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SAMPLE PAPER TEST 01 FOR ANNUAL EXAM 2025
(ANSWERS)

SUBJECT: MATHEMATICS **MAX. MARKS : 80**
CLASS : IX **DURATION : 3 HRS**

General Instruction:

1. This Question Paper has 5 Sections A-E.
2. **Section A** has 20 MCQs carrying 1 mark each.
3. **Section B** has 5 questions carrying 02 marks each.
4. **Section C** has 6 questions carrying 03 marks each.
5. **Section D** has 4 questions carrying 05 marks each.
6. **Section E** has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

SECTION – A
Questions 1 to 20 carry 1 mark each.

1. Value of $(256)^{0.16} \times (256)^{0.09}$ is
(a) 4 (b) 16 (c) 64 (d) 256.25
Ans: (a) 4

$$(256)^{0.16} \times (256)^{0.09} = (256)^{0.16+0.09} = (256)^{0.25}$$
$$= (256)^{\frac{25}{100}} = (4^4)^{\frac{1}{4}}$$
$$= 4^{4\times\frac{1}{4}} = 4$$

∴ Correct option is (*a*).

2. On simplifying $(\sqrt{3}-\sqrt{7})^2$, we get
(a) $2-\sqrt{21}$ (b) $5-\sqrt{21}$ (c) $2(5-\sqrt{21})$ (d) $10-\sqrt{21}$
Ans: (c) $2(5-\sqrt{21})$
$$(\sqrt{3}-\sqrt{7})^2 = (\sqrt{3})^2 + (\sqrt{7})^2 - 2\times\sqrt{3}\times\sqrt{7}$$
$$= 3+7-2\sqrt{21} = 10-2\sqrt{21} = 2(5-\sqrt{21})$$

3. On dividing $6\sqrt{27}$ by $2\sqrt{3}$, we get
(a) $3\sqrt{9}$ (b) 6 (c) 9 (d) none of these
Ans: (c) 9
$$\frac{6\sqrt{27}}{2\sqrt{3}} = \frac{3\times 3\sqrt{3}}{\sqrt{3}} = 9$$

4. Simplified form of $3^{\frac{2}{3}}.3^{\frac{1}{5}}$ is
(a) $3^{\frac{2}{15}}$ (b) $9^{\frac{2}{15}}$ (c) $3^{\frac{2}{3}}$ (d) $3^{\frac{13}{15}}$
Ans: (d) $3^{\frac{13}{15}}$

5. Factors of $3x^2 - x - 4$ are
(a) (x – 1) and (3x – 4) (b) (x + 1) and (3x – 4)
(c) (x + 1) and (3x + 4) (d) (x – 1) and (3x + 4)

Ans. (b) $(x + 1)$ and $(3x - 4)$

6. Zeros of the polynomial $p(x) = (x - 2)^2 - (x + 2)^2$ are
(a) 2, – 2 (b) 2x (c) 0, – 2 (d) 0
Ans: $p(x) = (x - 2)^2 - (x + 2)^2 = x^2 + 4 - 4x - (x^2 + 4 + 4x)$

$= x^2 + 4 - 4x - x^2 - 4 - 4x = -8x$

Now, $p(x) = 0 \Rightarrow -8x = 0 \Rightarrow x = 0$

Correct option is (d).

7. The point which lies on y-axis at a distance of 5 units in the negative direction of y-axis is
(a) (0, 5) (b) (5, 0) (c) (0, –5) (d) (–5, 0)
Ans. (c) (0, –5)

8. The point (5, –4) lies
(a) on the x-axis (b) on the y-axis (c) in the I quadrant (d) in the IV quadrant
Ans. (d) in the IV quadrant

9. How many linear equations in x and y can be satisfied by x = 1 and y = 2?
(a) Only one (b) Two (c) Infinitely many (d) Three
Ans. (c) Infinitely many

10. The equation of x-axis is of the form
(a) x = 0 (b) y = 0 (c) x + y = 0 (d) x = y
Ans. (b) y = 0

11. The equation 2x + 5y = 7 has a unique solution, if x, y are
(a) Natural numbers (b) Positive real numbers
(c) Real numbers (d) Rational numbers
Ans. (a) Natural numbers

12. If two complementary angles are in the ratio 13 : 5, then the angles are
(a) 65°, 35° (b) 65°, 25° (c) 13x°, 5x° (d) 60°, 30°
Ans. (b) 65°, 25°

13. Angles of a triangle are in the ratio 2 : 4 : 3. The smallest angle of the triangle is
(a) 60° (b) 40° (c) 80° (d) 20°
Ans. (b) 40°

