11

TERM-1
SAMPLE PAPER
SOLVED

MATHEMATICS
(STANDARD)

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 simplest form of $0.\overline{6}$ is:

(a) $\frac{66}{99}$ (b) $\frac{6}{9}$

(c) $\frac{6}{99}$ (d) $\frac{66}{9}$

2. If $(x + a)$ is a factor of the polynomial $2x^2 + 2ax + 5x + 10$, then the value of a is:

(a) 0 (b) 1

(c) 2 (d) –1

3. If $\sin A = \frac{1}{2}$, then the value of cos A is:

(a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{2}}$

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

4. What is probability that leap year, selected at random, will have 53 Sundays?

(a) $\frac{1}{7}$ (b) $\frac{2}{7}$

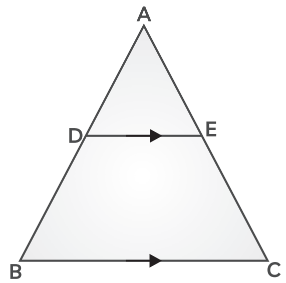
(c) $\frac{3}{7}$ (d) $\frac{4}{7}$

5. The pair of linear equations $x + 3y - 4 = 0$ and $7x + 21y + 28 = 0$ respresent:

(a) parallel lines (b) coincident lines

(c) intersecting lines (d) data insuffcient

6. In the figure, DE || BC. If AD = 4 cm, AB = 12 cm and AC = 24 cm, then the length of EC is:



(a) 8 cm (b) 16 cm

(c) 12 cm (d) 20 cm

7. If A(2, 3), B(–2, 1) and C(x, y) are vertices of ΔABC and $G\left(1, \frac{2}{3}\right)$ is its centroid, then the coordinates of vertex C are :

(a) (0, –2) (b) (3, 2)

(c) (3, –2) (d) (2, 0)

8. The region enclosed by an arc and a chord of a circle is called .... of the circle.

(a) segment (b) quadrant

(c) sector (d) area

9. Find the value of k for which the system of linear equations $x + ky = 0$, $2x - y = 0$ has unique solution.

(a) $k \neq -\frac{1}{2}$ (b) $k \neq \frac{3}{2}$

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

10. If $\tan x = \sin 45° \cos 45° + \sin 30°$, then the value of x is:

(a) 30° (b) 45°

(c) 60° (d) 90°

11. The LCM of $a = 2^3 \times 3^2$ and $b = 2^2 \times 3^3$ is:

(a) 2^3 (b) $2^3 \times 3^3$

(c) 3^3 (d) $2^2 \times 3^2$

12. The ratio in which the line segment joining the points A(6, 4) and B(1, –7) is divided by the x-axis, is:

(a) 6 : 1 (b) 2 : 7

(c) 1 : 3 (d) 4 : 7

13. 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) $\frac{2}{5}$

14. In a $\triangle ABC$, $\angle C = 90°$. Then $\text{cosec}^2 A - \tan^2 B =$

(a) 0 (b) 1

(c) $\frac{BC^2}{AC^2}$ (d) $\frac{AC^2}{AB^2}$

15. If $504 = 2^m \times 3^n \times 7^p$, then the value of $m + n - p$ is:

(a) 2 (b) 4

(c) 7 (d) 11

16. What is the area of a circle which can be inscribed in a square of side 6 cm?

(a) 9π cm^2 (b) 12π cm^2

(c) 18πcm^2 (d) 36π cm^2

17. Find the distance AB, where A and B are the points (–6, 7) and (–1, –5) respectively.

(a) 12 units (b) 13 units

(c) 21 units (d) 19 units

18. What is the smallest odd composite number?

(a) 1 (b) 5

(c) 9 (d) 15

19. Find the number of solutions for the pair of equations $x + 3y + 5 = 0$ and $-3x - 9y + 2 = 0$.

(a) 1 (b) 2

(c) infinite (d) zero

20. If M(5a, 9) is the mid-point of A(4, 10) and B(2a, 8), then the value of a is:

(a) 2 (b) 1

(c) $\frac{1}{2}$ (d) –1

SECTION - B

16 marks

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

21. 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 coin?

