same radius and place one on the other. What do you observe? They cover each other completely and we call them as congruent circles.

(a) Which of the following is not a criterion for congruence of triangles?
(i). SSA
(ii). SAS
(iii). ASA
(iv). SSS

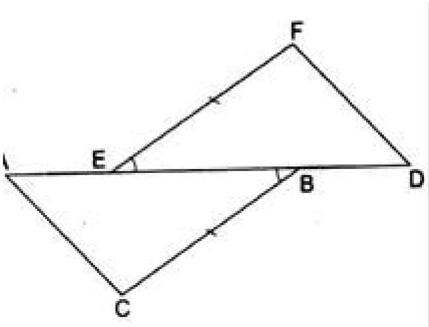
(b) If AB=QR, BC=RP and CA=PQ, then which of the following holds?
(i). ΔABC ≅ ΔPQR
(ii). ΔCBA ≅ ΔPQR

(iii). ΔCAB ≅ ΔPQR
(iv). ΔBCA ≅ ΔPQR

(c) If ΔABC≅ΔPQR AND ΔABC is not congruent to ΔRPQ, then which of the following is not true?
(i). BC=PQ
(ii). AC=PR
(iii). BC=QR
(iv). AB=PQ

(d) It is given that ΔABC≅ΔFDE in which AB=5cm, ∠B=40°, ∠A=80° and FD=5cm. Then, which of the following is true?
(i). ∠D=60°
(ii). ∠E=60°
(iii). ∠F=60°
(iv). ∠D=80°

(e) In the given figure, AE=DB, CB=EF And ∠ABC=∠FED. Then, which of the following is true?



(i). ΔABC ≅ ΔDEF
(ii). ΔABC ≅ ΔEFD
(iii). ΔABC ≅ ΔFED
(iv). ΔABC ≅ ΔEDF

19. Case study based -3: let us mark four points and see what we obtain on joining them in pairs in some order.

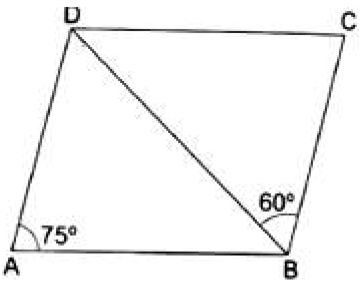
Note that if all the points are collinear (in the same line), we obtain a line segment, if three out of four points are collinear, we get a triangle, and if no three points out of four are collinear, we obtain a closed figure with four sides

Such a figure formed by joining four points in an order is called a quadrilateral.

A quadrilateral has four sides, four angles and four vertices. You may wonder why should we study about quadrilaterals (or parallelograms) Look around you and you will find so many objects which are of the shape of a quadrilateral - the floor, walls, ceiling, windows of your classroom, the blackboard, each face of the duster, each page of your book, the top of your study table etc.

(a) Three angles of a quadrilateral are 80°, 95° and 112°. Its fourth angle is
(i). 78°
(ii). 73°
(iii). 85°
(iv). 100°

(b) In the given figure, ABCD is a parallelogram in which ∠BAD = 75° and ∠CBD = 60°. Then, ∠BDC = ?



(i). 60°
(ii). 75°
(iii). 45°
(iv). 50°

(c) In which of the following figures are the diagonals equal?
(i). Parallelogram
(ii). Rhombus
(iii). Trapezium
(iv). Rectangle

(d) The lengths of the diagonals of a rhombus are 16 cm and 12 cm. The length of each side of the rhombus is

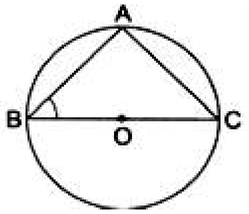
(i). 10 cm
(ii). 12 cm
(iii). 9 cm
(iv). 8 cm

(e) If ABCD is a parallelogram with two adjacent angles ∠A = ∠ B, then the parallelogram is a
(i). rhombus
(ii). trapezium
(iii). rectangle
(iv). none of these

20. Case study based – 4: You may have come across many objects in daily life, which are round in shape, such as wheels of a vehicle, bangles, dials of many clocks, coins of denominations 50 p, Re 1 and Rs 5, key rings, buttons of shirts, etc. (see Fig.10.1). In a clock, you might have observed that the second's hand goes round the dial of the clock rapidly and its tip moves in a round path. This path traced by the tip of the second's hand is called a circle.