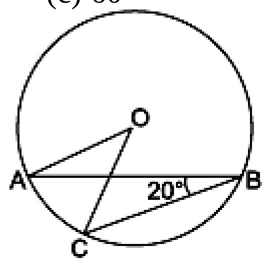
14. Which of the following is not a criterion for congruence of triangles?
(a) SAS (b) ASA (c) SSA (d) SSS
Ans. (c) SSA

15. In a parallelogram ABCD, AP and CQ are perpendicular drawn to the diagonal BD. On measuring it is found that ∠PAB = 65° and ∠DAB = 75°, then the measure of ∠QCD is
(a) 90° (b) 75° (c) 65° (d) 10°
Ans. (c) 65°

16. Given a circle of radius 5 cm and centre O. OM is drawn perpendicular to the chord XY. If OM =3 cm, then length of chord XY is
(a) 4 cm (b) 6 cm (c) 8 cm (d) 10 cm
Ans. (c) 8 cm

17. In figure, if ∠ABC = 20°, then ∠AOC is equal to:

(a) 20° (b) 40° (c) 60° (d) 10°



Ans. (b) 40°

18. The area of an equilateral triangle with side $4\sqrt{3}$ cm is

(a) 20 cm^2 (b) 20 cm^2 (c) 18.784 cm^2 (d) 20.784 cm^2

Ans. (d) 20.784 cm^2

DIRECTION: In the question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.

Choose the correct option

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

(c) Assertion (A) is true but Reason (R) is false.

(d) Assertion (A) is false but Reason (R) is true.

19. **Assertion (A):** 0.271 is a terminating decimal and we can express this number as 271/1000 which is of the form p/q, where p and q are integers and $q \neq 0$.

Reason (R): A terminating or non-terminating decimal expansion can be expressed as rational number.

Ans. (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

20. **Assertion (A):** The angles of a quadrilateral are x°, (x – 10)°, (x + 30)° and (2x)°, the smallest angle is equal to 58°.

Reason (R): Sum of the angles of a quadrilateral is 360°.

Ans. (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

SECTION – B

Questions 21 to 25 carry 2 marks each.

21. Simplify $\frac{6-4\sqrt{3}}{6+4\sqrt{3}}$ by rationalising the denominator.

Ans:

$$\frac{6-4\sqrt{3}}{6+4\sqrt{3}} = \left(\frac{6-4\sqrt{3}}{6+4\sqrt{3}}\right)\times\left(\frac{6-4\sqrt{3}}{6-4\sqrt{3}}\right) = \frac{(6-4\sqrt{3})^2}{(6)^2-(4\sqrt{3})^2}$$

$$= \frac{36-48\sqrt{3}+48}{36-48} \qquad [(a-b)^2 = a^2 - 2ab + b^2]$$

$$= \frac{84-48\sqrt{3}}{-12} = \frac{12(7-4\sqrt{3})}{-12} = 4\sqrt{3}-7$$

OR

Simplify: $\sqrt[4]{81} - 8\sqrt[3]{216} + 15\sqrt[5]{32} + \sqrt{225}$

Ans:

$\sqrt[4]{81} = (81)^{\frac{1}{4}} = (3^4)^{\frac{1}{4}} = 3^{4\times\frac{1}{4}} = 3$

$\sqrt[3]{216} = (216)^{\frac{1}{3}} = (6^3)^{\frac{1}{3}} = 6^{3\times\frac{1}{3}} = 6$

$\sqrt[5]{32} = (32)^{\frac{1}{5}} = (2^5)^{\frac{1}{5}} = 2^{5\times\frac{1}{5}} = 2$

$\sqrt{225} = (225)^{\frac{1}{2}} = (15^2)^{\frac{1}{2}} = 15^{2\times\frac{1}{2}} = 15$

Hence, $\sqrt[4]{81} - 8(\sqrt[3]{216}) + 15(\sqrt[5]{32}) + \sqrt{225}$

$= 3 - 8 \times 6 + 15 \times 2 + 15 = 3 - 48 + 30 + 15 = 48 - 48 = 0$

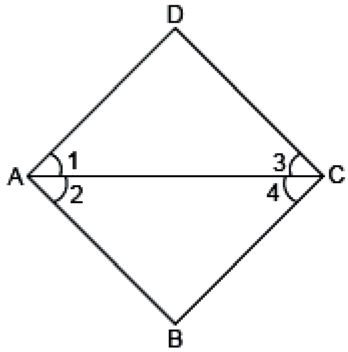
22. Without plotting the points indicate the quadrant in which they will lie, if
(i) ordinate is 5 and abscissa is – 3
(ii) abscissa is – 5 and ordinate is – 3
(iii) abscissa is – 5 and ordinate is 3
(iv) ordinate is 5 and abscissa is 3
Ans: (i) The point is (-3,5). Hence, the point lies in the II quadrant.