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

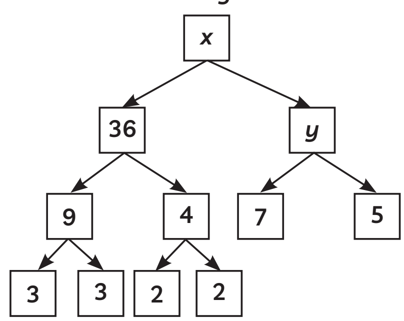
(c) $\frac{3}{25}$ (d) $\frac{1}{25}$

22. If the length of sides of $\triangle ABC$ are AB = 3 cm, AC = 4 cm and BC = 5 cm, then $\triangle ABC$ is right angled at:

(a) $\angle A$ (b) $\angle B$

(c) $\angle C$ (d) Data insufficient

23. The value of x in the given factor tree is:



(a) 360 (b) 1620

(c) 630 (d) 1260

24. If $\tan\theta + \cot\theta = 5$, then the value of $\tan^2\theta + \cot^2\theta$ is:

(a) 25 (b) 23

(c) 27 (d) 15

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

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

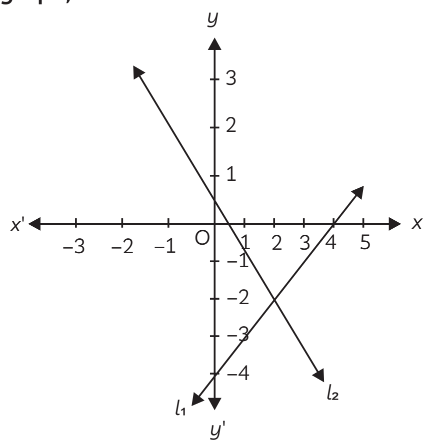
(c) $\frac{17}{5}$ (d) $\frac{12}{5}$

26. Find the radius of a circle whose centre is at the origin and a point P(5, 0) lies on its circumference.

(a) 34 units (b) 8 units

(c) 5 units (d) 7 units

27. The solution of the pair of linear equations represented by lines l_1 and l_2, in the given graph, is:



(a) (4, 0) (b) $\left(0, \frac{1}{2}\right)$

(c) (2, −2) (d) (−4, 0)

28. On selecting a letter randomly from the word PROBABILITY, the probability that the letter selected is a vowel is:

(a) $\frac{4}{11}$ (b) $\frac{5}{11}$

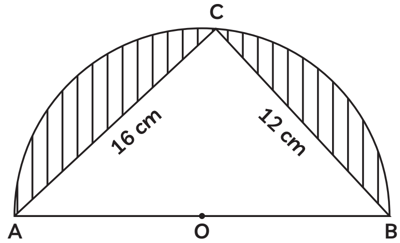
(c) $\frac{6}{11}$ (d) $\frac{7}{11}$

29. The HCF and LCM of two numbers are 9 and 360, respectively. If one number is 45, then the other number is:

(a) 36 (b) 18

(c) 72 (d) 35

30. In the given figure, if AOB is diameter, then the area of shaded region is: [Use π = 3.14]



(a) 61 cm^2 (b) 532 cm^2

(c) 147 cm^2 (d) 227 cm^2

31. The larger of two supplementary angles exceeds thrice the smaller by 20 degrees. The two angles are:

(a) 40°, 50° (b) 27.5°, 62.5°

(c) 140°, 40° (d) 135°, 45°

32. *Priyanka's new home had a rectangular shaped glass window in the kitchen that gave her a beautiful view of the front garden. The window pane was 40 inches in length and 24 inches in width.*

If a line DE is drawn at an angle of 30° to AD, the length of DE will be:

(a) 12 inches (b) 24 inches

(c) $16\sqrt{3}$ inches (d) $8\sqrt{3}$ inches

33. The least length of rope which can be cut into whole number of pieces of lengths 45 cm, 75 cm and 81 cm, is:

(a) 2275 cm (b) 2025 cm

(c) 2075 cm (d) 2725 cm

34. If the distance between the points (4, *p*) and (1, 0) is 5 units, then the value(s) of *p* are:

(a) ±4 (b) ±3

(c) ±2 (d) ±6

35. What is the type of solution for the pair of linear equations $ax + by = c$, $lx + my = n$, where $am \neq bl$ is?

(a) Unique

(b) Unfinite

(c) No solution

(d) Data is insuffcient

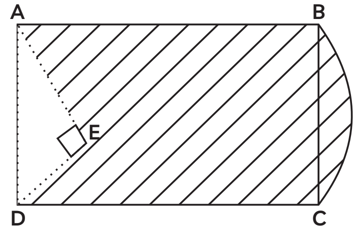
36. Evaluate the radius of a circle, if the circumference of the circle exceeds its diameter by 30.

