6

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 decimal representation of $\frac{129}{2^2 \times 5^3}$ will be:**

(a) terminating

(b) Non-terminating

(c) Non-terminating and repeating

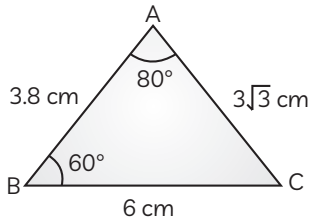
(d) Non-terminating and non-repeating

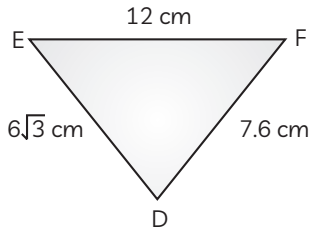
2. **For the given polynomial $p(x) = x^2 - 5x - 1$, if α and β are its zeroes then find the value of $\alpha^2\beta + \alpha\beta^2$.**

(a) –5 **(b) 4**

(c) 0 **(d) –7**

3. **What is the value of $\angle F$ in the given figure ?**

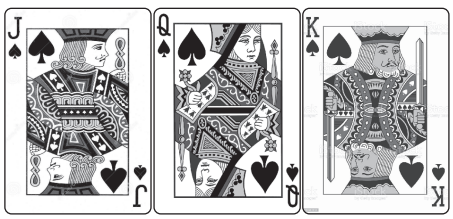




(a) 60° **(b) 80°**

(c) 40° **(d) 70°**

4. **What is the probability of getting black face card, if following cards are removed from a well-shuffled pack of 52 cards?**



(a) $\frac{1}{49}$ **(b) $\frac{2}{49}$**

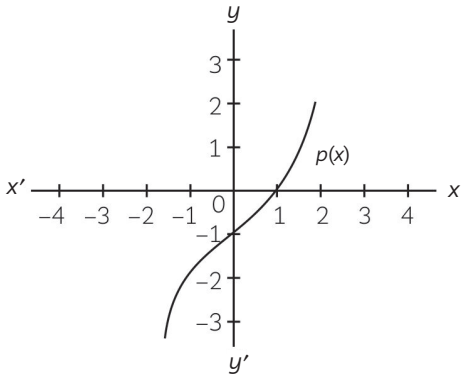
(c) $\frac{3}{49}$ **(d) $\frac{4}{49}$**

5. What is the probability of not getting a prime number in a single throw of a die?

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

(c) $\frac{2}{3}$ (d) $\frac{1}{4}$

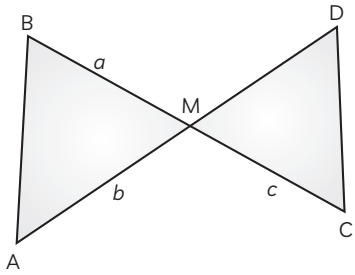
6. Find the number of zeroes, for the polynomial $p(x)$ shown in the graph below:



(a) 0 (b) 1

(c) 2 (d) 3

7. If $\Delta AMB \sim \Delta CMD$, then what is the measure of DM (in terms of a, b and c.) ?



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

(c) $\frac{ac}{b}$ (d) $\frac{ac}{c}$

8. What is the smallest odd composite number?

(a) 1 (b) 5

(c) 9 (d) 15

9. What is the value of θ in the expression, $\tan 3\theta = \sin 45° \cos 45° + \sin 30°$?

(a) 0° (b) 15°

(c) 30° (d) 45°

10. What is the fourth vertex of a parallelogram, if its three consecutive vertices are (–2, –1), (1, 0) and (4, 3)?

(a) (0, –2) (b) (2, 2)

(c) (2, 1) (d) (1, 2)

11. Rajesh and Mahesh are playing a game. In this game, each player throws two dice and note down the numbers on the dice. By the rules of the game, Mahesh needs to get two numbers such that their product is a perfect square, in order to win the game. What is the probability that Mahesh will win the game.