(ii) The point is (-5,-3). Hence, the point lies in the III quadrant.

(iii) The point is (-5,3). Hence, the point lies in the II quadrant.

(iv) The point is (3,5). Hence, the point lies in the I quadrant.

23. In the given figure, if $\angle 2 = \angle 4$ and $\angle 4 = \angle 1$, then using Euclid's axiom prove that $\angle 1 = \angle 2$.



Ans: Given: $\angle 2 = \angle 4$ and $\angle 4 = \angle 1$, using Euclid's axiom, things which are equal to the same thing are equal to one another.
Hence, $\angle 2 = \angle 4 = \angle 1$
$\Rightarrow \angle 1 = \angle 2$ Hence proved.

24. Does Euclid's fifth postulate imply the existence of parallel lines? Explain.
Ans. If straight line l falls on two straight lines m and n such that the sum of interior angles on same side of l is 180°, then by Euclid's 5th postulate the lines will not meet on this side of l. Also, the sum of interior angles on other side of l will be 180°, they will not meet on the other side also. $\Rightarrow$ m and n never meet $\Rightarrow$ m and n are parallel.

25. The radii of two cylinders are in the ratio 2 : 3 and their heights are in the ratio 5 : 3. Find the ratio of their total surface areas.
Ans. Radii of two cylinders are $r_1 = 2x$ and $r_2 = 3x$ respectively.
Height of two cylinders are $h_1 = 5x$ and $h_2 = 3x$ respectively.
Ratio of their total surface areas = $\dfrac{2\pi r_1(r_1+h_1)}{2\pi r_2(r_2+h_2)} = \dfrac{2\pi(2x)(7x)}{2\pi(3x)(6x)} = \dfrac{7}{9} = 7:9$

OR

Curved surface area of a cone is 308 cm^2 and its slant height is 14 cm. Find its total surface area.

Ans. Let radius of cone be r cm
Slant height of cone = l = 14 cm
curved surface area of cone = 308 cm^2
$\Rightarrow \pi rl = 308$
$\Rightarrow \frac{22}{7} \times r \times 14 = 308 \Rightarrow r = \frac{308 \times 7}{22 \times 14} = 7cm$
$\therefore$ Total surface area of cone = $\pi r(r + l) = \frac{22}{7} \times 7 \times (7 + 14) = \frac{22}{7} \times 7 \times 21 = 462$ cm^2

SECTION – C

Questions 26 to 31 carry 3 marks each.

26. Find the value of a and b, if $\frac{\sqrt{3}-1}{\sqrt{3}+1} = a + b\sqrt{3}$

Ans:
$$\frac{\sqrt{3}-1}{\sqrt{3}+1} = \left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right) \times \left(\frac{\sqrt{3}-1}{\sqrt{3}-1}\right)$$
$$= \frac{(\sqrt{3}-1)^2}{(\sqrt{3})^2 - 1^2} = \frac{3+1-2\sqrt{3}}{3-1} = \frac{4-2\sqrt{3}}{2} = \frac{2(2-\sqrt{3})}{2} = 2-\sqrt{3}$$
$$\Rightarrow 2-\sqrt{3} = a + b\sqrt{3}$$
Hence, on equating rational and irrational part both sides, we get $a = 2$, $b = -1$.

27. If $2x + 3y = 12$ and $xy = 6$, find the value of $8x^3 + 27y^3$.
Ans. We know that $(x + y)^3 = x^3 + y^3 + 3xy(x + y)$
$\Rightarrow x^3 + y^3 = (x + y)^3 - 3xy(x + y)$
Now, $8x^3 + 27y^3 = (2x)^3 + (3y)^3 = (2x + 3y)^3 - 3(2x)(3y)(2x + 3y)$
$= 12^3 - 18 \times 6 \times 12$ [Given $2x + 3y = 12$ and $xy = 6$]
$= 1728 - 1296 = 432$
Hence, $8x^3 + 27y^3 = 432$