(a) 11 cm (b) 21 cm
(c) 14 cm (d) 7 cm

37. Evaluate ∠A, in △ABC which is right-angled at C and AC = 4 cm and AB = 8 cm.
(a) 30°
(b) 45°
(c) 60°
(d) Can not be determined

38. The point which divides the line joining the points A(4, –3) and B(9, 7) in the ratio 3 : 2 is:
(a) (7, 3) (b) (4, 2)
(c) (5, 6) (d) (9, 4)

39. In the figure, from a rectangular region ABCD with AB = 20 cm, a right triangle AED with AE = 12 cm and DE = 9 cm is cut-off. On the other end, taking BC as diameter, a semi-circle is added. The perimeter of shaded region is: [Take π = 3.14]



(a) 84.55 cm^2 (b) 72.63 cm^2
(c) 84.55 cm (d) 72.63 cm

40. What is the relation between x and y, if the point P(x, y) is equidistant from the points A(7, 0) and B(0, 5)?
(a) $x + 2y = 9$ (b) $7x - 5y = 12$
(c) $5x + 2y = 15$ (d) $3x - 2y = 7$

SECTION - C 8 marks

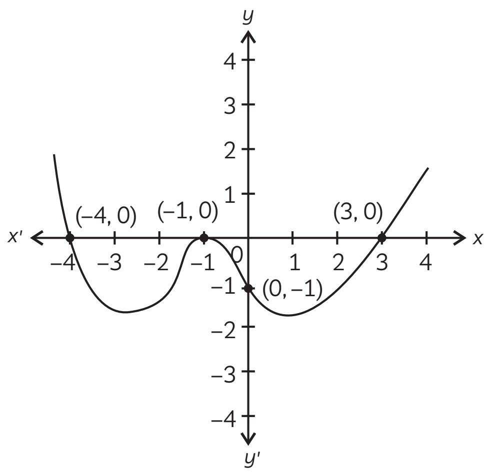
(Case Study Based Questions.)

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

Q. 41-45 are based on Case Study–1.

Case Study–1:

Graphical representation of any polynomial can also be used to determine the zeroes of a polynomial. Number of zeroes of a polynomial is equal to the number of points where the graph of a polynomial intersects x-axis. Here, is a polynomial graph that has three turns. This show that 3 real solutions, two of which passes through x-axis and one touches x-axis.

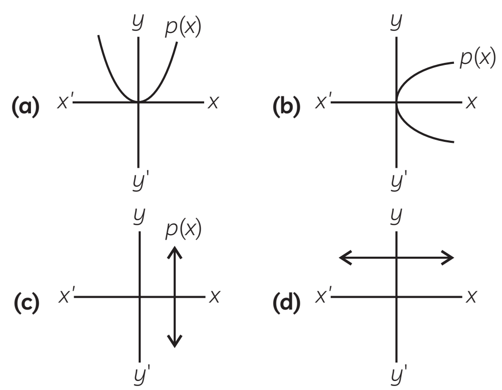


41. The number of zeroes of a polynomial is equal to the number of points where the graph of the polynomial:
(a) intersect x-axis (b) cuts y-axis
(c) intersect y-axis (d) intersect origin

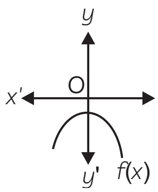
42. Evaluate from the graph, the zeroes of the polynomial function.
(a) –4, 1, 3 (b) –4, –1, –3
(c) 4, 1, 3 (d) –4, –1, 3

43. What is the maximum number of zeroes of the given polynomial?
(a) 0 (b) 1
(c) 2 (d) 3

44. The graphs of $y = p(x)$ are given in figures below. Which among the following shows that $p(x)$ has no zero ?



45. The graph of $y = f(x)$ is given. How many zeroes are there of $f(x)$?

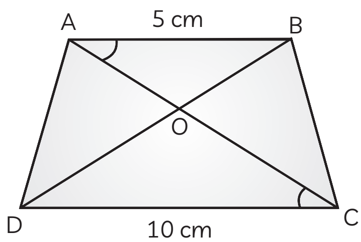


(a) 0 (b) 1
(c) 2 (d) 3

Q. 46-50 are based on Case Study–2.

Case Study–2:

Suresh's field is in the shape of a trapezium, whose map is in the scale 1 cm = 20 m. He want to draw four divisons in his field, so he could grow four different drops. The field is divided into four parts by joining the opposite vertices.