(a) $\frac{1}{9}$ (b) $\frac{2}{9}$

(c) $\frac{1}{3}$ (d) $\frac{2}{7}$

12. If one of the zero of the polynomial $f(x) = x^2 - 7x - 8$ is – 1, then find the other zero.

(a) 7 (b) 1

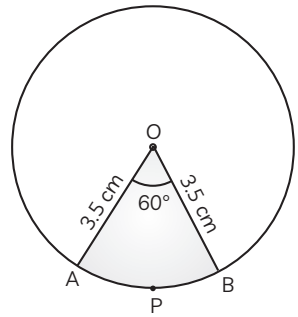
(c) 8 (d) 5

13. If $\tan\theta + \sec\theta = n$, then $\sec^4\theta - \tan^4\theta - 2\sec\theta\tan\theta =$

(a) $n - 1$ (b) n^2

(c) $\frac{1}{n^2}$ (d) 0

14. What is the length of OAPB, in the given figure? (Use $\pi = 3.14$)



(a) 22 cm (b) 11 cm

(c) 13 cm (d) 17 cm

15. If 3 is a zero of the polynomial $2x^2 + x + k$, then find the value of 'k' is:

(a) –21 (b) –5

(c) $\frac{1}{3}$ (d) 7

16. Two alarm clock ring their alarms at regular intervals of 50 seconds and 48 seconds. If they first beep together at 12 noon, at what time will they beep again ?

(a) 12 : 20 p.m. (b) 01 : 05 p.m.

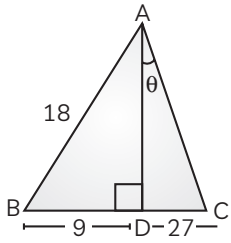
(c) 02 : 20 p.m. (d) 12 : 35 p.m.

17. Co-prime numbers is a set of numbers which have 1 as their ..... .

(a) only factor (b) LCM

(c) HCF (d) both (b) and (c)

18. **Find the value of tan θ, by using the following figure :**



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

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

19. **What is the point on *y*-axis which is equidistant from the points (2, 3) and (–4, 1)?**

(a) (0, –1) (b) (0, 1)

(c) (0, 2) (d) (0, –2)

20. *Suman has a piece of cloth measuring 120 cm (length) and 96 cm (width). She wants to cut it into smaller square cloth pieces in such a way that there is no wastage of cloth.*

The number of square pieces that can be cut from the given piece of cloth is :

(a) 20 (b) 24

(c) 40 (d) 48

SECTION - B

16 marks

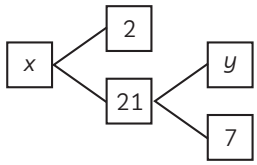
(Section B consists of 20 questions of 1 mark each. Any 16 questions are to be attempted.)

21. **The sum of two numbers is 25. One of the numbers exceeds the other by 9. The number are?**

(a) 15, 10 (b) 16, 9

(c) 13, 12 (d) 17, 8

22. **Calculate** $\frac{x}{y}$



(a) 14 (b) 3

(c) 15 (d) 18

23. **If $\Delta ABC \sim \Delta DEF$, such that $\angle A = 47°$ and $\angle E = 83°$, what is the value of $\angle C$?**

(a) 43° (b) 50°

(c) 17° (d) 55°

24. **Find the value of** $\frac{3 - 4\sin^2 A}{4\cos^2 A - 3}$ **if sec A =** $\frac{17}{8}$.

(a) $\frac{33}{611}$ (b) $\frac{53}{78}$

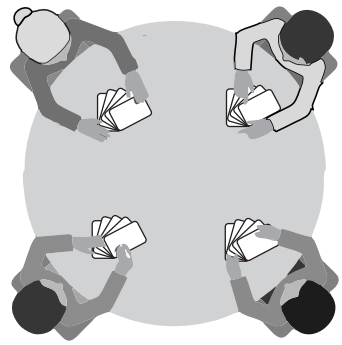
(c) $\frac{2}{\sqrt{3}}$ (d) $\frac{17}{64}$

25. **Find the ratio of circumferences of two circles, whose areas are in the ratio of 16 : 25.**

(a) 16 : 25 (b) 4 : 5

(c) 5 : 4 (d) 25 : 16

26. *Rita, Sita, Gita and Shyama are playing a bridge game. It is four persons play and a pair of two-two persons as a partner is made. A deck of 52 playing cards is distributed around the table clockwise in such a way that each person get 13 cards.*

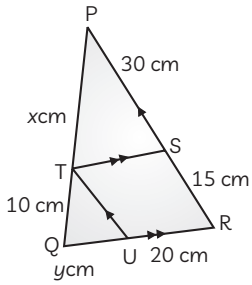


Find the probability that the card drawn is a queen of black colour.