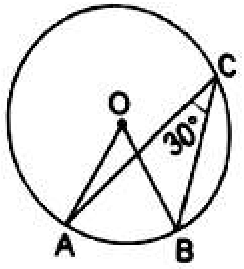
(a) The radius of a circle is 13 cm and the length of one of its chords is 10 cm. The distance of the chord from the centre is
(i). 11.5 cm
(ii). 12 cm
(iii). $\sqrt{69}$ cm
(iv). 23 cm

(b) In the given figure, BOC is a diameter of a circle and AB = AC. Then, ∠ABC = ?



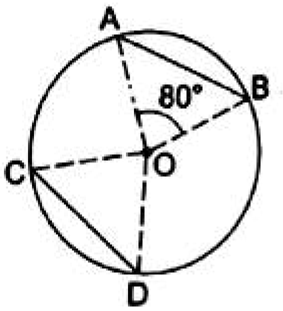
(i). 30°
(ii). 45°
(iii). 60°
(iv). 90°

(c) In the given figure, O is the centre of a circle and ∠ACB = 30°. Then, ∠AOB = ?



(i). 30°
(ii). 15°
(iii). 60°
(iv). 90°

(d) AB and CD are two equal chords of a circle with centre O such that ∠AOB = 80°, then ∠COD = ?



(i). 100°
(ii). 80°
(iii). 120°
(iv). 40°

(e) The angle in a semicircle measures
(i). 45°
(ii). 60°
(iii). 90°
(iv). 36°

PART–B

Section III

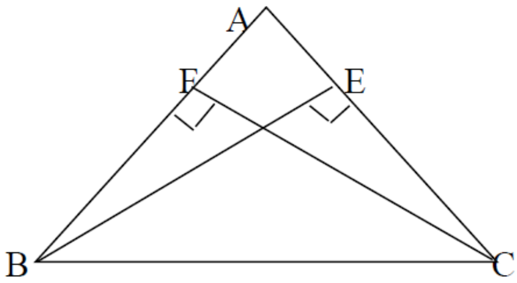
21. If P(x) = $x^3 - 1$, then find the value of P(1) + P(-1).

22. Express 0.4777… in the rational form.

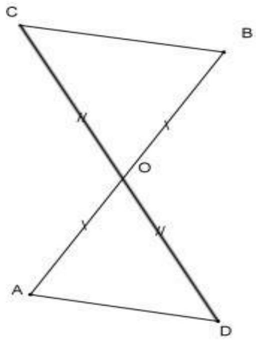
23. Write the factors of the polynomial $4x^2 + y^2 + 4 + 4xy + 8x + 4y$

24. If the point $(2k - 3, k + 2)$ is a solution of linear equation $2x + 3y + 15 = 0$, find the value of k.

25. ABC is an isosceles triangle in which altitudes BE and CF are drawn to equal sides AC and AB respectively. Show that these altitudes are equal

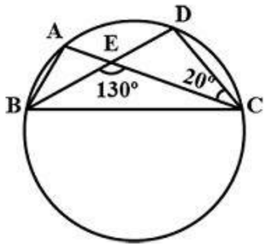


26. In the figure, OA=OB, OD =OC, then choose the congruence rule by which ΔAOD ≅ΔBOC.



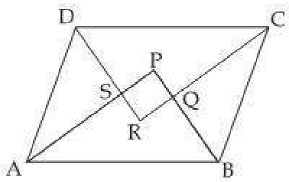
Section IV

27. In the figure A,B,C,D are four points on a circle. AC and BD intersect at a point E such that $\angle BEC = 130^0$ and $\angle ECD = 20^0$. Find $\angle BAC$.