46. Triangles AOB and COD are:
- (a) similar by SAS criteria
- (b) similar by RHS criteria
- (c) similar by AA criteria
- (d) not similar

47. Evaluate ratio of the areas of $\triangle AOB$ and $\triangle COD$.
- (a) 1 : 4 (b) 1 : 2
- (c) 2 : 1 (d) 4 : 1

48. Which of the following would be true, if the ratio of the perimeters of $\triangle AOB$ and $\triangle COD$ would have been 1 : 4?
- (a) CD = 2 AB (b) CD = 4 AB
- (c) AB = 2 CD (d) AB = 4 CD

49. If in triangles PQR and XYZ, $\frac{PQ}{XZ} = \frac{PR}{XY} = \frac{QR}{YZ}$, then:
- (a) $\triangle PRQ \sim \triangle XZY$ (b) $\triangle QRP \sim \triangle YXZ$
- (c) $\triangle PQR \sim \triangle XYZ$ (d) $\triangle PQR \sim \triangle XZY$

50. Which of the following statement is true, if the ratio of areas of two similar triangles is $a^2 : b^2$?
- (a) Their altitudes have a ratio $a : b$.
- (b) Their medians have a ratio $\frac{a}{2} : b$.
- (c) Their angle bisectors have a ratio $a^2 : b^2$
- (d) The ratio of their perimeters is $3a : b$.

SOLUTION

SECTION - A

1. *(b)* $\frac{6}{9}$

Explanation: Let

$$x = 0.\overline{6} = 0.6666..... \quad ...(i)$$

$$\Rightarrow \quad 10x = 6.6666....$$

[Multiplying by 10 both sides] ...(ii)

subtracting equation (i) from equation (ii), we get

$$\Rightarrow \quad 9x = 6$$

$$\Rightarrow \quad x = \frac{6}{9}$$

$$\Rightarrow \quad 0.\overline{6} = \frac{6}{9}$$

2. *(c) 2*

Explanation: Let

$$p(x) = 2x^2 + 2ax + 5x + 10$$

$\because$ $(x + a)$ is a factor of $p(x)$,

$$\therefore \quad p(x = -a) = 0$$

$$\Rightarrow \quad 2(-a)^2 + 2a(-a) + 5(-a) + 10 = 0$$

$$\Rightarrow \quad 2a^2 - 2a^2 - 5a + 10 = 0$$

$$\Rightarrow \quad -5a + 10 = 0$$

$$\Rightarrow \quad a = 2$$

3. *(c)* $\frac{\sqrt{3}}{2}$

Explanation: We have,

$$\sin A = \frac{1}{2} = \sin 30°$$

$$\Rightarrow \quad A = 30°$$

$$\therefore \quad \cos A = \cos 30° = \frac{\sqrt{3}}{2}$$

4. *(b)* $\frac{2}{7}$

Explanation: Number of days in a leap year = 366 days

Now, 366 days = 52 weeks and 2 days

The remaining two days can be Sunday and Monday; Monday and Tuesday; Tuesday and Wednesday, Wednesday and Thursday, Thursday and Friday, Friday and Saturday; Saturday and Sunday.

For the leap year to contain 53 Sundays, last two days must be either Sunday and Monday or Saturday and Sunday.

$\therefore$ Number of favourable outcomes = 2

Total number of possible outcomes = 7

$\therefore$ P(a leap year contains 53 Sundays) = $\frac{2}{7}$

5. *(a) parallel lines*

Explanation:

Here, $\frac{a_1}{a_2} = \frac{1}{7}$; $\frac{b_1}{b_2} = \frac{3}{21} = \frac{1}{7}$;

$$\frac{c_1}{c_2} = \frac{-4}{28} = -\frac{1}{7}$$

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

$\therefore$ Given pair of lines represent parallel lines.