(a) $\frac{5}{26}$ (b) $\frac{1}{26}$

(c) $\frac{3}{26}$ (d) $\frac{25}{26}$

27. *Thales theorem was given by a greek mathematician. According the this theorem, if a line is drawn parallel to one side of a triangle then it divides the other two sides in the same ratio'. This theorem is also known as Basic Proportionality Theorem.*



Here, the value of *x* is:

(a) 20 cm **(b) 15 cm**

(c) 5 cm **(d) 10 cm**

28. **What is the probability of getting exactly one head, when two coins are tossed simultaneously.**

(a) $\frac{1}{2}$ **(b)** $\frac{3}{4}$

(c) $\frac{1}{4}$ **(d)** $\frac{1}{5}$

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

(a) one **(b) two**

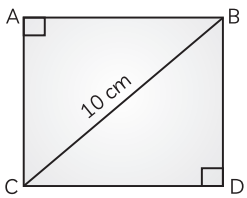
(c) Infinite **(d) None**

30. **What is the smallest number by which $\frac{891}{3500}$ must be multiplied so it becomes a terminating decimal?**

(a) 6 **(b) 7**

(c) 10 **(d) 5**

31. **Find the side of a square whose diagonal is 10 cm.**



(a) $5\sqrt{2}$ **cm** **(b)** $10\sqrt{2}$ **cm**

(c) 5 cm **(d) 10 cm**

32. **An integer is 1 less than twice that of another. If their sum is 23 then the smaller integer is:**

(a) 5 **(b) 7**

(c) 11 **(d) 13**

33. **What will be the number of the zero(s), if the graph of a quadratic polynomial does not intersect the *x*-axis?**

(a) zero **(b) one**

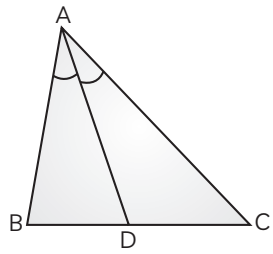
(c) two **(d) three**

34. **Evaluate the area of a semi-circle whose radius is 8.4 cm.**

(a) $110\ cm^2$ **(b)** $55\ cm^2$

(c) $57\ cm^2$ **(d)** $88\ cm^2$

35. **In the given figure in $\triangle ABC$, AD is the internal bisector of $\angle A$ and BD = 5 cm, BC = 7.5 cm, then what is the value of AB : AC?**



(a) 1 : 2 **(b) 2 : 1**

(c) 3 : 1 **(d) 1 : 3**

36. **Express R_3 in terms of R_1 and R_2, where the areas of two circles with radii R_1 and R_2 is equal to the area of the circle of radius R_3.**

(a) $R_3^2 + R_2^2 = R_1^2$ **(b)** $R_3^2 = R_1^2 - R_2^2$

(c) $R_3^2 = R_1^2 + R_2^2$ **(d)** $R_3^2 + R_1^2 = R_2^2$

37. **Find the value of *c* in $p(x) = ax^2 + bx + c$, if one of the zeroes of $p(x)$ is 0.**

(a) –7 **(b) 5**

(c) –2 **(d) 0**

38. **A ladder 10m long reaches the window of a house 8m above the ground. What is the distance of the foot of ladder from the base?**

(a) 8m **(b) 18m**

(c) 6m **(d) 5m**

39. **What is value of $\alpha + \beta$, if $\tan\alpha = 1$ and $\sec\beta = \sqrt{2}$?**

(a) 0° **(b) 30°**

(c) 45° **(d) 90°**

40. **What is the value of '*k*', if one zero of the polynomial $(k - 1)x^2 - 10x + 3$ is reciprocal of the other.**

(a) 4 **(b) 5**

(c) – 1 **(d) 0**

SECTION - C

8 marks

(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:

Rajesh want to choose a best plan for his mobile phone. He has 2 options available with him. The first plan of company A, cost ₹ 20 per month, with costing an additional 25 paise per minute.

The second plan of company B charges ₹ 40 per month, but calls cost 8 paise per minute. These two situations are shown below in the form of linear equations.

The total cost of the two company's are given as:

$y = 0.25x + 20$

and $y = 0.8x + 40$

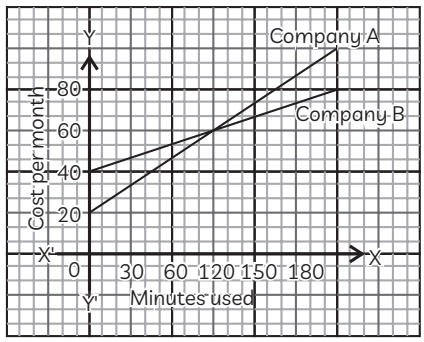
Where, x is the minutes used any y is the total cost per month.

