BLUE PRINT : SA-II (IX) : MATHEMATICS.

UNIT/TOPIC	1	2	3	4	Total
Algebra (Linear Equations in Two Variables)	2(2)		6(2)	8(2)	16(6)
Geometry (Quadrilaterals, Area, Circles, Constructions)	2(2)	4(2)	12(4)	20(5)	38(13)
Mensuration (Surface Areas and Volumes)	2(2)	2(1)	6(2)	8(2)	18(7)
Statistics and Probability	2(2)	6(3)	6(2)	4(1)	18(8)
Total	8(8)	12(6)	30(10)	40(10)	90(34)

SAMPLE QUESTION PAPER SA-II

CLASS IX

(SECTION-A)

TIME 3 HRS. **M.M.:90**

Question numbers 1 to 8 carry 1mark each. For each question, four alternative choices have been provided of which only one is correct. You have to select the correct choice.

1. Equation of x-axis is

   (A) $x = 0$ (B) $x = y$ (C) $y = 0$ (D) $x + y = 0$

2. The median of a triangle divides it into two

   (A) triangles of equal area (B) equilateral triangles

   (C) right triangles (D) isosceles triangles

3. In Fig.1, AOB is a diameter of the circle and AC = BC, then $\angle CAB$ is equal to

   (A) 30^o (B) 45^o (C) 90^o (D) 60^o

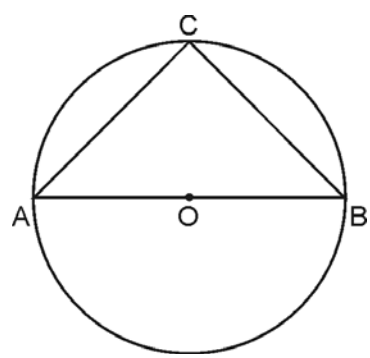


Fig. 1

4. Linear equation of the type $y = mx$, $m \neq o$ has

   (A) infinitely many solutions (B) a unique solution

   (C) only solution $x = 0$, $y = 0$ (D) solution $m = 0$.

5. In a frequency distribution, the mid-value of a class is 20 and the width of the class is 8. then the lower limit of the class is

   (A) 12 (B) 24 (C) 28 (D) 16

6. If the volume of a sphere is numerically equal to its surface area, then radius of the sphere is

   (A) 1 unit (B) 3 units (C) 2 units (D) 6 units

7. Which of the following cannot be empirical probability of an event?

(A) 4/5 (B) 1 (C) 0 (D) 5/4

8. The total surface area of a cone of radius 2r and slant height $\ell/2$ is

(A) $2\pi r\ (\ell + r)$ (B) $\pi r(\ell + \frac{r}{4})$ (C) $\pi r(4r + \ell)$ (D) $2\pi r$

SECTION-B

Question numbers 9 to 14 carry 2 marks each.

9. D and E are points on sides AB and AC respectively of $\triangle$ ABC such that ar (DBC) = ar (EBC). Prove that DE∥BC.

10. An edge of a cube is increased by 10%. Find the percentage by which the surface area of the cube has increased.

11. Find the mode of the following data:

5, 7, 6, 5, 9, 8, 6, 7, 11, 10, 5, 7, 6, 8, 6, 9, 10.

12. In a cricket match, a batsman hits a boundary 4 times out of 30 balls, he plays. Find the probability that he did not hit a boundary.

13. Prove that equal chords of a circle subtend equal angles at the centre.

OR

In Fig.2 , ∠DAB = 70°, ∠DBA = 35°.

Find the measure of ∠ACB.

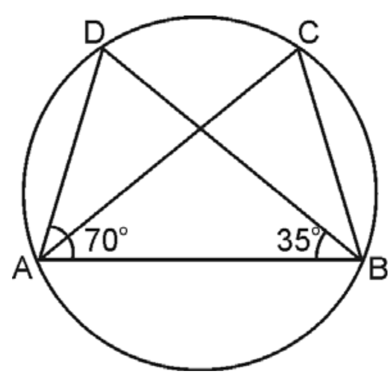


Fig. 2

14. If the arithmetic mean of 25, 30, 32, x, 43 is 34, then find the value of x.

SECTION-C

Question numbers 15 to 24 carry 3 marks each.