28. Examine which of the numbers 1, −1, −3 are zeroes of the polynomial $p(x) = 2x^4 + 9x^3 + 11x^2 + 4x - 6$.

29. Show that the bisectors of angles of a parallelogram form a rectangle.



30. Prove that: "The sum of the angles of a triangle is 180^0"

31. Show that: "If the diagonals of a quadrilateral bisect each other at right angles, then it is a rhombus."

32. Construct a right triangle ΔXYZ in which $\angle Z = 90^0$, YZ=3cm, XZ+$XY = 5cm$.

33. Find the volume of a sphere whose surface area is $154cm^2$.

Section V

34. A conical tent is 10m high and the radius of its base is 24m. Find

(i) slant height of the tent.
(ii) Cost of the canvas required to make the tent, if the cost of $1m^2$ canvas is ₹ 70

35. The following table shows the number of people of different age groups travelling in a metro during a day: Draw Histogram for the given data:

Age group (in years)	No. of people(in hundreds)
0-10	27
10-20	33
20-30	39
30-40	45
40-50	27
50-60	15

36. Draw the graph of the equation $x - y = 4$

Answer the following using graph paper:

(i) Find the value of y, $if\ x = 7$ from the graph.

(ii) Write the coordinate of the point where the graph intersects on $x - axis$.

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HINTS & SOLUTIONS

Maths Sample paper

1. $7^{1/3}$

2. 5^{10}

3. 1/17 OR -4

4. 0

5. x = 28

6. 51/2 cm

7. 35°

8. 8 cm

9. SAS

10. 3/8

11. a = 25° OR 106°

12. x = 85° OR 40°

13. x = 20° OR 24° and 60°

14. 180°

15. 6 cm

16. $\sqrt{2} + 5$

17. (a) (iii) Co – interior angles

(b) (i) acute angle

(c) (iv) 75°

(d) (ii) 85°

(e) (iii) 36°

18. (a) (i) SSA

(b) (iii) ΔCAB ≅ ΔPQR

(c) (i) BC = PQ

(d) (ii) ∠E = 60°

(e) (i) ΔABC ≅ ΔDEF

19. (a) (ii) 73°

(b) (iii) 45°

(c) (iv) Rectangle

(d) (i) 10 cm

(e) (iii) Rectangle

20. (a) (ii) 12 cm

(b) (ii) 45°

(c) (iii) 60°

(d) (ii) 80°

(e) (iii)90°

21. P(1) = x^3-1

P (1) = 1^3-1

= 1 - 1

= 0

P (-1) = -1^3-1

= -1-1

= -2

P (1) + P (-1) = 0-2

= -2

22. Let x = 0.4777 ...

Multiply by 10, we get
10x = 4.777... … (I)
Again, multiply by 10, we get
100x = 47.77... … (II)
Subtracting (II) from (I), we get
90x = 43
x = $\frac{43}{90}$

23.

$$4x^2+y^2+4xy+8x+4y+4=4x^2+4xy+y^2+8x+4y+4$$
$$=\left[(2x)^2+2\times(2x)(y)+(y)^2\right]+4(2x+y)+4$$
$$=(2x+y)^2+4(2x+y)+4$$
$$=a^2+4a+4 \qquad (let\ (2x+y)=a)$$
$$=a^2+2a+2a+4$$
$$=a(a+2)+2(a+2)$$
$$=(a+2)(a+2)$$
$$=(a+2)^2$$
$$=(2x+y+2)^2 \qquad (substitute\ a=2x+y)$$
$$Thus,\ 4x^2+y^2+4xy+8x+4y+4=(2x+y+2)^2$$

24. Since (2k - 3, k + 2) lies on 2x + 3y + 15 = 0

⇒2(2k - 3) + 3(k + 2) + 15 = 0
4k - 6 + 3k + 6 + 15 = 0
7k + 15 = 0
$k = \frac{-15}{7}$

25. Given: BE and CF are altitudes, AC = AB

To show: BE = CF

Proof:
In ΔAEB and ΔAFC,

∠A = ∠A (Common)

∠AEB = ∠AFC (Right angles)

AB = AC (Given)

AAS Postulate (Angle-Angle-Side) If two angles and a non-included side of one triangle are congruent to the corresponding parts of another triangle, then the triangles are congruent.
Therefore, By AAS congruence axiom,

$\Delta AEB \cong \Delta AFC$

Thus,

BE = CF (By corresponding parts of congruent triangles)
Hence, Proved.

