4

TERM-1
SAMPLE PAPER
SOLVED

MATHEMATICS
(BASIC)

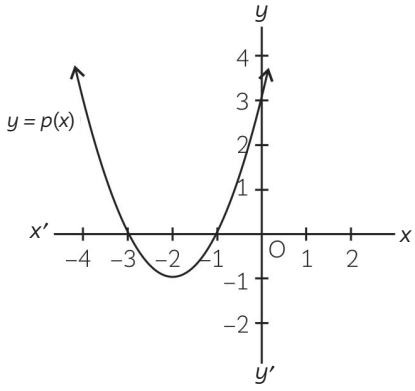
Time Allowed: 90 Minutes *Maximum Marks: 40*

General Instructions: Same instructions as given in the Sample Paper 1.

SECTION - A **16 marks**

(Section A consists of 20 questions of 1 mark each. Any 16 questions are to be attempted.)

1. **The graph of a polynomial $p(x)$ is given in the figure. What are the zeroes of the polynomial from the graph?**



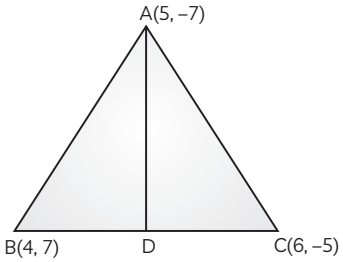
(a) 3 and 0 (b) –3 and –1
(c) –3 and 0 (d) –1 and 0

2. **What is the type of solution for pair of linear equations $ax + by = c$, $lx + my = n$, where $am \neq bl$.**
(a) unique
(b) infinite
(c) No solution
(d) Data is insufficient

3. **Somesh is tossing a coin 3 times and noting the outcome each time. He needs to get the same result in all the tosses in order to win the game. What is the probability that he will loss the game?**
(a) $\frac{2}{7}$ (b) $\frac{1}{4}$
(c) $\frac{3}{4}$ (d) $\frac{2}{5}$

4. **Form a linear equation to represent the given situation: Meena went to a bank to withdraw ₹ 2000. She asked the cashier to give her ₹ 50 and ₹ 100 note only. Meena got 25 notes in all. Consider ₹ 50 notes as x and ₹ 100 notes as y.**
(a) $50x + 100y = 2000$, $x + y = 25$
(b) $x + 50y = 100$, $100x + y = 2000$
(c) $x + y = 25$, $100x + 50y = 2000$
(d) $2x + 100y = 2000$, $x + y = 20$

5. **Here, AD is a median of ΔABC. What are the coordinates of D?**



(a) (5, 1) (b) (–1, 1)
(c) (–5, 1) (d) (1, 1)

6. Find the value of (sin A + cos A) × cosec A, if cot A = $\frac{12}{5}$.

(a) $\frac{13}{5}$ (b) $\frac{5}{12}$

(c) $\frac{17}{5}$ (d) $\frac{12}{5}$

7. If the probability of raining tomorrow is 0.75, then the probability that it will not rain tomorrow is:

(a) $\frac{1}{4}$ (b) $\frac{3}{4}$

(c) $\frac{1}{2}$ (d) $\frac{1}{3}$

8. *Sonali and two of her friends went out to celebrate friendship day. The went to Pizza hut and ordered double cheese pizza and other stuff. They cut the pizza into 6 slices, so each one can have 2 slices of it.*

Consider a circle of radius 21 cm, in which an arc of any length subtends an angle of 60° at the centre of the circle. Then what is the length of the arc?

(a) 21 cm (b) 22 cm

(c) 14 cm (d) 28 cm

9. Form a quadratic polynomial whose zeroes are $\frac{3}{5}$ and $-\frac{1}{2}$.

(a) $x^2 - 9x + 6$

(b) $10x^2 - x - 3$

(c) $9x^2 + x + 6$

(d) $7x^2 - 3x + 4$

10. Two triangles are similar and their areas are 121 cm^2 and 64 cm^2 respectively. If the median of the first triangle is 12.1 cm, calculate the measure of corresponding median of the other triangle.

(a) 6.4 cm (b) 8.8 cm

(c) 9.6 cm (d) 7.6 cm

11. Which of the following condition is correct for the graph of quadratic polynomial $p(x) = ax^2 + bx + c$ to be an upward parabola?

(a) $a < 0$ (b) $a = 0$

(c) $a > 0$ (d) $b = 0$

12. Find the values(s) of x, if the distance between the points A(x, –1) and B(3, 2) is 5.

(a) 7, –1 (b) 1, 7

(c) as –7, 1 (d) –1, –7

13. If point P(4, 2) lies on the line segment joining the points A(2, 1) and B(8, 4) then

(a) AP = PB

(b) PB = $\frac{1}{3}$AP

(c) AP = $\frac{1}{2}$PB

(d) AP = $\frac{1}{3}$PB

14. A box had 24 marbles of which x are red, 2x are white and 3x are blue. A marble is selected at random from it. What is the probability that it is white?