15. Find three different solutions for the equation

$$3x - 8y = 27$$

16. Prove that a diagonal of a parallelogram divides it into two congruent triangles.

17. Draw a line segment AB = 5cm. From the point A, draw a line segment AD = 6cm making $\angle DAB = 60^o$. Draw the perpendicular bisector of AD. Does it pass through B? (Use ruler and compass only).

18. A lead pencil consists of a cylinder of wood with a solid cylinder of graphite filled in the interior. The diameter of the pencil is 7mm and the diameter of the graphite is 1mm. If the length of the pencil is 14cm, find the volume of the wood. (use $\pi = 22/7$)

OR

A heap of wheat is in the form of a cone, the diameter of whose base is 14m and height is 3m. Find its volume. The heap is to be covered by canvas to protect it from rain. Find the area of the canvas required.

19. Find mean of the following data:

Marks:	10	11	12	13	14	15
Number of students:	6	3	4	5	7	5

OR

The points scored by a basket-ball team in a series of matches are as follows:

17, 2, 7, 27, 25, 5, 14, 18 , 10, 24, 10, 8, 7, 10

Find mean, median and mode for the data.

20. Give the geometrical representation of x = -3 as an equation

(i) in one variable (ii) in two variables.

OR

Solve the equation 2x+1 = x–3 and represent the solution(s) (i) on the number line (ii) in the Cartesian plane.

21. The radius of a spherical balloon increases from 7cm to 14cm as air is being pumped into it. Find the ratio of surface areas of the balloon in the two cases.

22. In Fig.3, ABCD is a parallelogram and E is the mid point of AD.DL∥BE meets AB produced at F. Prove that B is the midpoint of AF and EB =LF.

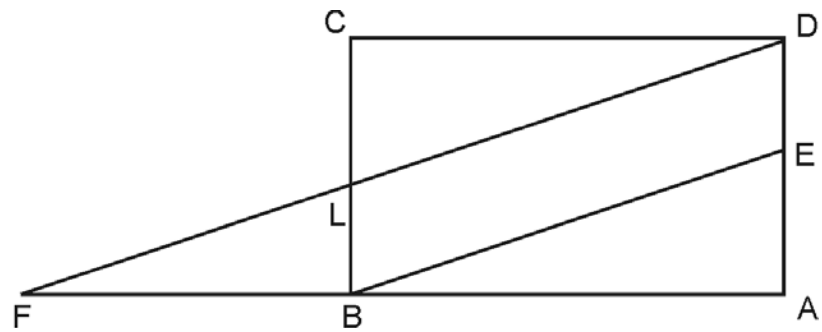


Fig. 3

23. In Fig.4, ABCD is a trapezium in which AB∥DC. O is the mid point of BC. Through the point O, a line PQ∥AD has been drawn which intersects AB at Q and DC produced at P. Prove that ar (ABCD) = ar (AQPD).

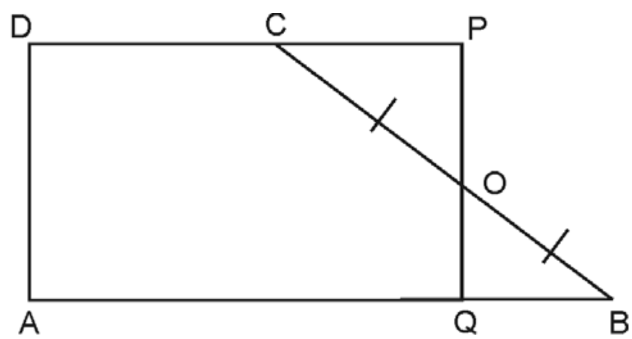


Fig. 4

24. A die is thrown 400 times with the frequencies for the outcomes 1, 2, 3, 4, 5 and 6 as given in the following table.

Outcome:	1	2	3	4	5	6
Frequency:	72	65	70	71	63	59

Find the probability of

(i) getting a number less than 3.

(ii) getting an outcome 6.

(iii) getting a number more than 4.

SECTION-D

Question numbers 25 to 34 carry 4 marks each.