6. *(b) 16 cm*

Explanation:

$\because$ DE || BC

$\therefore$ By Thales theorem,

$$\frac{AD}{DB} = \frac{AE}{EC} \quad ...(i)$$

$\because$ AD = 4 cm and AB = 12 cm

$\therefore$ DB = AB – AD = 12 – 4 = 8 cm

Let EC = x cm.

Then, AE = AC – EC = 24 – x

So, from (i), we have

$$\frac{4}{8} = \frac{24 - x}{x}$$

$$\Rightarrow \quad 4x = 192 - 8x$$

$$\Rightarrow \quad 12x = 192$$

$$\Rightarrow \quad x = 16$$

$$\therefore \quad EC = 16 \text{ cm}$$

7. *(c) (3, –2)*

Explanation:

$$\because \quad G\left(1, \frac{2}{3}\right) = \left(\frac{2 + (-2) + x}{3}, \frac{3 + 1 + y}{3}\right)$$

$$= \left(\frac{x}{3}, \frac{4+y}{3}\right)$$

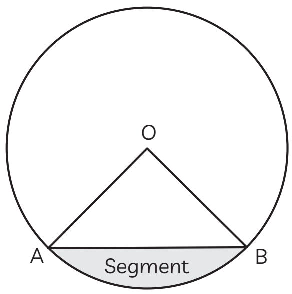
$\Rightarrow \quad 1 = \frac{x}{3}; \ \frac{2}{3} = \frac{4+y}{3}$

$\Rightarrow \quad x = 3; \quad y = -2$

$\therefore \quad C = (3, -2)$

8. *(a) Segment*

Explanation: The region enclosed by an arc and a chord of a circle is called segment of the circle.



9. *(a)* $k \neq -\frac{1}{2}$

Explanation: Given system of equations is

$$x + ky = 0 \text{ and } 2x - y = 0$$

On comparing these equations with $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, we get

$$a_1 = 1, b_1 = k, c_1 = 0$$

and $\quad a_2 = 2, b_2 = -1, c_2 = 0$

Condition for unique solution is:

$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

$\Rightarrow \quad \frac{1}{2} \neq \frac{k}{-1}$

$\Rightarrow \quad k \neq -\frac{1}{2}$

10. *(b) 45°*

Explanation: We have,

$$\tan x = \sin 45° \cos 45° + \sin 30°$$

$$= \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} + \frac{1}{2}$$

$$= \frac{1}{2} + \frac{1}{2} = 1 = \tan 45°$$

$\Rightarrow \quad \tan x = \tan 45°$

$\Rightarrow \quad x = 45°$

11. *(b)* $2^3 \times 3^3$

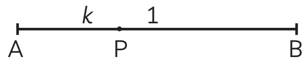
Explanation:

$\because \quad a = 2^3 \times 3^2$ and $b = 2^2 \times 3^3$

$\therefore \quad \text{LCM}(a, b) = 2^3 \times 3^3$

12. *(d) 4 : 7*

Explanation:



Let P(x, 0) be a point on the x-axis which divides the line joining points A and B in the ratio k : 1.

$\therefore$ Using section formula,

$$P(x, 0) = \left(\frac{k+6}{k+1}, \frac{-7k+4}{k+1}\right)$$

$\Rightarrow \quad 0 = \frac{-7k+4}{k+1} \Rightarrow -7k + 4 = 0$

$\Rightarrow \quad k = \frac{4}{7}$

$\Rightarrow$ Required ratio $= k : 1 = \frac{4}{7} : 1 = 4 : 7$

13. *(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}

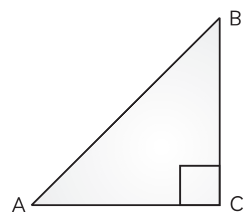
$\therefore$ Number of favourable outcomes = 6