26. Given:

OA = OB

And OD = OC

To Prove:

ΔAOD ≅ ΔBOC

Proof :

Lines CD and AB intersect.

∠AOD = ∠BOC (Vertically Opposite Angles)

In ΔAOD and ΔBOC,

OA = OB (Given)

∠AOD = ∠BOC (Vertically Opposite Angles)

OD = OC (Given)

Therefore, ΔAOD ≅ ΔBOC (By SAS Congruence)----- (1)

27.

$\angle CED + \angle BEC = 180°$

| Linear Pair Axiom

$\Rightarrow \angle CED + 130° = 180°$

$\Rightarrow \angle CED = 180° - 130° = 50°$ ...(1)

$\angle ECD = 20°$ ...(2)

In ΔCED,

$\angle CED + \angle ECD + \angle CDE = 180°$

| Sum of all the angles of a triangle is 180°

$\Rightarrow 50° + 20° + \angle CDE = 180°$

| Using (1) and (2)

$\Rightarrow$ $70° + \angle CDE = 180°$

$\Rightarrow$ $\angle CDE = 180° - 70°$

$\Rightarrow$ $\angle CDE = 110°$ ...(3)

Now, $\angle BAC = \angle CDE$

| Angles in the same segment of a circle are equal

$= 110°$.

I Using (3).

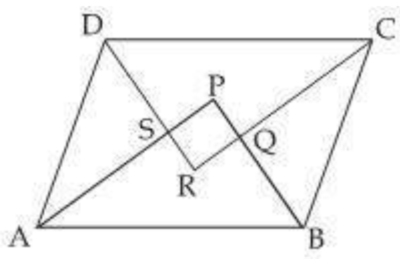
28. $p(1) = 2(1)^4 + 9(1)^3 + 11(1)^2 + 4(1) - 6 \neq 0$

$p(-1) = 2(-1)^4 + 9(-1)^3 + 11(-1)^2 + 4(-1) - 6 \neq 0$

$p(-3) = 2(-3)^4 + 9(-3)^3 + 11(-3)^2 + 4(-3) - 6 = 0$

Hence -3 is a zero

29. P, Q, R and S are the points of intersection of bisectors of the angles of the parallelogram.



In ΔADS,

$\angle DAS + \angle ADS = \frac{1}{2}\angle A + \frac{1}{2}\angle D$

$= \frac{1}{2}(\angle A + \angle D)$

$= \frac{1}{2} \times 180^\circ = 90^\circ$

($\angle$A and $\angle$D are interior angles on the same side of the transversal)

Also in ΔADS,

$\angle$DAS + $\angle$ADS + $\angle$DSA = 180° (angle sum property)

$\Rightarrow \angle 90^\circ + \angle DSA = 180^\circ$

$\Rightarrow \angle DSA = 90^\circ$

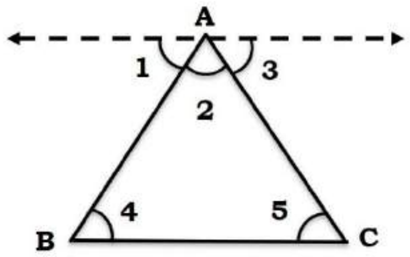
$\therefore \angle PSR = 90^\circ$ (Vertically opposite angles)

Similarly, it can be shown that $\angle$APB or $\angle$SPQ = 90°

Also, $\angle$SRQ = $\angle$RQP = 90°

Hence, PQRS is a rectangle.

30.



Construct a line Parallel to BC, passing through A.

Label the angles as shown.

$\angle$1 = $\angle$4 (Alternate interior angles)

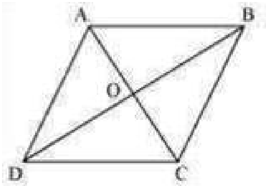
$\angle$3 = $\angle$5 (Alternate interior angles)

Also, $\angle$1 + $\angle$2 + $\angle$3 = 180° (Angles on a straight line)

Thus, $\angle$1 + $\angle$4 + $\angle$5 = 180°

Hence Proved.