(a) $\frac{1}{3}$ (b) $\frac{1}{8}$

(c) $\frac{1}{4}$ (d) $\frac{1}{6}$

15. Find a relation between a and b, for which the system of equations $ax + 2y = 7$ and $3x + by = 16$ represents parallel lines.

(a) $a - b = 5$ (b) $a + 2b = 7$

(c) $ab = 6$ (d) $\frac{a}{2b}$

16. Find the coordinates of third vertex of a triangle, if centroid of the triangle is (3, – 5) and two of its vertices are (4, –8) and (3, 6).

(a) (1, 5) (b) (2, –13)

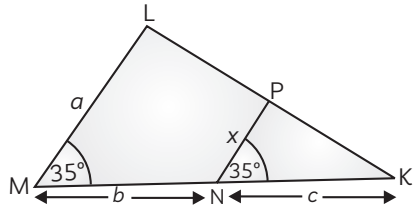
(c) (5, 6) (d) (–1, 3)

17. Evaluate for $\sin^{29} x + \text{cosec}^{29} x$, if $\sin x + \text{cosec } x = 2$.

(a) 2 (b) 0

(c) 1 (d) $\frac{1}{2}$

18. Evaluate the value of x in terms of a, b and c. (See the given figure)

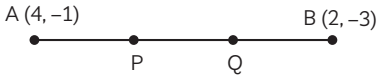


(a) $\frac{ac}{b+c}$ (b) $\frac{ab+ac}{b^2}$

(c) $\left(\frac{1}{a}+\frac{1}{b}\right)^c$ (d) $\frac{ab}{a+c}$

19. *There are four friends Seema, Suresh, Mohit and Asha. They all live in the same colony and their houses are in the same line on the same side of the road. The houses of four friends can*

be represented on the coordinate axis as points A, B, P and Q as shown in figure.



Coordinates of A and B with respect to coordinate axis are known and points P and Q trisect AB.

What are the coordinates of point P?

(a) $\left(-2, \frac{-5}{3}\right)$ (b) $\left(-2, \frac{5}{3}\right)$

(c) $\left(2, \frac{-5}{3}\right)$ (d) $\left(2, \frac{5}{3}\right)$

20. **What is the value of sec θ, if sin θ – cos θ = 0?**

(a) 1 (b) 2

(c) – 1 (d) 0

SECTION - B

16 marks

(Section B consists of 20 questions of 1 mark each. Any 16 questions are to be attempted.)

21. **Find the radius of a circle, if the end points of diameter of the circle are (2, 4) and (–3, –1).**

(a) $3\sqrt{2}$ units (b) $5\sqrt{2}$ units

(c) $\frac{5\sqrt{2}}{3}$ units (d) $\frac{5\sqrt{2}}{2}$ units

22. **Find the value(s) of k, if one of the zeroes of the polynomial $f(x) = (k^2 + 8)x^2 + 13x + 6k$ is reciprocal of the other.**

(a) 2, 4 (b) 3, 5

(c) 1, 3 (d) –1, 1

23. **If two irrational numbers are multiplied, then their product is :**

(a) Zero

(b) always rational

(c) always irrational

(d) rational or irrational

24. **From where does the graph of the equations $x – y = 0$ passes?**

(a) x-axis (b) y-axis

(c) origin (d) data insufficient

25. **Calculate the ratio between the LCM and HCF of the numbers 5, 15 and 20.**

(a) 5 : 3 (b) 7 : 2

(c) 9 : 4 (d) 12 : 1

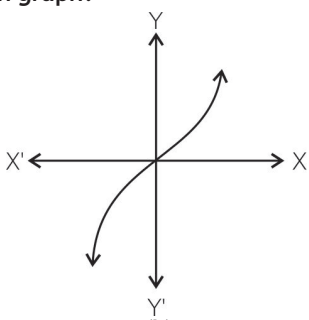
26. **What is the value of x in the following equation :**

$\sin 2x = \sin 45° \cos 45° + \sin 30°$.