28. Find the value of a, if the line $3y = ax + 7$, will pass through: (i) (3, 4), (ii) (1, 2), (iii) (2, –3)
Ans. $3y = ax + 7$
(i) Putting $x = 3$ and $y = 4$ in the given equation of line, we have
$3 \times 4 = a \times 3 + 7 \Rightarrow 12 = 3a + 7 \Rightarrow 3a = 12 - 7$
$\Rightarrow 3a = 5 \Rightarrow a = \frac{5}{3}$
(ii) Putting $x = 1$ and $y = 2$ in the given equation of line, we have
$3 \times 2 = a \times 1 + 7 \Rightarrow 6 = a + 7 \Rightarrow a = 6 - 7 \Rightarrow a = -1$
(iii) Putting $x = 2$ and $y = -3$ in the given equation, we have
$3 \times (-3) = a \times 2 + 7 \Rightarrow -9 = 2a + 7 \Rightarrow 2a = -9 - 7$
$\Rightarrow 2a = -16 \Rightarrow a = \frac{-16}{2} \Rightarrow a = -8$

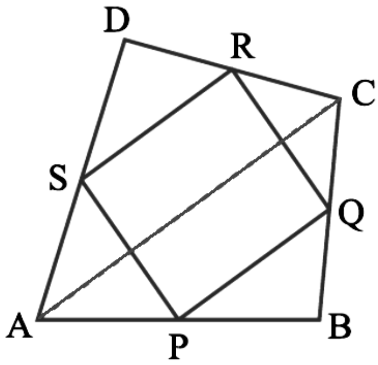
29. Prove that the quadrilateral formed by joining the mid-points of the sides of a quadrilateral, in order, is a parallelogram.
Ans. In ΔABC,
P and Q are mid-points of side AB and BC respectively.
$\therefore$ PQ $\parallel$ AC and PQ = $\frac{1}{2}$ AC ...(i) (By mid-point theorem)
Similarly, in ΔADC,
S and R are mid-points of sides AD and DC respectively.

$\therefore$ RS || AC and RS = $\frac{1}{2}$AC ...(ii) (By mid-point theorem)

From (i) and (ii), we get PQ || RS and PQ = RS

Similarly, we can prove that RQ || PS and PS = RQ

$\Rightarrow$ PQRS is a parallelogram.

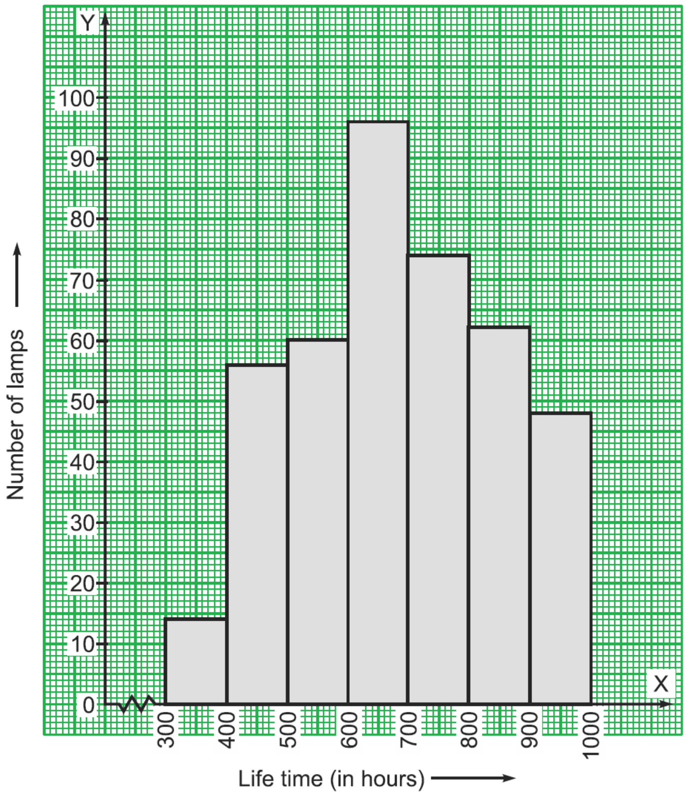


30. The following table gives the life times of 400 neon lamps:

Life time (in hours)	Number of Lamps
300 – 400	14
400 – 500	56
500 – 600	60
600 – 700	86
700 – 800	74
800 – 900	62
900 – 1000	48

Represent the given information with the help of a histogram.