Cost : Plans prices range from under 10 to over 100

Types of Plan : Prepaid and post-paid or phone on a plane

Network : Coverage

Other benifits : Calls. SMS, Data and other extras



41. **If Rajesh decides to take first plan and calls for 90 minutes in a month, then how much amount he will have to pay?**

(a) ₹ 45 **(b) ₹ 42.50**

(c) ₹ 40 **(d) ₹ 20**

42. **Rajesh's friend takes second plan and also calls for 90 minutes in a month. Then how much amount will he have to pay?**

(a) ₹ 47 **(b) ₹ 47.20**

(c) ₹ 45 **(d) ₹ 45.20**

43. **What are the values of x and y in the system of linear equations $x + 2y = -1$ and $2x - 3y = 12$?**

(a) (–3, –2) **(b) (3, 2)**

(c) (–3, 2) **(d) (3, –2)**

44. **If the system of pair of linear equations $kx + 2y = 5$, $3x + y = 1$ has a unique solution, then the value of k is:**

(a) $k = 6$ **(b) $k \neq 6$**

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

45. **Which type of lines is represented by the system of linear equations $x + 2y - 4 = 0$, $2x + 4y - 12 = 0$?**

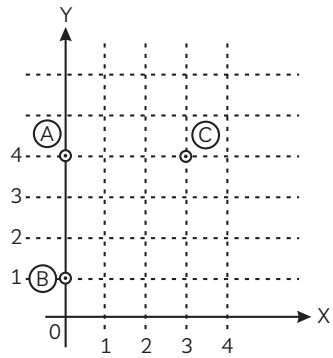
(a) Coincident lines **(b) Parallel lines**

(c) Intersecting lines **(d) Can't say**

Q. 46-50 are based on Case Study–2.

Case Study–2:

Three sports incharge are sitting at positions A, B and C to monitor the activity of students in the playground. They are conducting the physical education exam of students. The positions of three instructors are shown on the coordinate axes. In School play ground three sports incharge are sitting at positions located by the points A, B and C on coordinate axes as points A, B and C.



46. **Coordinates of point B are**

(a) (0, 0) **(b) (1, 0)**

(c) (0, 1) **(d) (1, 1)**

47. **What are the coordinates of point C?**

(a) (3, 3) **(b) (4, 3)**

(c) (3, 4) **(d) (4, 4)**

48. **Evaluate the distance AB.**

(a) distance OC **(b) distance AC**

(c) distance BC **(d) both (a) and (c)**

49. **Evaluate the distance BC.**

(a) $4\sqrt{2}$ **units** **(b)** $3\sqrt{2}$ **units**

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

50. **ΔABC is**

(a) an equilateral triangle

(b) a scalene triangle

(c) an isosceles right angled triangle

(d) an isosceles triangle

SOLUTION

SAMPLE PAPER - 6

SECTION - A

1. *(d) Terminating*

Explanation : Since the denominator of $\frac{129}{2^2 \times 5^3}$ will be of the form $2^m \times 5^n$. So it is a terminating decimal.

2. *(a) –5*

Explanation : Given, polynomial is

$$p(x) = x^2 - 5x - 1$$

Here, $a = 1, b = -5$ and $c = -1$

So, sum of zeroes, $\alpha + \beta = -\frac{b}{a} = \frac{-(-5)}{1} = 5$

And product of zeroes, $\alpha\beta = \frac{c}{a} = \frac{-1}{1} = -1$

Now, $\alpha^2\beta + \alpha\beta^2 = \alpha\beta(\alpha + \beta)$

$= -1 \times 5 = -5.$

3. *(a) 60°*

Explanation : In ΔABC and ΔDEF,

$$\frac{AB}{DF} = \frac{BC}{EF} = \frac{CA}{ED} = \frac{1}{2}$$

$\therefore$ By SSS criterion of similarity, we have :

$\Delta ABC \sim \Delta DFE$

$\Rightarrow$ $\angle A = \angle D$. $\angle B \Rightarrow \angle F$ and $\angle C = \angle E$

$\therefore$ $\angle F = 60°$

4. *(c)* $\frac{3}{49}$

Explanation: Total number of cards = 52

Since, three face cards of spades are removed, therefore number of remaining cards

$= 52 - 3 = 49$

$\therefore$ Total number of possible outcomes, $n(S) = 49$.

Let E = Event of getting a black face card.

Then total number of favourable outcomes = 3

i.e., $n(E) = 3$

$\therefore$ P(getting a black face card) $= \frac{n(E)}{n(S)} = \frac{3}{49}$

5. *(a)* $\frac{1}{2}$

Explanation: On a die, there are six numbers namely, 1, 2, 3, 4, 5, 6.