(a) 30° (b) 45°

(c) 60° (d) 75°

27. **How many zeroes are there of $y = f(x)$ for the given graph?**



(a) 0 (b) 1

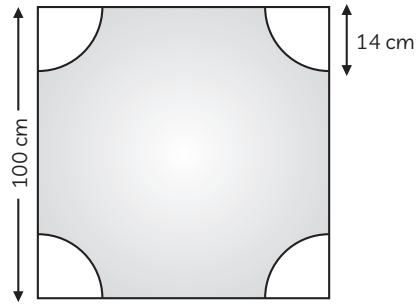
(c) 2 (d) 3

28. **If $x = a$, $y = b$ is the solution of the pair of equation $x – y = 2$ and $x + y = 4$, then the value of 'a' and 'b' are respectively.**

(a) 1, 3 (b) 2, 3

(c) 3, 1 (d) 2, 5

29. **Find the area of shaded region in the given figure in which the square is of side 100 cm and quadrant of radius 14 cm is formed at four corners.**



(a) 9384 cm^2 (b) 8998 cm^2

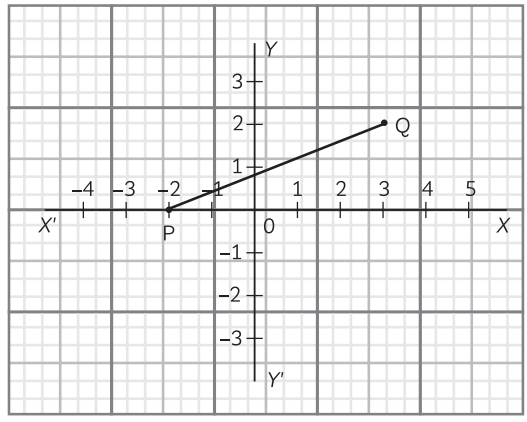
(c) 9212 cm^2 (d) 9656 cm^2

30. **If $\tan\theta = \frac{12}{13}$, then evaluate $\frac{2\sin\theta\cos\theta}{\cos^2\theta - \sin^2\theta}$**

(a) $\frac{144}{169}$ (b) $\frac{25}{313}$

(c) $\frac{313}{25}$ (d) $\frac{169}{144}$

31. **Read the given graph carefully and answer the question that follows—**



What is the midpoint of the line PQ?

(a) (1, 2) (b) $\left(\frac{1}{2}, 1\right)$

(c) (2, 1) (d) $\left(-\frac{1}{2}, -1\right)$

32. Which of the following is not a zero of polynomial, $p(x) = x^2 - 7x + 6$

(a) 1 (b) 2

(c) 6 (d) 5

33. If any two given lines represent a pair of inconsistent linear equations, then both lines must be :

(a) intersecting

(b) coincident

(c) parallel

(d) both (b) and (c)

34. For the given polynomial $p(x) = 2x^2 - 8x + 6$, what is the sum of its zeroes is.

(a) – 1 (b) $\frac{1}{3}$

(c) 4 (d) 3

35. Evaluate : cot 10°. cot 20°. cot 30°. cot 40° ..... cot 90°.

(a) 1 (b) –1

(c) $\frac{\sqrt{3}}{2}$ (d) 0

36. What is the perimeter of a semicircular protractor of diameter 14 cm?

(a) 36 cm (b) 7 cm

(c) 28 cm (d) 32 cm

37. Somya's saving purse contains hundred 50 p coins, seventy ₹ 1 coins, fifty ₹ 2 coins and thirty ₹ 5 coins If it is equally likely that one of the coins will fall out when the purse is turned upside down, then what is the probability that the coin that fell down will be a ₹ 1 coins ?

(a) $\frac{8}{25}$ (b) $\frac{7}{25}$

(c) $\frac{3}{25}$ (d) $\frac{1}{25}$

38. Evaluate one of the common solution of $ax + by = c$ and y-axis ?

(a) $(0, b)$ (b) $\left(0, \frac{c}{b}\right)$

(c) $\left(0, \frac{a}{c}\right)$ (d) (0, 0)

39. What is the probability of getting 101 marks out of 100 marks in maths exams?

(a) 1 (b) 0

(c) 0.5 (d) 0.01

40. What is the radius of a circle, whose sum of circumference and the radius is 51 cm?

(a) 7 cm (b) 14 cm

(c) 21 cm (d) 42 cm

SECTION - C

8 marks

(Section C consists of 10 questions of 1 mark each. Any 8 questions are to be attempted.)

Q. 41 to 45 are based on Case Study - 1

Case Study – 1

Track and field is a sport that includes athletic contests established on the skills of running, jumping and throwing. The running or foot racing events, which include sprints, middle and long-distance events, racewalking, and hurdling, are won by the athlete who completes it in the least time. Athletics/track and field have somewhat of an oval configuration of the track and thus require an oval stadium.

Three athletes Purva, Amita and Ashi used to practice daily at the local stadium for their upcoming athletic track events. Purva took 252 seconds to complete one round of the track, whereas Amita and Ashi took 308 and 198 seconds respectively to complete one round.