25. Show that the line segments joining the mid points of the opposite sides of a quadrilateral bisect each other.

26. Construct a triangle ABC in which BC = 8cm, $\angle B = 30^\circ$ and AB – AC = 3.5cm

OR

Construct a triangle PQR in which $\angle R = 45^\circ$, $\angle Q = 60^\circ$ and PQ + QR + RP = 11cm.

27. Draw the graph of linear equation $x + 2y = 8$. From the graph, check whether (-1, -2) is a solution of this equation.

28. A storage tank is in the form of a cube. When it is full of water, the volume of the water is $15.625 m^3$. If the present depth of the water is 1.3m, find the volume of water already used from the tank.

29. In Fig.5, PQ is the diameter of the circle with centre O. If $\angle PQR = 65^\circ$, $\angle RPS = 40^\circ$ and $\angle PQM = 50^\circ$, find $\angle QPR$, $\angle PRS$ and $\angle QPM$.

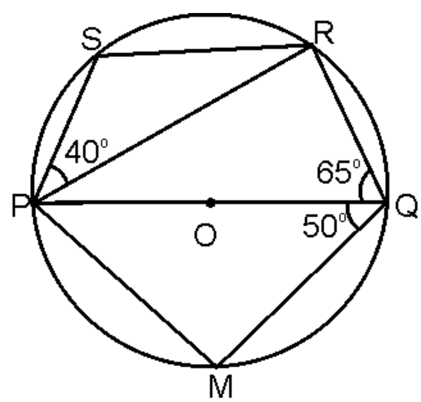


Fig. 5

30. Diagonals AC and BD of a quadrilateral ABCD intersect at O in such a way that ar (AOD) = ar (BOC). Prove that ABCD is a trapezium.

OR

Diagonals AC and BD of a quadrilateral ABCD intersect each other at P. Show that ar (APB) x ar (CPD) = ar (APD) x ar (BPC)

31. The following table shows the amount received on a certain sum of money invested at simple interest for different periods of time:

Time (in years)	2	5	10	15	20
Amount (in Rs.)	240	300	400	500	600

Plot these points on Cartesian plane, taking Time along x-axis and Amount along y-axis. Join the points. From the graph, write down the amount after 12 years.

32. If two equal chords of a circle intersect within the circle, prove that the line joining the point of intersection to the centre makes equal angles with the chords.

33. The circumference of the base of a cone is $\frac{220}{7}$ cm and its slant height is 13cm. Find the volume of the cone. (Use $\pi = \frac{22}{7}$)

34. Construct a histogram and frequency polygon for the following frequency distribution:

Weight (in kg):	40-45	45-50	50-55	55-60	60-65	65-70
Number of persons:	15	25	28	15	12	5

MARKING SCHEME (SA – II)

CLASS IX

SECTION-A

1.	(C)	2.	(A)	
3.	(B)	4.	(A)	
5.	(D)	6.	(B)	
7.	(D)	8.	(C)	**1mark each**

SECTION-B

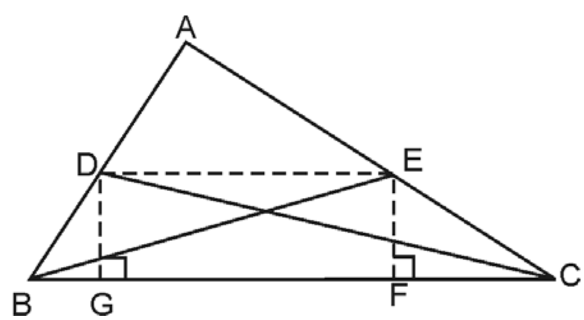
9. Figure, construction. ½

ar (DBC) = ar (EBC)

$\Longrightarrow \frac{1}{2}$ BC x DG = $\frac{1}{2}$ x BC x EF ½

$\Longrightarrow$ DG = EF ½

$\Longrightarrow$ DE∥BC ½



10. Let the edge of the cube be x units

Increased edge = $\frac{11x}{10}$ units ½

Original Surface Area = $6x^2$ ½

New Surface Area = $6 \times \frac{121}{100} x^2$, Increase in area = $6 \times \frac{121}{100} x^2 - 6x^2$ ½