$\therefore$ Total number of possible outcomes = 6

Let E = Event of getting a prime number

$\therefore$ E = 2, 3, 5 *i.e.* 3

$\therefore$ $P(E) = \frac{3}{6} = \frac{1}{2}$

$\overline{E}$ = Event of not getting a prime number.

$$P(\overline{E}) = 1 - P(\overline{E}) = 1 - \frac{1}{2} = \frac{1}{2}$$

6. *(b) 1*

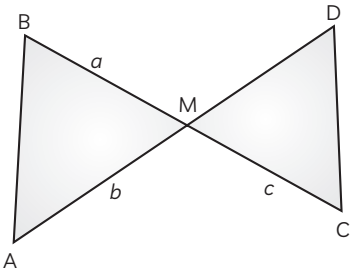
Explanation: It is clear from the graph of $p(x)$ cut the x-axis at only one point. Hence, the number of zeroes of $p(x)$ is 1.

⚠ Caution

➥ *The points where graph cuts the x-axis are the zeroes of the polynomial.*

7. *(c)* $\frac{ac}{b}$

Explanation:



$\because$ $\Delta AMB \sim \Delta CMD$

$\therefore$ $\frac{AM}{CM} = \frac{BM}{DM} = \frac{AB}{CD}$

(Corresponding sides of similar triangles)

$\Rightarrow$ $\frac{AM}{CM} = \frac{BM}{DM}$

$\Rightarrow$ $\frac{b}{c} = \frac{a}{DM}$

$\Rightarrow$ $DM = \frac{ac}{b}$

8. *(c) 9*

Explanation: We know that composite numbers are those than number 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.

9. *(b) 15°*

Explanation: We have, $\tan 3\theta = \sin 45° \cos 45° + \sin 30°$

$\Rightarrow$ $\tan 3\theta = \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} + \frac{1}{2}$

$\Rightarrow$ $\tan 3\theta = \frac{1}{2} + \frac{1}{2} = 1$

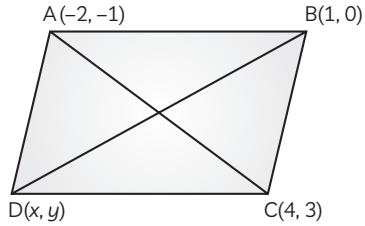
$\Rightarrow$ $\tan 3\theta = 1 \Rightarrow \tan 3\theta = \tan 45°$

$\Rightarrow$ $3\theta = 45°$

$\therefore$ $\theta = 15°$

10. *(d) (1, 2)*

Explanation: Let A(–2, – 1), B(1, 0), C(4, 3) and D(*x*, *y*) be the vertices of the parallelogram ABCD.



$\therefore$ Coordinates of mid-point of AC = Coordinates of mid-point of BD.

$\Rightarrow$ $\left(\frac{-2+4}{2}, \frac{-1+3}{2}\right) = \left(\frac{1+x}{2}, \frac{0+y}{2}\right)$

$\Rightarrow$ $(1, 1) = \left(\frac{1+x}{2}, \frac{y}{2}\right)$

$\Rightarrow$ $\frac{1+x}{2} = 1$ and $\frac{y}{2} = 1$

$\Rightarrow$ $x = 2 - 1 = 1$ and $y = 2$

Hence, fourth vertex is (1, 2).

Concept Applied

➥ *Diagonals of parallelogram bisect each other.*

11. *(b)* $\frac{2}{9}$

Explanation: Number of possible outcomes on throwing two dice = 36

Clearly, Mahesh will win when he get the product of numbers as a perfect square *i.e.*, when he will get (1, 1), (1, 4), (2, 2), (3, 3), (4, 1), (4, 4), (5, 5), (6, 6).

$\therefore$ Number of favourable outcomes = 8

$\therefore$ P(getting a product of perfect square)

$= \frac{8}{36} = \frac{2}{9}$

$\therefore$ Probability that Mahesh will win the game is $\frac{2}{9}$

12. *(c) 8*

Explanation : We have,

$f(x) = x^2 - 7x - 8$

Now, sum of the zeroes = $\frac{\text{coefficient of } x^1}{\text{coefficient of } x^2} = 7$

Since, one of the zero is – 1.