41. If all three athletes started at the same time, they meet again at the starting point after:

(a) 10 min 16 s (b) 20 min 32 s

(c) 23 min 6 s (d) 46 min 12 s

42. The number of rounds completed by Purva when all three meet again at the starting time:

(a) 11 (b) 15

(c) 22 (d) 30

43. **The HCF of 252 and 308 is :**

(a) 4 **(b) 12**

(c) 14 **(d) 28**

44. **The prime factorization of 308 can be expressed as :**

(a) $2 \times 3 \times 7 \times 11$ **(b) $2^2 \times 7 \times 11$**

(c) $2^2 \times 11 \times 17$ **(d) $2^2 \times 3 \times 17$**

45. **The LCM of 60, 90 and 180 is:**

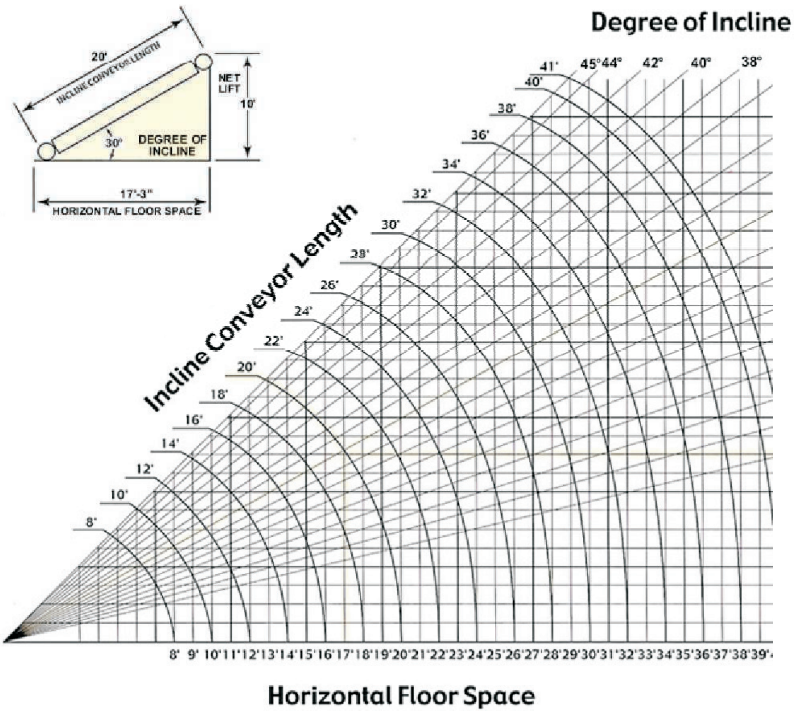
(a) 720 **(b) 360**

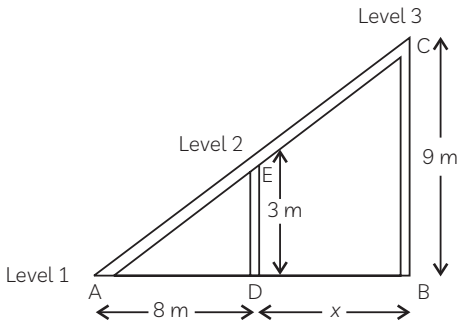
(c) 180 **(d) 90**

Q. 46 to 50 are based on Case Study - 2

Case Study – 2

A factory is using an inclined conveyor belt to transport its product from level 1 to level 2 which is 3 m above level 1 as shown in the figure below. The inclined conveyor is supported from one end to level 1 and from the other end to a post located 8 m away from level 1 supporting point.





The factory wants to extend the conveyor belt to reach at a new level 3 which is 9 m above level 1 while maintaining the inclination angle.

46. **Which concept of geometry helps in determining the distance at which level 3 should be placed?**

(a) Area of sector

(b) Congruency of triangles

(c) Similarity of triangles

(d) Pythagoras Theorem

47. **The distance at which a new post is to be installed to support the conveyor belt at level 3, is**

(a) 11 m **(b) 14 m**

(c) 20 m **(d) 24 m**

48. **How much distance is extended from D to B?**

(a) 12 m **(b) 16 m**

(c) 6 m **(d) 3 m**

49. **The length of the conveyor belt up to level 3 is**

(a) 22.8 m **(b) 26 m**

(c) 25.6 m **(d) 33 m**

50. **The length of the conveyor belt up to level 2 is**

(a) 12.1 m **(b) 7.2 m**

(c) 6.9 m **(d) 8.5 m**

SOLUTION

SAMPLE PAPER - 4

SECTION - A

1. *(b) –3 and –1*

Explanation: Since the graph intersects the x-axis at two points *i.e.*, at $x = -3$ and $x = -1$.

So, -3 and -1 are the zeroes of the polynomial $p(x)$.

2. *(a) unique*

Explanation: Given equation of lines are $ax + by - c = 0$ and $lx + my - n = 0$

Since, $am \neq bl \Rightarrow \frac{a}{l} \neq \frac{b}{m} \Rightarrow \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

$\therefore$ The given pair of equations has a unique solution.