∴ Surface Area increased by 21% = $\frac{21 \times 6}{100} x^2$ ½

11. Arranging the data (17 terms) in ascending order.

5, 5, 5, 6, 6, 6, 6, 7, 7, 7, 8, 8, 9, 9, 10, 10, 11 — 1

6 is repeated maximum number of times i.e. 4

∴ mode = 6 — 1

12. Prob. (he hits a boundary) = 4/30 — 1

∴ Prob. (he does not hit a boundary) = $1 - \frac{4}{30} = \frac{26}{30}$ or $\frac{13}{15}$ — 1

13. Fig. — ½

OA = O’ A’ (Radii of congruent circles)

OB = O’ B’

$\angle$ AOB = $\angle$A’ O’ B’ (given)

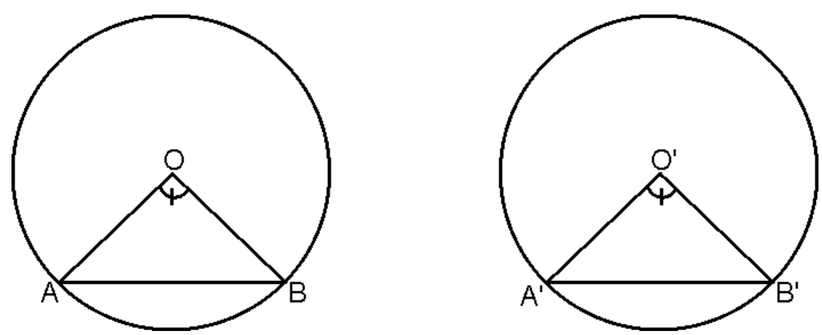
∴ $\triangle$OAB ≅ $\triangle$ O’ A’ B’ (SAS) — 1

⟹ AB = A’ B’ (CPCT) — ½

OR

$\angle$ADB = $180^\circ - (70 + 35)^\circ = 75^\circ$ — 1

∴ $\angle$ACB = 75° (angles in the same segment) — ½ + ½



14. $$\frac{25 + 30 + 32 + x + 43}{5} = 34$$ — 1

⟹ $x = 40$ — 1

SECTION-C

15. 3x – 8y = 27: Some of the solution are (9,0), (1,-3), (-7, -6).

For each correct solution one mark

[These may be different also]

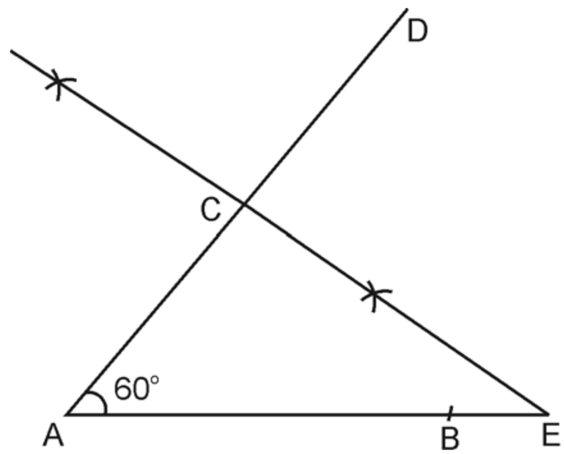
16. Given, To prove, Figure 1

Correct Proof of the theorem 2

17. For constructing $\angle BAD = 60^o$ correctly 2

For drawing perpendicular bisector of AD ½

No, it does not pass through the point B. ½



18. Inner radius of the cylinder $= 0.5mm\ (r_1)$

Outer radius of the cylinder $= 3.5mm\ .\ (r_2)$ ½

∴ Volume of the wood $= \pi(r^2_2 - r_1^2)\ h$ ½

$= \frac{22}{7}(12.25 - .25) \times 140$ 1

$= 5280mm^3.$ 1

OR

Volume of the wheat $= \frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 3$

$= 154\ m^3$

r = 7m, h = 3m ∴ $\ell = \sqrt{h^2 + r^2} = \sqrt{58}$ m. 1½

∴ Area of the canvas required $= \pi r \ell$

$= \frac{22}{7} \times 7 \times \sqrt{58}$

$= 22\sqrt{58}\ m^2$ 1

19.