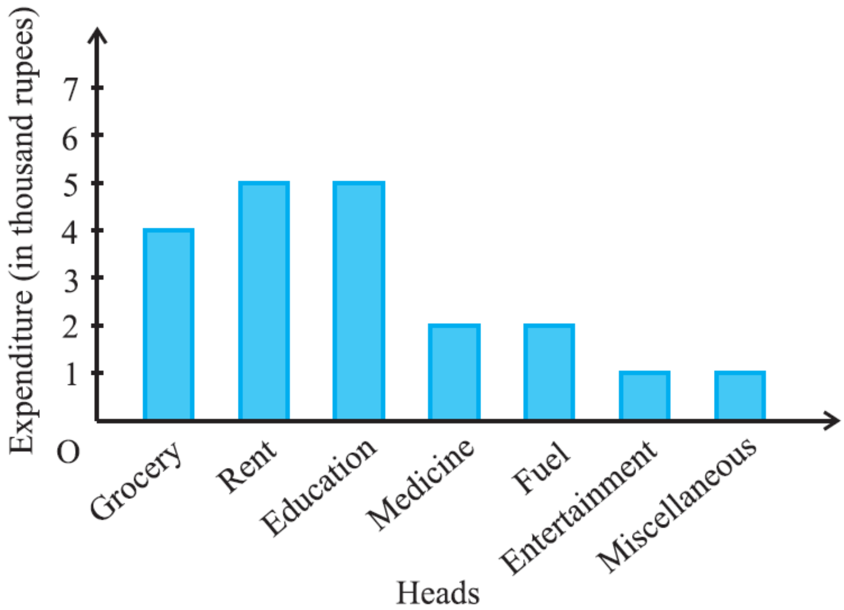
Ans.



31. A family with a monthly income of Rs 20,000 had planned the following expenditures per month under various heads: Draw a bar graph for the given below data.

Heads	Expenditure (in thousand rupees)
Grocery	4
Rent	5
Education of children	5
Medicine	2
Fuel	2
Entertainment	1
Miscellaneous	1

Ans.



SECTION – D

Questions 32 to 35 carry 5 marks each.

32. A gardener has to put double fence all around a triangular field with sides 120 m, 80 m and 60 m. In the middle of each of the sides, there is a gate of width 10 m.

(i) Find the length of wire needed for fencing.

(ii) Find the cost of fencing at the rate of ₹ 6 per metre.

(iii) Find the area of triangular field.

(iv) Find the cost of levelling the ground at the rate of ₹ 10 per m2.

Ans. Perimeter of triangular field = 120 + 80 + 60 = 260 m

(i) Length of wire needed for single fencing

= 260 – 30 (to be left for gate on each side) = 230 m

$\therefore$ Total length of wire needed for double fencing = 2 × 230 = 460 m

(ii) Cost of fencing = ₹ 6 per metre

$\therefore$ Total cost of fencing = 460 × 6 = ₹ 2760

(iii) Given a = 120 m, b = 80 m and c = 60 m

The semi-perimeter, $s = \dfrac{260}{2} = 130$ m

Using Heron's formula,

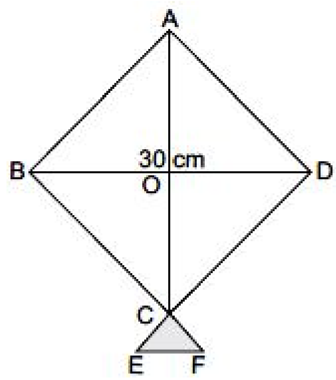
Area of triangular field $= \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{130(130-120)(130-80)(130-60)}$

$= \sqrt{130 \times 10 \times 50 \times 70} = 100\sqrt{455} = 100 \times 21.33 = 2133 m^2$

OR

Anurag makes a kite using red and yellow piece of paper. Red piece of paper is cut in the shape of square with diagonal 30 cm. At one of the vertex of this square, a yellow paper with the shape of an equilateral triangle of side such that $a^2 = 32\sqrt{3}$ is attached to give the shape of a kite. Find the total area of paper required to make the kite.

Ans. Let ABCD be the square made by red piece of paper. Diagonal AC and BD bisect each other at right angle.



The area of square ABCD in terms of diagonal is given by

ar(ABCD) = $\dfrac{1}{2} \times BD^2 = \dfrac{1}{2} \times (30)^2 = \dfrac{900}{2} = 450$ cm^2

$\therefore$ Red paper area = 450 cm^2

Area of equilateral ΔCEF is given by

ar(ΔCEF) = $\dfrac{\sqrt{3}}{4} \times a^2 = \dfrac{\sqrt{3}}{4} \times 32\sqrt{3}$ (Given $a^2 = 32\sqrt{3}$)

$= 8 \times 3 = 24$ cm^2

$\therefore$ Yellow paper area = 24 cm^2

$\therefore$ Total area of paper required to make the kite

= Red paper area + Yellow paper area = 450 + 24 = 474 cm^2

33. Find the value of a and b so that $x + 1$ and $x - 1$ are factors of $x^4 + ax^3 + 2x^2 - 3x + b$.

Ans: Let $f(x) = x^4 + ax^3 + 2x^2 - 3x + b$ be the given polynomial and $g(x) = x + 1$, $h(x) = x - 1$