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

Explanation: When a coin is tossed 3 times, total possible outcomes are {HHH, HHT, HTH, THH, HTT, THT, TTH, TTT}

$\therefore$ Number of possible outcomes = 8

Possible outcomes for Ramesh to lose the game are {HHT, HTH, THH, HTT, THT, TTH}

$\therefore$ Number of favourable outcomes = 6

$\therefore$ Required probability = $\frac{6}{8} = \frac{3}{4}$

4. *(a) $50x + 100y = 2000$, $x + y = 25$*

Explanation: Let x and y be the number of ₹ 50 and ₹ 100 notes respectively.

$\therefore$ $x + y = 25$

(Since total notes is 25)

and Total amount = 2000

$\Rightarrow$ $50x + 100y = 2000$

Thus required linear equations are $x + y = 25$ and $50x + 100y = 2000$.

5. *(a) (5, 1)*

Explanation: We know, median of a triangle bisects the base.

$\therefore$ D is the mid-point of BC.

$\therefore$ Coordinates of D = $\left(\frac{6+4}{2}, \frac{7-5}{2}\right)$

= (5, 1)

6. *(c)* $\frac{17}{5}$

Explanation: We have, $\cot A = \frac{12}{5}$

$\therefore \sin A = \frac{5}{13}$, $\cos A = \frac{12}{13}$ and $\operatorname{cosec} A = \frac{13}{5}$

Now, $(\sin A + \cos A) \times \operatorname{cosec} A$

$= \left(\frac{5}{13} + \frac{12}{13}\right) \times \frac{13}{5} = \frac{17}{5}$

7. *(a)* $\frac{1}{4}$

Explanation: We know that,

P(rain tomorrow) + P(not rain tomorrow) = 1

$\Rightarrow$ 0.75 + P(not rain tomorrow)

$= 1 - 0.75 = 0.25 = \frac{1}{4}$

Hence, the probability that it will not rain tomorrow is $\frac{1}{4}$.

8. *(b) 22 cm*

Explanation: Length of arc = $\frac{\theta}{360°} \times 2\pi r$

Here, $r = 21$ cm

Angle at centre, $\theta = 60°$

$\therefore$ Length of arc = $\frac{60°}{360°} \times 2 \times \frac{22}{7} \times 21$

= 22 cm

9. *(b) $10x^2 - x - 3$*

Explanation: Given zeroes are $\frac{3}{5}$ and $-\frac{1}{2}$.

$\therefore$ Their sum = $\frac{3}{5} + \left(-\frac{1}{2}\right)$

$$= \frac{6-5}{10} = \frac{1}{10}$$

and product $= \frac{3}{5}\left(-\frac{1}{2}\right) = \frac{-3}{10}$

$\therefore$ Required polynomial is $x^2 - \frac{1}{10}x - \frac{3}{10}$,

or $10x^2 - x - 3$.

10. *(b) 8.8 cm*

Explanation: Let the corresponding median of the other triangle be x cm.

$$\therefore \quad \frac{121}{64} = \left(\frac{12.1}{x}\right)^2$$

[$\because$ The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding medians]

$$\Rightarrow \quad \frac{11}{8} = \frac{12.1}{x}$$

[Taking square root on both sides]

$$\Rightarrow \quad x = \frac{12.1 \times 8}{11}$$

$$\Rightarrow \quad x = 8.8$$

$\therefore$ Corresponding median of the other triangle is 8.8 cm.

11. *(c) $a > 0$*

Explanation: For the graph of quadratic polynomial $p(x) = ax^2 + bx + c$ to be an upward, parabola, is $a > 0$.

12. *(a) 7, –1*

Explanation: Let A(x, – 1) and B(3, 2) be the given points.

and AB = 5 [Given]

$$\Rightarrow \sqrt{(x-3)^2 + (-1-2)^2} = 5$$

$$\Rightarrow (x-3)^2 + 9 = 5^2$$

$$\Rightarrow x^2 - 6x + 18 = 25$$

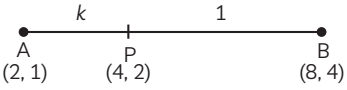
$$\Rightarrow x^2 - 6x - 7 = 0$$

$$\Rightarrow (x-7)(x+1) = 0$$

$$\Rightarrow x = 7 \text{ or } -1.$$

13. *(c) $AP = \frac{1}{2}PB$*

Explanation: Let point P divides the line segment AB in the ratio k : 1.