Marks (x)	Number of students (f)	f x x	
10	6	60	
11	3	33	
12	4	48	
13	5	65	
14	7	98	
15	5	75	
	$\sum f$ =30	$\sum fx$ =379	2

Mean $(\overline{x})$ = $\frac{\sum fx}{\sum f}$ = $\frac{379}{30}$ ½

= 12.63 ½

OR

Arranging the data in ascending order

2, 5, 7, 7, 8, 10, 10, 10, 14, 17, 18, 24, 25, 27

n = 14, median = $\frac{7^{th}+8^{th}\ term}{2}$

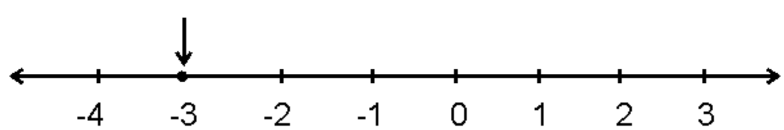
= $\frac{10 + 10}{2}$ = 10 1

Mode = 10 ½

Mean = $\frac{184}{14}$ 1

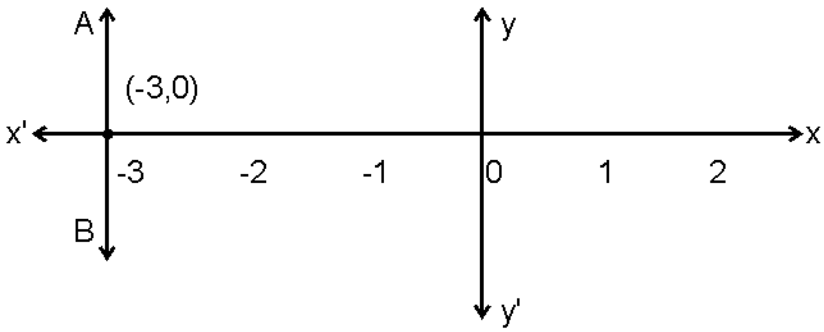
= 13.14 ½

20. (i) In one variable: x =-3, is represented on number line.



1

(ii) in two variables: Equation is x + o.y = -3 ½



1

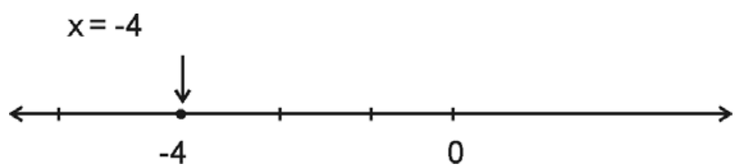
AB is the required line parallel to y-axis. ½

OR

2x + 1 = x – 3

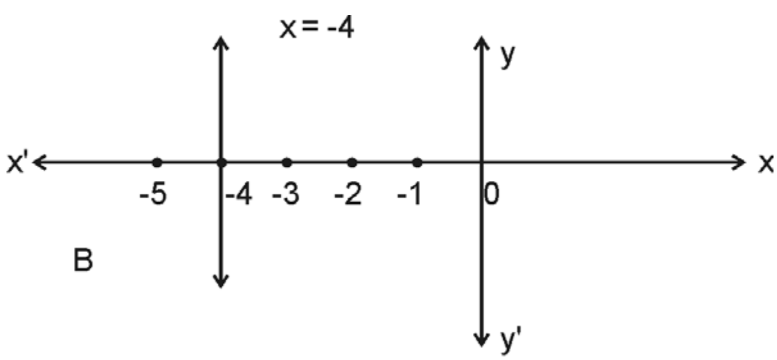
2x – x = -3 -1 1

(i)