If $g(x)$ is a factor of $f(x)$, then by factor theorem,

$f(-1) = 0$

$\Rightarrow (-1)^4 + a(-1)^3 + 2(-1)^2 - 3(-1) + b = 0$

$\Rightarrow 1 - a + 2 + 3 + b = 0$

$\Rightarrow -a + b = -6$ ...(i)

If $h(x)$ be a factor of $f(x)$, then, again by factor theorem, $f(1) = 0$

$\Rightarrow 1^4 + a(1)^4 + 2(1)^2 - 3(1) + b = 0$

$\Rightarrow 1 + a + 2 + 3 + b = 0$

$\Rightarrow a + b = 0$ ...(ii)

Adding (i) and (ii), we get

$2b = -6$ or $b = -3$

From (ii), we have $a - 3 = 0 \Rightarrow a = 3$

Hence, required value of a and b are 3 and – 3 respectively.

OR

Without actual division, prove that $(2x^4 + 3x^3 - 12x^2 - 7x + 6)$ is exactly divisible by $(x^2 + x - 6)$.

Ans. Let $p(x) = 2x^4 + 3x^3 - 12x^2 - 7x + 6$ and $g(x) = x^2 + x - 6$.

Then, $g(x) = x^2 + x - 6$

$= x^2 + 3x - 2x - 6$

$= x(x + 3) - 2(x + 3) = (x + 3)(x - 2)$.

Clearly, p(x) will be exactly divisible by g(x) only when it is exactly divisible by (x + 3) as well as (x - 2).

Now, $(x + 3 = 0 \Rightarrow x = -3)$ and $(x - 2 = 0 \Rightarrow x = 2)$.

By factor theorem, g(x) will be a factor of p(x), if p(-3) = 0 and p(2) = 0.

Now, $p(-3) = \{2 \times (-3)^4 + 3 \times (-3)^3 - 12 \times (-3)^2 - 7 \times (-3) + 6\}$

$=\{(2 \times 81)+3 \times (-27) - (12 \times 9) + 21 + 6\}$

$= (162 - 81 - 108 + 21 + 6) = 0$.

And, $p(2) = (2 \times 2^4) + (3 \times 2^3) - (12 \times 2^2) - (7 \times 2) + 6\}$

$= (32 + 24 - 48 - 14 + 6) = 0$.

Thus, p(x) is exactly divisible by each one of (x + 3) and (x - 2).

Hence, p(x) is exactly divisible by $(x + 3)(x - 2)$, i.e., by $(x^2 + x - 6)$.

34. A dome of a building is in the form of a hemisphere. From inside, it was white-washed at the cost of Rs 498.96. If the cost of white-washing is Rs 2.00 per square metre, find the (i) inside surface area of the dome, (ii) volume of the air inside the dome.

Ans. Let, r m be the inner radius of the hemispherical dome. Then,

(*i*) Inside surface area of the hemispherical dome $= \dfrac{\text{Total cost}}{\text{Cost per square metre}}$

$$= \frac{498.96}{2} \text{ m}^2 = 249.48 \text{ m}^2$$

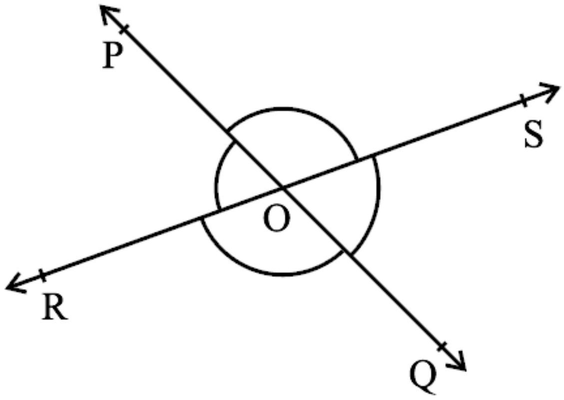
Now, $2\pi r^2 = 249.48$

$$\Rightarrow r^2 = \frac{249.48 \times 7}{2 \times 22} = 39.69 \Rightarrow r = \sqrt{39.69} = 6.3 \text{ m}$$

(*ii*) Volume of the air inside the dome = Volume of the hemispherical dome

$$= \frac{2}{3}\pi r^3 = \frac{2}{3} \times \frac{22}{7} \times (6.3)^3 \text{ m}^3 = 523.908 \text{m}^3$$

35. Prove that "If two lines intersect each other, then the vertically opposite angles are equal." Using this theorem, find all the angles if ∠ POR : ∠ ROQ = 5 : 7 in the below figure where lines PQ and RS intersect each other at point O.