$\therefore$ Using section formula,

$$4 = \frac{8k+2}{k+1}$$

$$\Rightarrow \quad 4k + 4 = 8k + 2$$

$$\Rightarrow \quad 4k = 2$$

$$\Rightarrow \quad k = \frac{1}{2}$$

$\therefore$ Ratio $= \frac{1}{2} : 1 = 1 : 2$

$$\frac{AP}{PB} = \frac{1}{2}$$

or $AP = \frac{1}{2}PB$

14. *(a) $\frac{1}{3}$*

Explanation: Acoording to question

$$x + 2x + 3x = 24$$

$$\Rightarrow \quad 6x = 24 \Rightarrow x = 4$$

$\therefore$ Number of white balls $= 2x = 2 \times 4 = 8$

$\therefore$ Probability of getting white balls.

$$= \frac{8}{24} = \frac{1}{3}$$

15. *(c) $ab = 6$*

Explanation: We have

$$ax + 2y = 7$$

and $3x + by = 16$

Condition for parallel lines is:

$$\Rightarrow \quad \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

$$\Rightarrow \quad \frac{a}{3} = \frac{2}{b} \neq \frac{7}{16}$$

$$\therefore \quad ab = 6$$

16. *(b) (2, –13)*

Explanation: Coordinates of centroid (G)

$$= \left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$$

$$\Rightarrow \quad (3, -5) = \left(\frac{4+3+x_3}{3}, \frac{-8+6+y_3}{3}\right)$$

$$\Rightarrow \quad 7 + x_3 = 9 \text{ and } -2 + y_3 = -15$$

$$\Rightarrow \quad x_3 = 2 \text{ and } y_3 = -13$$

17. *(a) 2*

Explanation: $\sin x + \text{cosec } x = 2$

$$\Rightarrow \quad \sin x + \frac{1}{\sin x} = 2$$

$$\Rightarrow \quad \sin^2 x + 1 = 2 \sin x$$

$$\Rightarrow \quad \sin^2 x + 1 - 2 \sin x = 0$$

$$\Rightarrow \quad (\sin x - 1)^2 = 0$$

$$\sin x = 1$$

$$\Rightarrow \quad \sin^{29} x = 1$$

Also, $\text{cosec } x = 1$

$$\Rightarrow \quad \text{cosec}^{29} x = 1$$

$$\sin^{29} x + \text{cosec}^{29} x = 1 + 1 = 2$$

18. *(a) $\frac{ac}{b+c}$*

Explanation: In ΔKNP and ΔKML, we have

$\angle KNP = \angle KML = 35°$ (Given)

$\angle K = \angle K$ (Common)

$\therefore$ $\Delta KNP \sim \Delta KML$

(By AA similarity criterion)

$\Rightarrow \quad \frac{PN}{LM} = \frac{KN}{KM}$

($\because$ Corresponding sides of similar triangles are proportional)

$\Rightarrow \quad \frac{x}{a} = \frac{c}{KN + NM} = \frac{c}{c+b}$

$\Rightarrow \quad x = \frac{ac}{b+c}$

19. *(c)* $\left(2, \frac{-5}{3}\right)$

Explanation: As, AP = PQ = QB

$\therefore$ P divides AB in the ratio 1 : 2

$\therefore$ Coordinates of P are

$$x = \frac{1(-2)+2(4)}{1+2}$$

$$= \frac{-2+8}{3} = \frac{6}{3} = 2$$

and $$y = \frac{1(-3)+2(-1)}{1+2}$$

$$= \frac{-3-2}{3} = \frac{-5}{3}$$

$\therefore$ Coordinates of P are $\left(2, \frac{-5}{3}\right)$.

20. *(b) 2*

Explanation: We have,

$\sin\theta - \cos\theta = 0$

$\Rightarrow \quad \sin\theta = \cos\theta \Rightarrow \frac{\sin\theta}{\cos\theta} = 1$

$\Rightarrow \quad \tan\theta = 1 = \tan 45°$

$\Rightarrow \quad \theta = 45°$

$\therefore \quad \sec^2\theta = \sec^2 45° = (\sqrt{2})^2 = 2$

SECTION - B

21. *(d)* $\frac{5\sqrt{2}}{2}$ *units*

Explanation: Diameter of circle

$$= \sqrt{(-3-2)^2 + (-1-4)^2}$$

$$= \sqrt{(-5)^2 + (-5)^2}$$

$$= \sqrt{25+25}$$

$$= \sqrt{50} = 5\sqrt{2}$$

$\therefore$ Radius of circle = $\frac{5\sqrt{2}}{2}$ units

22. *(a) 2, 4*

Explanation: Let α, β be two zeroes of the given polynomial. Then, $\alpha = \frac{1}{\beta}$ or $\beta = \frac{1}{\alpha}$

$\therefore$ Let $\alpha, \frac{1}{\alpha}$ be the two zeroes of the given polynomial.