31. To Prove: If diagonals of a quadrilateral bisect at 90°, it is a rhombus.

Figure: 

Definition of Rhombus: A parallelogram whose all sides are equal.
Given: Let ABCD be a quadrilateral whose diagonals bisect at 90º

In ΔAOD and ΔCOD,

OA = OC (Diagonals bisect each other)

∠AOD = ∠COD (Given)

OD = OD (Common)

ΔAOD ≅ ΔCOD (By SAS congruence rule)

AD = CD ....(1)

Similarly,

AD = AB and CD = BC ....(2)

From equations (1) and (2),

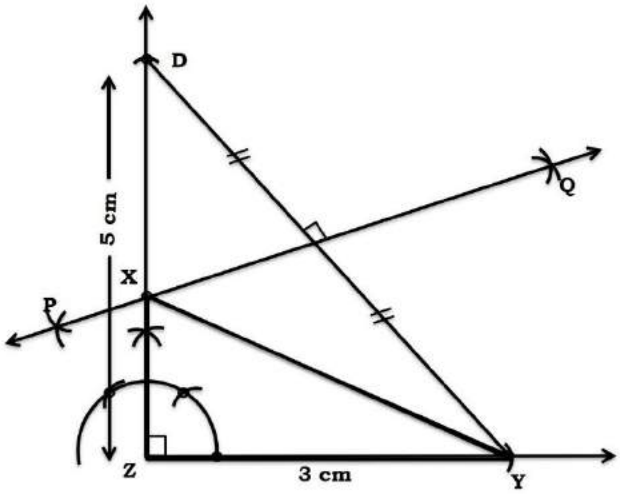
AB = BC = CD = AD

Since opposite sides of quadrilateral ABCD are equal, it can be said that ABCD is a parallelogram. Since all sides of a parallelogram ABCD are equal, it can be said that

ABCD is a rhombus

Hence, Proved.

32. Given below is the required construction.



ΔXYZ is the required triangle.

33. Let the radius be "r".

Given, Surface area = 154 cm^2

We know that Surface Area of a sphere is given by, $S = 4\pi r^2$
Therefore,

$4\pi r^2 = 154$

$4 \times \frac{22}{7} \times r \times r = 154$

$r^2 = \frac{154 \times 7}{4 \times 22} = \frac{7 \times 7}{2 \times 2}$

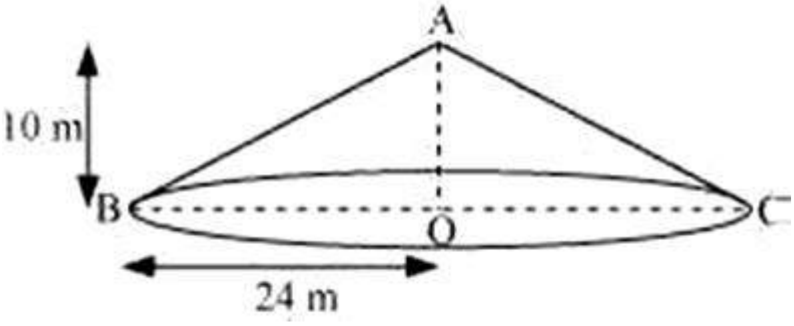
r = 3.5 cm
Now,

Volume = $\frac{4}{3}\pi r^3$
$= \frac{4}{3} \times \frac{22}{7} \times (3.5)^3$
$= 179\frac{2}{3}$ cm^3
= 179.67 cm^3

34. (i) Let ABC be a conical tent.

Height (h) of conical tent = 10 m

Radius (r) of conical tent = 24 m



Let the slant height of the tent be l.