$\therefore$ Other zero = 7 – (– 1) = 7 + 1 = 8

13. *(c)* $\frac{1}{n^2}$

Explanation: $\tan\theta + \sec\theta = n$

$\Rightarrow$ $\frac{1}{\tan\theta + \sec\theta} = \frac{1}{n}$

On rationalising by $\sec\theta - \tan\theta$, we get

$\frac{\sec\theta - \tan\theta}{\sec^2\theta - \tan^2\theta} = \frac{1}{n}$

$\Rightarrow \quad \sec\theta - \tan\theta = \frac{1}{n}$

On squaring both sides, we get

$\sec^2\theta + \tan^2\theta - 2\sec\theta,\ \tan\theta = \frac{1}{n^2}$ ...(i)

Now, $\sec^4\theta - \tan^4\theta - 2\sec\theta\tan\theta$

$= (\sec^2\theta - \tan^2\theta)(\sec^2\theta + \tan^2\theta) - 2\sec\theta\tan\theta$

$= \sec^2\theta + \tan^2\theta - 2\sec\theta\tan\theta$

$[\because \sec^2\theta \tan^2\theta = 1]$

$= \frac{1}{n^2}$ [using (i)]

14. *(b) 11 cm*

Explanation: Here, $r = 3.5$ cm and $\theta = 60°$

Length of OAPB $= 2r + \frac{\theta}{360°} \times 2\pi r$

$= 2 \times 3.5 + 2 \times 3.14 \times 3.5 \times \frac{60°}{360°} = 10.66$ cm

$\cong 11$ cm

15. *(a) –21*

Explanation: Let $p(x) = 2x^2 + x + k$

Since, 3 is zero of p(x)

$\therefore \quad p(3) = 0$

$\Rightarrow \quad 2(3)^2 + 3 + k = 0$

$\Rightarrow \quad 18 + 3 + k = 0$

$\Rightarrow \quad k = -21$

16. *(a) 12 : 20 p.m.*

Explanation:

We have,

$50 = 2 \times 5^2$

$48 = 2^4 \times 3$

Time after which they beep together

$= \text{LCM}(50, 48)$

$= 2^4 \times 3 \times 5^2$

$= 1200$ s or 20 min

Since, the two clocks first beep together at 12 noon, so next they will beep together at 12 noon + 20 min *i.e.*, 12 : 20 pm.

17. *(c) HCF*

Explanation: Co-prime numbers have only 1 as their comman factor.

18. *(a)* $\sqrt{3}$

Explanation: In right ΔABD, we have

$AB^2 = AD^2 + BD^2$

(Pythagoras theroem)

$(18)^2 = AD^2 + (9)^2$

$\Rightarrow \quad AD^2 = 324 - 81 = 243$

$\Rightarrow \quad AD = \sqrt{243}$

$\Rightarrow \quad AD = 9\sqrt{3}$

Now, in ΔADC

$\tan\theta = \frac{CD}{AD} = \frac{27}{9\sqrt{3}} = \frac{3}{\sqrt{3}} = \sqrt{3}$

19. *(a) (0, – 1)*

Explanation: We know that x-coordinate on y-axis is zero.

Therefore, let the point on y-axis be P(0, y) and given points are A(2, 3) and B(–4, 1).

$\therefore$ PA = PB $\Rightarrow$ $PA^2 = PB^2$

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

$\Rightarrow \quad 4 + y^2 - 6y + 9 = 16 + y^2 - 2y + 1$

$\Rightarrow \quad -4y = 17 - 13 = 4$

$\Rightarrow \quad y = -1$

$\therefore$ Point on y-axis is (0, –1).

20. *(a) 20*

Explanation: To find the number of square pieces that can be cut from the given piece of cloth such that there is no wastage of cloth, we will find HCF (120, 96) by prime factorization.

$\because \quad 120 = 2^3 \times 3 \times 5$

and $\quad 96 = 2^5 \times 3$

$\therefore \quad \text{HCF} = 2^3 \times 3 = 24$

Number of square pieces

$= \frac{\text{Area of cloth}}{\text{Area of a square piece}}$

$= \frac{120 \times 96}{24 \times 24}$

$= 20$

SECTION - B

21. *(d) 17, 8*

Explanation: Let, the numbers be x and y,

$\because \quad x + y = 25$ ... (i)

and $\quad x - y = 9$ ... (ii)

On adding equations (i) and (ii)

$x + y = 25$

$x - y = 9$

$2x = 34$

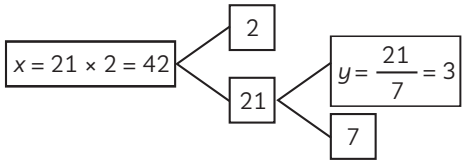
$x = 17$

$y = 25 - 17$

$= 8$

$\therefore$ Numbers are 17 and 8.