By relationship between zeroes and coefficients of a polynomial, we have

$$\alpha \times \frac{1}{\alpha} = \frac{6k}{k^2+8}$$

$\Rightarrow \quad k^2 + 8 = 6k$

$\Rightarrow \quad k^2 - 6k + 8 = 0$

$\Rightarrow \quad (k-4)(k-2) = 0$

$\Rightarrow \quad k = 4, 2$

23. *(d) Rational or Irrational*

Explanation: For the irrational number $\sqrt{2}$ and $\sqrt{5}$, $\sqrt{2} \times \sqrt{5} = \sqrt{10}$, which is irrational.

And for irrational numbers $(2+\sqrt{3})$ and $(2-\sqrt{3})$, $(2+\sqrt{3})(2-\sqrt{3}) = 4 - 3 = 1$, which is rational.

Thus, product of two irrational numbers may be rational or irrational

24. *(c) origin*

Explanation: As $x - y = 0$

$x = y$

$\therefore$ It represents a line, passing through the origin.

25. *(d) 12 : 1*

Explanation: $5 = 5 \times 1$

$15 = 5 \times 3$

$20 = 5 \times 2 \times 2$

$\therefore \quad HCF = 5$

and, $\quad LCM = 5 \times 2 \times 2 \times 3 = 60$

$$\text{Ratio} = \frac{LCM}{HCF} = \frac{60}{5} = \frac{12}{1}$$

$= 12 : 1$

26. *(b) 45°*

Explanation: $\sin 2x = \sin 45° \cos 45° + \sin 30°$

$\Rightarrow \quad \sin 2x = \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} + \frac{1}{2}$

$\Rightarrow \quad \sin 2x = \frac{1}{2} + \frac{1}{2} = 1 = \sin 90°$

$\Rightarrow \quad 2x = 90° \Rightarrow x = 45°$

27. *(b) 1*

Explanation: Graph intersect the *x*-axis at only one point *i.e.*, origin.

Hence, this curve (graph) has only one zero.

28. *(c) 3, 1*

Explanation:

Here, a and b the solution of the pair of equations

$$a - b = 2 \quad \text{(i)}$$

and $$a + b = 4 \quad \text{(ii)}$$

on adding equations (i) and (ii), we get

$$2a = 6$$

or $$a = 3$$

and $$b = 3 - 2 = 1$$

$\therefore$ $x = a = 3$ and $y = b = 1$

29. *(a) 9384 cm^2*

Explanation: Radius of quadrant = 14 cm

$\therefore$ Area of quadrant $= \frac{90°}{360°} \times \pi\ (14)^2$

$$= \frac{1}{4} \times \frac{22}{7} \times 14 \times 14$$

$$= 154\ cm^2$$

$\therefore$ Area of four quadrants $= 4(154) = 616\ cm^2$

Area of square $= (100)^2 = 10000\ cm^2$

$\therefore$ Area of shaded region = Area of square – Area of four quadrants

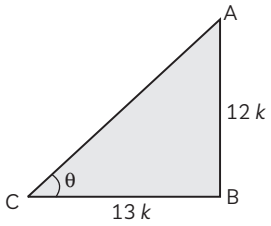
$$= 10000 - 616$$

$$= 9384\ cm^2$$

30. *(c)* $\frac{313}{25}$

Explanation:

Here, $\tan\theta = \frac{12}{13}$



Perpendicular = 12 k

Base = 13 k

In ΔABC

$$AC^2 = AB^2 + BC^2$$

$$= (12\ k)^2 + (13\ k)^2$$

$$= 144\ k^2 + 169\ k^2$$

$$= 313\ k^2$$

$$AC = \sqrt{313}\ k$$

$$\frac{2\sin\theta\cos\theta}{\cos^2\theta - \sin^2\theta} = \frac{2\left(\frac{12}{\sqrt{313}}\right) \times \left(\frac{13}{\sqrt{313}}\right)}{\left(\frac{12}{\sqrt{313}}\right)^2 - \left(\frac{13}{\sqrt{313}}\right)^2}$$

$$= \frac{312}{313} \times \frac{313}{169 - 144}$$

$$= \frac{313}{25}$$

31. *(b)* $\left(\frac{1}{2}, 1\right)$

Explanation:

Here, coordinates of P(–2, 0) and Q(3, 2)

$\therefore$ Mid point of PQ $= \left(\frac{-2+3}{2}, \frac{0+2}{2}\right)$

$$= \left(\frac{1}{2}, 1\right)$$

32. *(b) 2*

Explanation:

$$p(x) = x^2 - 7x + 6$$

$$p(1) = 1^2 - 7 \times 1 + 6 = 0$$

$$p(2) = 2^2 - 7 \times 2 + 6 = 10 - 14 = 4 \neq 0$$

$$p(6) = 6^2 - 7 \times 6 + 6 = 42 - 42 = 0$$

33. *(c) parallel*

Explanation: As in case of parallel lines, the two lines never intersects and they are in consistent

34. *(c) 4*

Explanation : The sum of zeroes of given polynomial is $-\left(-\frac{8}{2}\right)$ *i.e.*, 4.