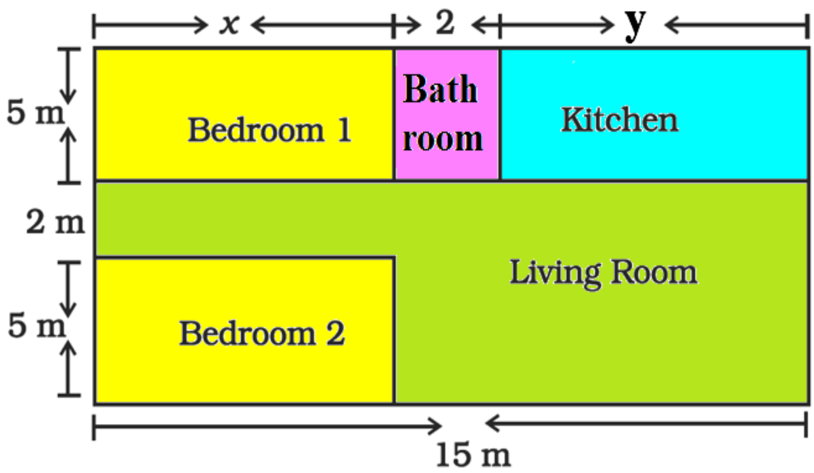


Ans. Given, To Prove, Figure – 1½ marks
Proof - – 1½ marks
∠ POR +∠ ROQ = 180° (Linear pair of angles)
But ∠ POR : ∠ ROQ = 5 : 7 (Given)
Therefore, ∠ POR = 5/12 × 180° = 75°
Similarly, ∠ ROQ = 712 × 180° = 105°
Now, ∠ POS = ∠ROQ = 105° (Vertically opposite angles)
and ∠ SOQ = ∠POR = 75° (Vertically opposite angles)

SECTION – E(Case Study Based Questions)

Questions 36 to 38 carry 4 marks each.

36. Case Study – 1: In the below given layout, the design and measurements has been made such that area of two bedrooms and Kitchen together is 95 sq. m.



(i) Form the pair of linear equation in two variables formed from the statements. [1]
(ii) Find the length of the outer boundary of the layout. [1]
(iii) Find the area of each bedroom and kitchen in the layout. [2]

OR

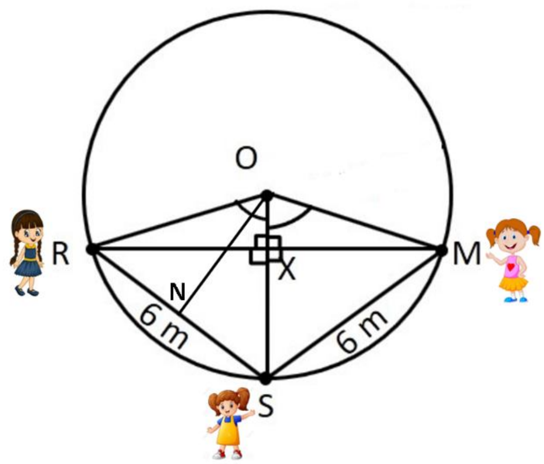
(iii) If the point (3, 4) lies on the graph of $3y = ax + 7$, then find the value of *a*.
Ans: (i) Area of two bedrooms = 10 × sq m
Area of kitchen = 5y sq m
10x + 5y = 95
2x + y = 19
Also, x + 2 + y = 15
x + y = 13
(ii) Length of outer boundary = 12 + 15 + 12 + 15 = 54 m
(iii) On solving two equations part (a)

x = 6 m and y = 7 m
Area of bedroom = 5 × 6 = 30 m^2
Area of kitchen = 5 × 7 = 35 m^2

OR

By substituting the value of x = 3 and y = 4 in the the equation 3y = ax + 7, we get
3(4) = a(3) + 7
⇒ 12 = 3a + 7
⇒ 3a = 5 ⇒ a = 5/3
Hence, the value a = 5/3

37. Case Study – 2: Three girls Reshma, Salma and Mandip are playing a game by standing on a circle of radius 5m drawn in a park. Reshma throws a ball to Salma, Salma to Mandip, Mandip to Reshma. The distance between Reshma and Salma and between Salma and Mandip is 6m each. In the given below figure Reshma's position is denoted by R, Salma's position is denoted by S and Mandip's position is denoted by M.