22. *(a) 14*



$\therefore \quad \frac{x}{y} = \frac{42}{3} = 14$

23. *(b) 50°*

Explanation: $\Delta ABC \sim \Delta DEF$

$\because \quad \angle A = \angle D = 47°$

and $\quad \angle B = \angle E = 83°$

In ABC,

$\angle A + \angle B + \angle C = 180°$

[Angle sum property of triangle]

$\therefore \quad \angle C = 180° - (\angle A + \angle B)$

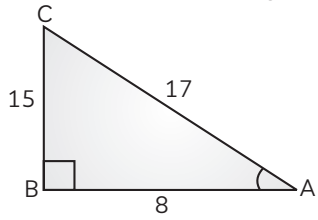
$= 180° - (47 + 83°)$

$= 180° - (130°)$

$= 50°$

24. *(a)* $\frac{33}{611}$

Explanation: Given, $\sec A = \frac{17}{8}$



$\Rightarrow \quad \cos A = \frac{8}{17}$

$\therefore \quad \sin A = \frac{15}{17}$

Now, $\frac{3 - 4\sin^2 A}{4\cos^2 A - 3} = \frac{3 - 4 \times \left(\frac{15}{17}\right)^2}{4 \times \left(\frac{8}{17}\right)^2 - 3}$

$= \frac{3 \times 289 - 4 \times 225}{4 \times 64 - 3 \times 289}$

$= \frac{867 - 900}{256 - 867}$

$= \frac{-33}{-611} = \frac{33}{611}$

25. *(b) 4 : 5*

Explanation: Let the radii of two circles be r_1 and r_2.

So, $\frac{\pi r_1^2}{\pi r_2^2} = \frac{16}{25}$ [Given]

$\frac{r_1^2}{r_2^2} = \frac{16}{25}$

$\Rightarrow \quad \frac{r_1}{r_2} = \frac{4}{5}$

Ratio of their circumferences is $= \frac{2\pi r_1}{2\pi r_2} = \frac{r_1}{r_2} = \frac{4}{5}$

26. *(b)* $\frac{1}{26}$

Explanation: Total number of cards = 52

Number of black queens = 2.

$\therefore$ P(black queen) $= \frac{2}{52} = \frac{1}{26}$

27. *(a) 20*

Explanation: In ΔPQR, we have, TS || QR, therefore by Thales theorem,

$\frac{x}{10} = \frac{30}{15} \Rightarrow x = 20$ cm

28. *(a)* $\frac{1}{2}$

Explanation: When two coins are tossed simultaneously then

total possible outcomes = {HT, TH, HH, TT}

$\therefore \quad n(S) = 4$

Favourable outcomes = {HT, TH}

$\therefore \quad n(E) = 2$

$\therefore$ P(getting exactly one head) $= \frac{n(E)}{n(S)}$

$= \frac{2}{4} = \frac{1}{2}$

29. *(d) None*

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

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

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

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 equation has no solution.

30. *(b) 7*

Explanation: $\frac{891}{3500}$ can be written as

$$\frac{3^4 \times 11}{2^2 \times 5^3 \times 7}$$

If denominator is of the form of $2^m \times 5^n$ (m, n are whole number) then given fraction will become a terminating decimal.

So, given fraction must be multiplied by minimum number 7 to make it a terminating decimal.

31. *(a) $5\sqrt{2}$*

Explanation: ABCD is a square.

Let AB = BC = CD = DA = 'a'm

Then, in ΔBDC, by Pythagoras theorem

$$AD^2 = BC^2 + CB^2$$

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

$$\Rightarrow \quad 100 = 2a^2$$

$$\Rightarrow \quad a = \sqrt{50} = 5\sqrt{2} \text{ cm}$$

32. *(b) 7*

Explanation: Let, the integers be x and y.

ATQ, $x = 2y - 1$ ...(i)

On $x - 2y = -1$ ...(ii)

Applying (i) and (ii)

$$x - 2y = -1$$
$$x + y = 20$$
$$- \quad - \quad -$$
$$-3y = -21$$

$\therefore \quad y = 7$ and $x = 13$

33. *(a) zero*

Explanation : If the graph of a quadratic polynomial does not intersect the x-axis, then the number of zero(s) is '0'.