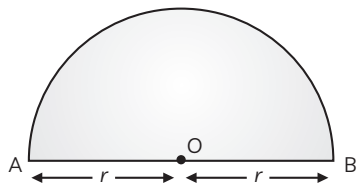
35. *(d) 0*

Explanation: Since, cot 90° = 0

$\therefore$ cot 10°. cot 20°. cot 30° ..... . cot 90° = 0

36. *(a) 36 cm*

Explanation: Perimeter of a semicircle = $\pi r + 2r$



$= \frac{22}{7} \times 7 + 2 \times 7 = 22 + 14 = 36$ cm

37. *(b)* $\frac{7}{25}$

Explanation: Total coins in the purse

$$= 100 + 70 + 50 + 30$$

$$= 250$$

$\therefore$ Total number of possible outcomes = 250

Number of ₹ 1 coins = 70

$\therefore$ Number of favourable outcomes = 70

$\therefore$ P(getting a ₹ 1 coin) = $\frac{70}{250} = \frac{7}{25}$

38. *(b)* $\left(0, \frac{c}{b}\right)$

Explanation: On y-axis,

$x = 0$

$\therefore \quad a \times 0 + by = c$

$\Rightarrow \quad y = \frac{c}{b}$

39. *(b) 0*

Explanation: In exam of 100 marks, we cannot get 101 marks, so is an impossible event. And probability of an impossible event is zero.

40. *(a) 7 cm*

Explanation: Given, sum of circumference and radius of a circle is 51 cm.

$\therefore \quad 2\pi r + r = 51$

$\Rightarrow \quad r(2\pi + 1) = 51$

$\Rightarrow \quad r = \frac{51}{2 \times \frac{22}{7} + 1} = \frac{51 \times 7}{51} = 7$ cm

SECTION - C

41. *(d) 46 min 12 s*

Explanation: To find the time after which the three athletes will meet again at the starting point, we have to find the LCM of 252, 308 and 198 by prime factorization.

$\because \quad 252 = 2 \times 2 \times 3 \times 3 \times 7$

$308 = 2 \times 2 \times 7 \times 11$

$198 = 2 \times 3 \times 3 \times 11$

$\therefore \quad$ LCM $= 2 \times 2 \times 3 \times 3 \times 7 \times 11$

$= 2772$ s or 46 min 12 s

42. *(a) 11*

Explanation: Time taken by Purva to complete one round = 252 s. As the three meet again after 2772 s, Purva would have completed 2772/252 = 11 rounds.

43. *(d) 28*

Explanation:

$\because \quad 252 = 2 \times 2 \times 3 \times 3 \times 7$

$308 = 2 \times 2 \times 7 \times 11$

$\therefore \quad$ HCF $= 2^2 \times 7 = 28$

44. *(b)* $2^2 \times 7 \times 11$

Explanation: The prime factors of 308 = 2 × 2 × 7 × 11 = $2^2 \times 7 \times 11$

45. *(c) 180*

Explanation: To find the LCM of 60, 90 and 180, we will find their prime factors.

$60 = 2^2 \times 3 \times 5$

$90 = 2 \times 3^2 \times 5$

$180 = 2^2 \times 3^2 \times 5$

$\therefore \quad$ LCM $= 2^2 \times 3^2 \times 5 = 180$

46. *(c) Similarity of triangles*

47. *(d) 24 cm*

Explanation:

In ΔADE and ΔABC,

Since, both Δs are similar, then, their corresponding sides will be proportional

Then $\frac{AD}{AB} = \frac{DE}{BC}$

$\Rightarrow \quad \frac{8}{AB} = \frac{3}{9} \Rightarrow$ AB = 24 cm

48. *(b) 16 m*

Explanation:

Distance extended, x = AB – AD = 24 – 8 = 16 m

49. *(b) 26 m*

Explanation:

Since, ΔABC is a right-angled at B.

$\therefore \quad AC^2 = AB^2 + BC^2$ (by Pythagoras theorem)

$AC^2 = (24)^2 + 9^2$

$AC = \sqrt{676 + 81} = 25.63$

$\simeq$ 26 m

Then, distance need to be travelled to reach new level is 26 m

50. *(d) 8.5 m*

Explanation:

In ΔADE, by pythagoras theorem

$AD^2 + DE^2 = AE^2$

$\Rightarrow \quad 8^2 + 3^2 = AE^2$

$\Rightarrow \quad AE^2 = 64 + 9$

$= 73$

$\Rightarrow \quad AE = \sqrt{73} = 8.5$ m