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

14. *(b) 1*

Explanation: We have,

$$\text{cosec } A = \frac{AB}{BC}$$



and $\quad \tan B = \frac{AC}{BC}$

So, $\quad \text{cosec}^2 A - \tan^2 B = \left(\frac{AB}{BC}\right)^2 - \left(\frac{AC}{BC}\right)^2$

$$= \frac{AB^2 - AC^2}{BC^2}$$

$$= \frac{BC^2}{BC^2}$$

[Using Pythagoras theorem in ΔABC]

$$= 1$$

15. *(b) 4*

Explanation: We have,

2	504
2	252
2	126
3	63
3	21
7	7
	1

$$504 = 2^3 \times 3^2 \times 7$$

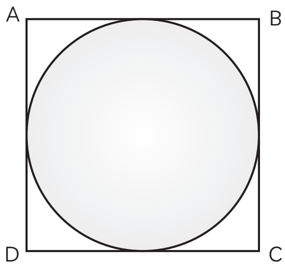
Comparing it with $2^m \times 3^n \times 7^p$, we get

$$m = 3, n = 2, p = 1$$

$$\therefore \quad (m + n - p) = 3 + 2 - 1 = 4$$

16. *(a)* $9\pi\ cm^2$

Explanation: Given, side of square = 6 cm



$\therefore$ Diameter of a circle, (d) = Side of square = 6 cm

$\therefore$ Radius of a circle (r) = $\frac{d}{2} = \frac{6}{2} = 3$ cm

$\therefore$ Area of circle = $\pi\ (r)^2 = \pi(3)^2 = 9\pi\ cm^2$

17. *(b) 13 units*

Explanation: The given points are A(–6, 7) and B(–1, –5).

$$\therefore \text{AB} = \sqrt{(-6-(-1))^2 + (7-(-5))^2}$$

$$= \sqrt{(-5)^2 + (12)^2} = \sqrt{169} = 13$$

18. *(c) 9*

Explanation: We know that composite numbers are those numbers which have atleast one factor other 1 and the number itself. Numbers 3, 5 and 7 have no other factor. So they are not composite numbers. Number 9 is a composite number, because it has factor 3 × 3. Hence 9 is the smallest odd composite number.

19. *(d) Zero*

Explanation: The given equations are $x + 3y + 5 = 0$ and $-3x - 9y + 2 = 0$

Here, $a_1 = 1, b_1 = 3, c_1 = 5;$

$a_2 = -3, b_2 = -9, c_2 = 2$

Now, $\frac{a_1}{a_2} = \frac{1}{-3}$

$\frac{b_1}{b_2} = \frac{3}{-9} = \frac{-1}{3}$

and $\frac{c_1}{c_2} = \frac{5}{2}$

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

$\therefore$ The given pair of equations has no solution.

20. *(c)* $\frac{1}{2}$

Explanation: We have,

$$m(5a, 9) = \left(\frac{4+2a}{2}, \frac{10+8}{2}\right)$$

$$\Rightarrow \quad 5a = \frac{4+2a}{2}$$

$$\Rightarrow \quad 10a = 4 + 2a$$

$$\Rightarrow \quad 8a = 4 \quad \Rightarrow \quad a = \frac{1}{2}$$

SECTION - B

21. *(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) = $\frac{70}{250} = \frac{7}{25}$

22. *(a)* $\angle A$

Explanation: We have,

$$AB^2 = 9;\ AC^2 = 16;\ BC^2 = 25$$

$$\because \quad AB^2 + AC^2 = 9 + 16 = 25 = BC^2$$

$\therefore$ By the converse of Pythagoras theorem, ΔABC is right angled at $\angle$A, *i.e.* angle opposite to hypotenuse.

23. *(d) 1260*

Explanation:

We have, $y = 7 \times 5 = 35$

and $x = 36 \times y$

$= 36 \times 35 = 1260$

24. *(b) 23*

Explanation: We have,

$$\tan\theta + \cot\theta = 5$$

$\Rightarrow$ $(\tan\theta + \cot\theta)^2 = 5^2$ [Squaring both sides]

$\Rightarrow \tan^2\theta + \cot^2\theta + 2\tan\theta\ \cot\theta = 25$

$\Rightarrow \tan^2\theta + \cot^2\theta + 2 \times \tan\theta \times \frac{1}{\tan\theta} = 25$

$$\left[\because \cot\theta = \frac{1}{\tan\theta}\right]$$

$\Rightarrow$ $\tan^2\theta + \cot^2\theta = 25 - 2 = 23$

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

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

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

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

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

26. *(c) 5 units*

Explanation: Radius of circle = Distance between origin and the point P.

$$= \sqrt{(5-0)^2 + (0-0)^2} = 5 \text{ units}$$

27. *(c) (2, –2)*

Explanation: From the graph, it is clear that the two lines l_1 and l_2 intersect each other at point (2, –2).