(i) Find the area of triangle ORS. [2]
(ii) What is the distance between Reshma and Mandip? [2]

OR

(ii) If BC is a diameter of a circle of centre O and OD is perpendicular to the chord AB of a circle, show that CA = 2OD. [2]

Ans: (i) $NR = NS = \frac{1}{6} = 3\,\text{m}$

OR = OS = OM = 5m. (Radii of the circle)
In ΔORN, by Pythagoras theorem,
$ON^2 + NR^2 = OR^2$
⇒ $ON^2 + (3^2) = (5)^2$
⇒ $ON^2 = (25 – 9) = 16$
⇒ ON = 4m
ORSM will be a kite (OR = OM and RS = SM). We know that diagonals of a kite are perpendicular and the diagonal common to both the isosceles triangle is bisected by another diagonal
∴ ∠RXS will be of 90° and RX = XM

Area of ΔORS = $\frac{1}{2} \times ON \times RS = \frac{1}{2} \times 4 \times 6 = 12\ m^2$

(ii) Area of ΔORS = $\frac{1}{2} \times ON \times RS$

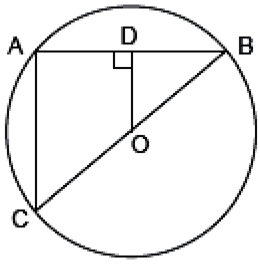
⇒ $\frac{1}{2} \times RX \times OS = \frac{1}{2} \times 4 \times 6$

⇒ RX × 5 = 24
⇒ RX = 4.8

⇒ RM = 2RX = 2(4.8) = 9.6 Therefore, the distance between Reshma and Mandip is 9.6 m.

OR

(ii)



Since OD ⊥ AB

∴ D is the mid-point of AB (perpendicular drawn from the centre to a chord bisects the chord)

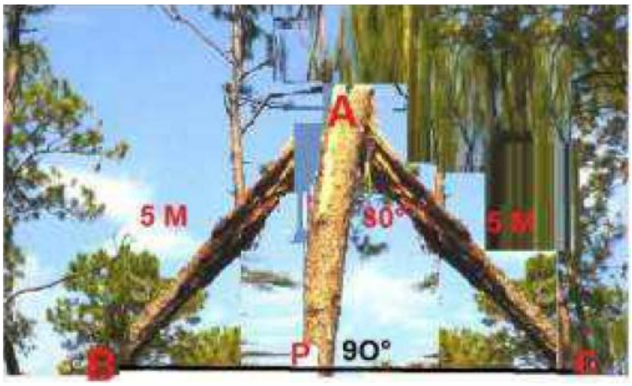
O is centre ⇒ O is the mid-point of BC.

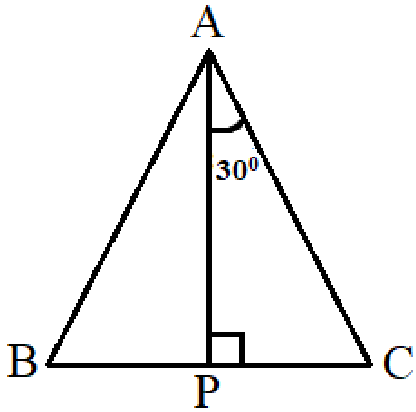
In ΔABC, O and D are the mid-points of BC and AB, respectively.

∴ OD || AC and OD = $\frac{1}{2}$ AC (mid-point theorem)

∴ CA = 2OD

38. Case Study – 3: Aditya and his friends went to a forest, they saw a big tree got broken due to heavy rain and wind. Due to this rain the big branches AB and AC with lengths 5m fell down on the ground. Branch AC makes an angle of 30° with the main tree AP. The distance of Point B from P is 4 m. You can observe that ΔABP is congruent to ΔACP.





(a) Show that ΔABP is congruent to ΔACP (1)

(b) Find the value of ∠ACP? (2)

OR

What is the total height of the tree? (2)

(c) Find the value of ∠BAP? (1)

Ans: (a) In ΔACP and ΔABP

AB = AC (Given)

AP = AP (common)

∠APB = ∠APC =90°

By RHS criteria ΔACP ≅ ΔABP

(b) In ΔACP, ∠APC + ∠PAC + ∠ACP = 180°

⇒ 90° + 30° + ∠ACP = 180° (angle sum property of triangle)

⇒ ∠ACP =180° - 120° = 60°

∠ACP = 60°

OR

In ΔACP, by Pythagoras theorem,

$AC^2 = AP^2 + PC^2$

⇒ $25 = AP^2 + 16$

⇒ $AP^2 = 25 – 16 = 9$

⇒ AP = 3 m

Total height of the tree = AP + 5 = 3 + 5 = 8m
(c) $\Delta ACP \cong \Delta ABP$
Corresponding part of congruent triangle
$\angle BAP = \angle CAP$
$\angle BAP = 30°$ (given $\angle CAP = 30°$)