In ΔABO,
$AB^2 = AO^2 + BO^2$
$l^2 = h^2 + r^2$
$= (10\text{ m})^2 + (24\text{ m})^2$
$= 676\text{ m}^2$
l = 26 m

(ii) CSA of tent = $\pi r l$

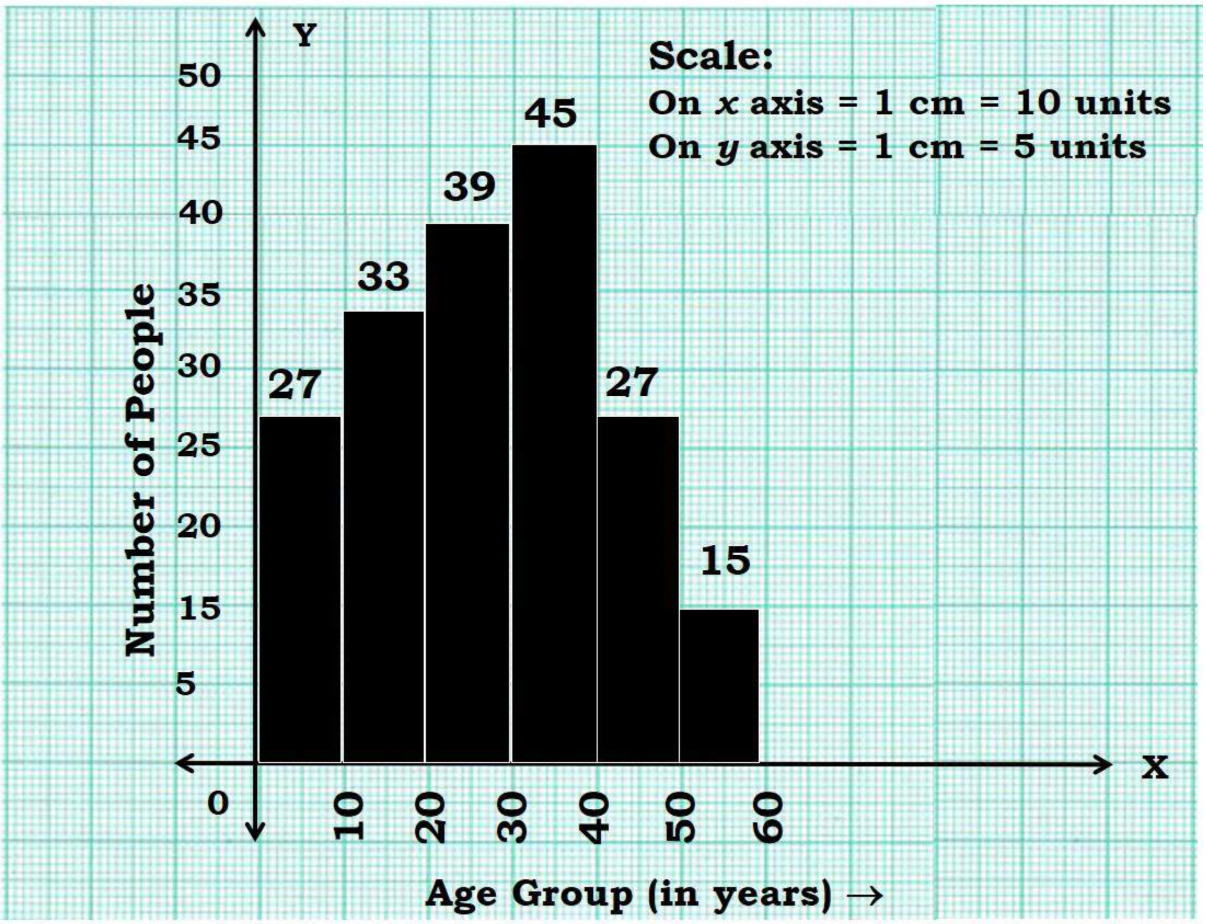
$= \frac{22}{7} * 24 * 26$

$= \frac{13728}{7}\text{ m}^2$

Cost of 1 m^2 canvas = Rs 70

So, cost of $\frac{13728}{7}\text{ m}^2$ canvas = $(\frac{13728}{7}\text{ m}^2 * 70)$
= Rs 137280

35.



Is the required Histogram

36.

Plot the required graph.

(i) y = 3, if x = 7

(ii) For x – axis, y = 0, Thus x = 4, the required point is (4, 0)

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