1

(ii) 1



21. initial radius (r_1) = 7cm

Present radius (r_2) = 14cm

Initial surface area (S_1) = 4π x 7 x 7cm^2

Present surface area (S_2) = 4π x 14 x 14cm^2

$\frac{S_2}{S_1} = \frac{4}{1}$ or 4:1 1

22. DL∥BE and DE∥BL ⟹ quad. BEDL is a parallelogram. ½

⟹ DE = BL ⟹ AE = BL

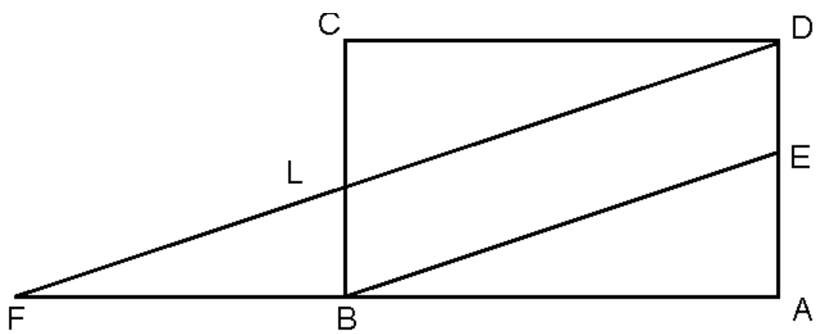
∠EBA = ∠LFB (corresponding angles)

∠FBL = ∠BAE (Corresponding angles

⟹ ΔFLB ≅ ΔBEA 1½

⟹ FB = BA or B is the mid point of FA. ½

and, EB = LF (cpct) ½



23. OB = OC (given)

∠1 = ∠2 (Vert. opp. angles)

∠3 = ∠4 (Alt. int. angles)

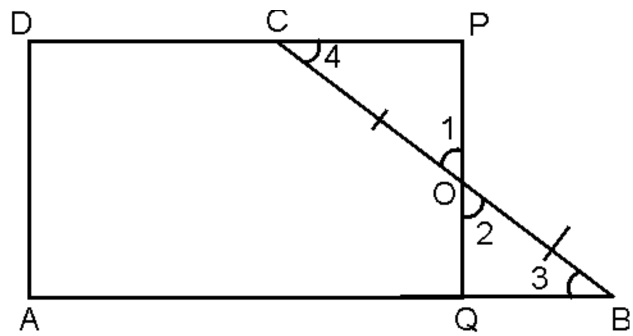
⟹ ΔOQB ≅ ΔOPC (ASA) 1½

⟹ ar (OQB) = ar (OPC) ½

Now ar (ABCD) = ar (AQOCD) + ar (OQB)

= Ar (AQOCD) + ar (OPC)

= Ar (AQPD) 1



24. (i) Prob. (getting a number less than 3) = $\frac{72 + 65}{400}$ = $\frac{137}{400}$ 1

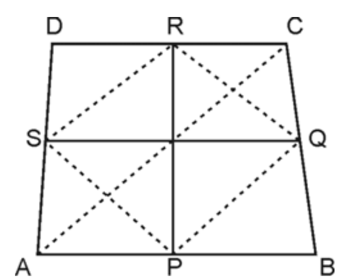
(ii) Prob. (getting an outcome 6) = $\frac{59}{400}$ 1

(iii) Prob. (getting a number more than 4) = $\frac{63+59}{400}$ = $\frac{61}{200}$ 1

SECTION-D

25. Let ABCD be a quadrilateral. P, Q, R, S are mid points of AB, BC, CD and DA respectively.

Join PQ, QR, RS and SP.



Join AC 1

In ΔDAC, SR$\|$AC & SR = $\frac{1}{2}$ AC (Mid point theorem) 2

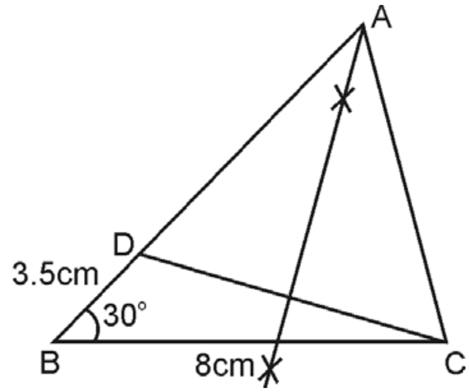
In ΔBAC, PQ$\|$AC & PQ = $\frac{1}{2}$ AC

$\Longrightarrow$ PQRS is a parallelogram ½

$\therefore$ PR and SQ are diagonals of PQRS, therefore PR & SQ bisect each other. ½