Their solution is (2, –2).

28. *(a)* $\frac{4}{11}$

Explanation: Here, total number of letters = 11

Total vowels = 4 *i.e.* O, A, I, I

$\therefore$P(selecting a vowel) = $\frac{4}{11}$

29. *(c) 72*

Explanation: Let the other number be *x*

We know,

HCF × LCM = Product of two numbers

$\Rightarrow$ $9 \times 360 = 45 \times x$

$\Rightarrow$ $x = \frac{9 \times 360}{45} = 72$

30. *(a) 61 cm²*

Explanation: We know angle in a semi-circle is a right angle.

$\therefore$ $\angle ACB = 90°$

$\therefore$ Using Pythagoras theorem in ΔABC, we get

$$AB^2 = AC^2 + BC^2$$
$$= (16)^2 + (12)^2$$
$$= 256 + 144 = 400$$

$\Rightarrow$ $AB = 20$

$\therefore$ Radius of semi-circle = $\frac{20}{2} = 10$ cm

Now, Area of shaded region = Area of semi-circle – Area of ΔABC

$$= \frac{1}{2}\pi r^2 - \frac{1}{2} \times AC \times BC$$
$$= \frac{1}{2} \times 3.14 \times (10)^2 - \frac{1}{2} \times 16 \times 12$$
$$= 157 - 96$$
$$= 61 \text{ cm}^2$$

31. *(c) 140°, 40°*

Explanation: Let *x* and *y* be the two supplementary angles, $x > y$.

Then, $x + y = 180°$ ...(i)

And, $x - 3y = 20°$ [Given] ...(ii)

Solving the two equations, we get

$$y = 40°, x = 140°$$

32. *(c)* $16\sqrt{3}$ *inches*

Explanation: It is given that AD = 24 in and CD = 40 in.

In order to find DE, we will use

$$\cos 30° = \frac{\text{base}}{\text{hypotenuse}} = \frac{AD}{DE}$$

$\Rightarrow$ $\frac{\sqrt{3}}{2} = \frac{24}{DE}$

$\Rightarrow$ $DE = \frac{24 \times 2}{\sqrt{3}} = \frac{48}{\sqrt{3}}$

$$= \frac{48}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$
$$= \frac{48\sqrt{3}}{3} = 16\sqrt{3} \text{ inches}$$

33. *(b) 2025 cm*

Explanation: Required least length of rope

= LCM(45, 75, 81)

$\because$ $45 = 3^2 \times 5$

$75 = 3 \times 5^2$

$81 = 3^4$

$\therefore$ Required least length of rope

$= 3^4 \times 5^2$

$= 81 \times 25$

$= 2025$

34. *(a) ±4*

Explanation: Using distance formula,

$\because \sqrt{(1-4)^2 + (0-p)^2} = 5$

$\Rightarrow$ $9 + p^2 = 25$ [Squaring both sides]

$\Rightarrow$ $p^2 = 16$

$\Rightarrow$ $p = \pm\sqrt{16} = \pm 4$

35. *(a) unique*

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

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

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

36. *(d) 7 cm*

Explanation: Let C be the circumference and r be the radius.

Then, $C = 2r + 30$

$\Rightarrow \quad 2\pi r = 2r + 30$

$\Rightarrow \quad 2r(\pi - 1) = 30$

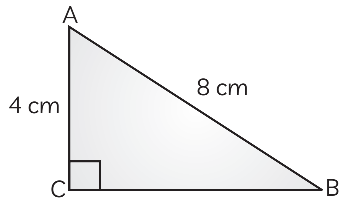
$\Rightarrow \quad 2r\left(\frac{22}{7} - 1\right) = 30$