26. Correct construction of Δ CBD 2

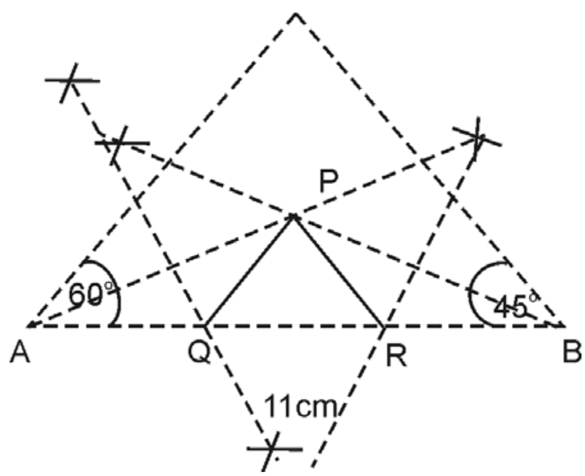
Correct construction of ΔABC 2



OR

Correct construction of ΔPAB 2

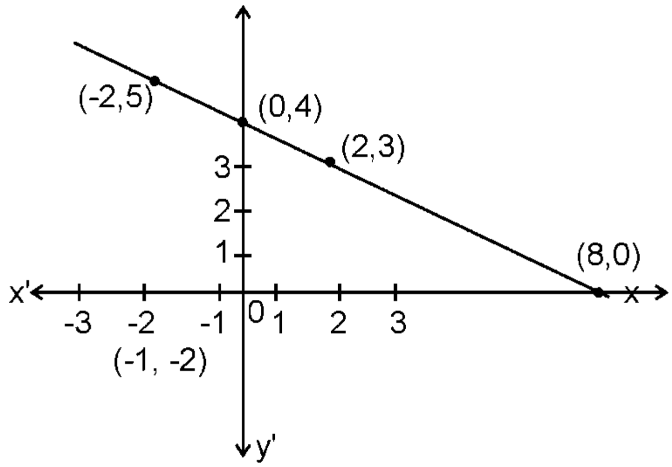
Correct construction of ΔPQR 2



27. Equation is x+2y = 8 $\Rightarrow$ y = $\frac{1}{2}$ (8-x)

x	-2	0	2
y	5	4	3

½



Correct graph 2½

(-1, -2) does not lie on the line, therefore not a solution 1

28. Let the edge of the cube be x m.

Volume of water when tank is full = $15.625 m^3$ 1

$\Rightarrow x^3 = 15.625\ m^3 \Rightarrow x = 2.5m.$ 1

Volume of water remained in tank = $(2.5)^2 \times 1.3\ m^3$

= $8.125 m^3$ 1

∴ Volume of water already used = $(15.625 – 8.125)\ m^3$

= $7.500 m^3$ 1

29. $\angle QRP = 90^o$ (angle in a semi circle)

$\therefore \angle QPR = 90^o – 65^o = 25^o$ 1

∴ PQRS is a cyclic quadrilateral

$\therefore \angle PSR = (180-65)° = 115^o$ 1

$\Rightarrow \angle PRS = 180° - (115 + 40)° = 25^o$ 1

$\angle M = 90^o \therefore \angle QPM = 90°-50°=40^o$ 1

30. Draw perpendicular DE ad CF on AB from D and C respectively ½

ar (AOD) = ar (BOC)

$\Rightarrow$ ar (AOD) + ar (AOB) = ar (BOC) + ar (AOB) ½

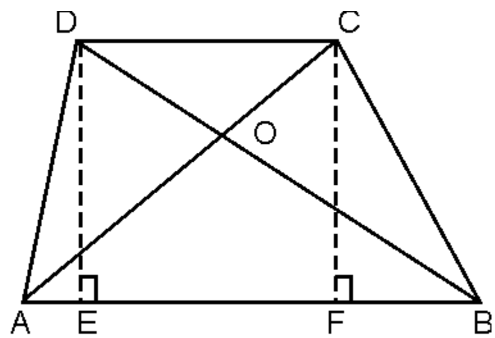
$\Longrightarrow$ ar (DAB = ar (CAB) ½

$\Longrightarrow$ $\frac{1}{2}$ AB x DE = $\frac{1}{2}$ AB x CF 1

$\Longrightarrow$ DE = CF ½

$\Longrightarrow$ AB∥DC ½

$\Longrightarrow$ ABCD is a trapezium. ½



OR

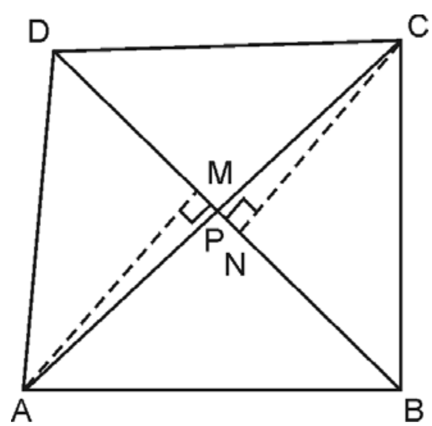
Draw perpendiculars CN and AM on BD from C and A respectively 1

ar (APB) x ar (CPD)

= $\frac{1}{2}$ (PB x AM) x $\frac{1}{2}$ (PD x CN) 1

= $\frac{1}{2}$ (PB X CN) x $\frac{1}{2}$ (PD x AM) 1

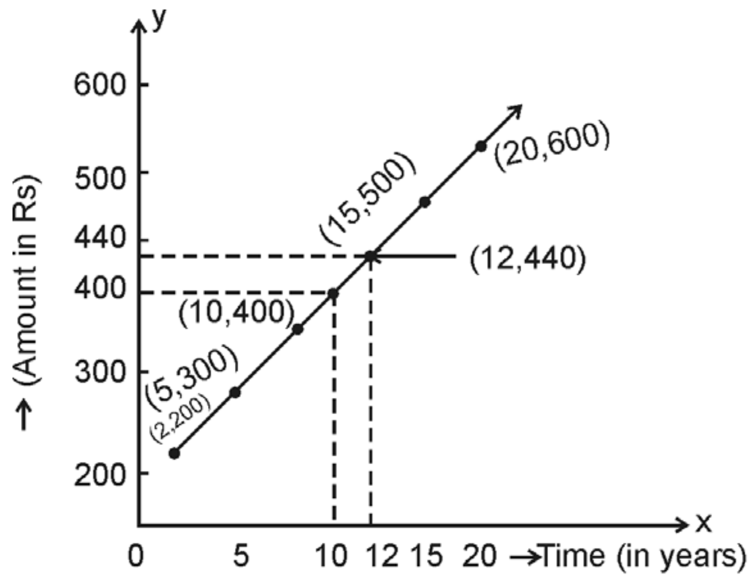
= ar (BPC) x ar (APD) 1



31. Plotting the points correctly $\frac{1}{2}$ x 5 = 2½

Joining the points ½

Amount after 12 years = Rs. 440 1



32. AB = CD

Draw OP ⊥ AB, OQ ⊥CD. 1

OP = OQ (equal chords are equidistant from centre)

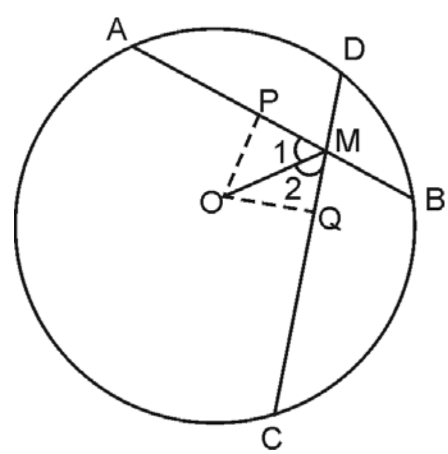
OM = OM

∠ OPM = ∠OQM (90^o each)

∴ △OPM ≅ △OQM (RHS) 2

⇒ ∠1 = ∠2 (cpct)

Or ∠OMP = ∠OMQ 1



33. Let the radius of the cone be r, slant height be ℓ, height be h.

$2\pi r = \dfrac{220}{7}$cm 1

$\Rightarrow$ r = 5cm

$\therefore$ ℓ = 13cm 1

$\therefore$ h = $\sqrt{13^2 - 5^2}$ = 12cm 1

$\therefore$ Volume of the cone = $\frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times 5 \times 5 \times 12$ 1

$= \frac{2200}{7}$cm^3

34. Correctly drawn Histogram 3

Frequency polygon 1