$\Rightarrow \quad 2r\left(\frac{15}{7}\right) = 30$

$\Rightarrow \quad r = 7$ cm

37. *(c) 60°*

Explanation: In ΔABC,



$\cos A = \frac{AC}{AB} = \frac{4}{8} = \frac{1}{2}$

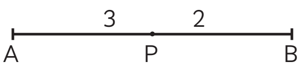
$= \cos 60°$

$\Rightarrow \quad \angle A = 60°$

38. *(a) (7, 3)*

Explanation: Let the required point be p(x, y)

Then, using section formula,



$p(x, y) = \left(\frac{3\times9+2\times4}{3+2}, \frac{3\times7+2\times(-3)}{3+2}\right)$

$= \left(\frac{35}{5}, \frac{15}{5}\right)$

$= (7, 3)$

39. *(c) 84.55 cm*

Explanation: Here,

BC = AD

Using Pythagoras theorem in ΔAED, we have

$AD^2 = AE^2 + ED^2 = (12)^2 + (9)^2$

$= 144 + 81 = 225$

$\Rightarrow \quad AD = 15$

$\therefore$ Diameter BC of semi-circle = 15 cm

Now, Perimeter of shaded region

$= AB + \text{arc } BC + CD + DE + AE$

$= 20 + \pi \times \frac{BC}{2} + 20 + 9 + 12$

$= 61 + 3.14 \times \frac{15}{2}$

$= 61 + 23.55$

$= 84.55$ cm

40. *(b) 7x – 5y = 12*

Explanation: Since the point P(x, y) is equidistant from the points A(7, 0) and B(0, 5),

$\therefore \quad PA = PB \quad$ ...(i)

Using distance formula, we have

$PA = \sqrt{(x-7)^2 + (y-0)^2}$

$= \sqrt{x^2 + y^2 + 49 - 14x}$

Similarly, we have

$PB = \sqrt{(x-0)^2 + (y-5)^2}$

$= \sqrt{x^2 + y^2 + 25 - 10y}$

Substituting the values of PA and PB in (i), we get

$\sqrt{x^2 + y^2 + 49 - 14x} = \sqrt{x^2 + y^2 + 25 - 10y}$

Squaring both sides, we get

$x^2 + y^2 + 49 - 14x = x^2 + y^2 + 25 - 10y$

$\Rightarrow \quad 14x - 10y = 24$

$\Rightarrow \quad 7x - 5y = 12$

SECTION - C

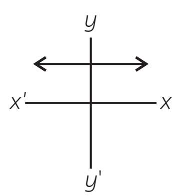
41. *(a) intersect x-axis*

42. *(d) –4, –1, 3*

43. *(d) 3*

Explanation: Maximum number zeroes of the polynomial is 3, because graph cuts x-axis at three points.

44. *(d)*



Explanation: The graph does not intersect x-axis at any point. So, it has no zero.

45. *(a) 0*

Explanation: This graph has no zero, because it does not intersect x-axis at any point.

46. *(c) Similar by AA criteria*

Explanation: In ΔAOB and ΔCOD

$\angle AOB = \angle COD$ (Vertically opposite angles)

$\angle OAB = \angle OCD$ (Alternate interior angles)

$\therefore \quad \Delta AOB \sim \Delta COD$ (By AA criteria)

47. *(a) 1 : 4*

Explanation: Since $\Delta AOB \sim \Delta COD$

So, $\dfrac{ar(\Delta AOB)}{ar(\Delta COD)} = \dfrac{AB^2}{CD^2} = \left(\dfrac{5}{10}\right)^2 = \left(\dfrac{1}{2}\right)^2 = \dfrac{1}{4}$

48. *(b) CD = 4 AB*

Explanation: $\dfrac{\text{Perimeter} \cdot (\Delta AOB)}{\text{Perimeter} \cdot (\Delta COD)}$

$= \dfrac{AB}{CD} = \dfrac{1}{4}$

$\Rightarrow \quad 4AB = CD$

49. *(d) $\Delta PQR \sim \Delta XZY$*

Explanation: $\dfrac{PQ}{XZ} = \dfrac{PR}{YZ} = \dfrac{QR}{YZ}$

$\Rightarrow \Delta PQR \sim \Delta XZY$

50. *(a) Their altitudes have a ratio a : b.*

Explanation: If the ratio of areas of two similar triangles is $a^2 : b^2$, then their altitudes medians, corresponding sides, perimeters and angle bisectors have a ratio $a : b$.