34. *(a) 110 cm^2*

Explanation: We have,

Radius (r) of the circle = 8.4 cm

$\therefore$ Area of the semi-circle $= \frac{1}{2}\pi r^2$

$$= \frac{1}{2} \times \frac{22}{7} \times (8.4)^2$$

$$= \frac{1}{2} \times 221.76$$

$$= 110 \text{ cm}^2 \text{ (approx)}$$

35. *(b) 2 : 1*

Explanation : Since, AD is the internal bisector of $\angle$A

$$\therefore \quad \frac{AB}{AC} = \frac{BD}{DC} = \frac{BD}{BC - BD}$$

$$= \frac{5}{7.5 - 5} = \frac{5}{2.5} = \frac{2}{1}$$

$\therefore \quad$ AB : AC = 2 : 1

36. *(c) $R_3^2 = R_1^2 + R_2^2$*

Explanation: Area of circle with radius $R_3 = \pi R_3^2$

Area of circle with radius $R_2 = \pi R_2^2$

Area of circle with radius $R_1 = \pi R_1^2$

As per condition

$$\pi R_3^2 = \pi R_1^2 + \pi R_2^2$$

$$\Rightarrow \quad R_3^2 = R_1^2 + R_2^2$$

37. *(d) 0*

Explanation: We have,

$$p(x) = ax^2 + bx + c$$

One zero of $p(x)$ is zero.

$$p(0) = 0$$

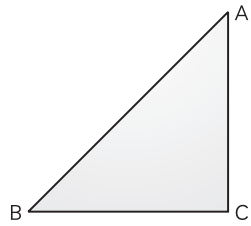
$$\Rightarrow \quad 0 = a(0) + b(0) + c$$

$$\Rightarrow \quad 0 = 0 + c$$

$$\Rightarrow \quad c = 0$$

38. *(c) 6 m*

Explanation: Here AB is a ladder of length 10m, A is the position of a window in the house C *i.e.*, AC = 8m



In right ΔABC

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

[by pythagoras theores]

$$10^2 = 8^2 + BC^2$$

$$BC^2 = 100 - 64$$

$$= 36$$

$$BC = 6 \text{ m}$$

$$a = \sqrt{50} = 5\sqrt{2} \text{ cm}$$

39. *(d) 90°*

Explanation: Given, $\tan \alpha = 1 = \tan 45°$

and $\sec \beta = \sqrt{2} = \sec 45°$

$$\Rightarrow \quad \alpha = 45° \text{ and } \beta = 45°$$

So, $\alpha + \beta = 45° + 45° = 90°$

40. *(a) 4*

Explanation: Let one of the zeroes of the polynomial be α.

Then another zero is $\frac{1}{\alpha}$.

Now, $\alpha.\frac{1}{\alpha} = \frac{3}{(k-1)}$

$\therefore \quad 1 = \frac{3}{k-1}$

$\Rightarrow \quad k - 1 = 3$

$\Rightarrow \quad k = 4$

SECTION - C

41. *(b)₹ 42.50*

Explanation: We have,

$y = 0.25x + 20$

When $x = 90$

$\therefore \quad y = 0.25 \times 90 + 20$

$= 42.50$

$\therefore$ Total cost for a month is ₹ 42.50.

42. *(b) ₹ 47.20*

Explanation: We have, total cost,

$y = 0.08x + 40$

When $x = 90$ minutes, then total cost for him

$y = 0.08 \times 90 + 40$

$= 47.20$

$\therefore \quad$ Cost = ₹ 47.20

43. *(d) (3, –2)*

Explanation: We have,

$(x + 2y = -1) \times 2$ ...(i)

$2x - 3y = 12$ ...(ii)

$- \quad + \quad -$ (On subtracting)

$7y = -14$

$\Rightarrow \quad y = -2$

Putting $y = -2$ in equation (i), we get

$x + 2 \times (-2) = -1$

$\Rightarrow \quad x = -1 + 4 = 3$

$\Rightarrow \quad x = 3$

$\therefore$ Solution is (3, –2).

44. *(b) $k \neq 6$*

Explanation: Given system of linear equations

$kx + 2y = 5$

$3x + y = 1$

For unique solution, we have

$\Rightarrow \quad \frac{k}{3} \neq \frac{2}{1} \Rightarrow k \neq 6$

45. *(b) parallel lines*

Explanation: Given linear equations are:

$x + 2y - 4 = 0$

$2x + 4y - 12 = 0$

We have, $\frac{1}{2} = \frac{2}{4} \neq \frac{-4}{-12}$

$\Rightarrow \quad \frac{1}{2} = \frac{1}{2} \neq \frac{1}{3}$

i.e., $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$\therefore$ It represent parallel lines.

46. *(c) (0, 1)*

47. *(c) (3, 4)*

48. *(b) distance AC*

Explanation: We have, A(0, 4), B(0, 1) and C(3, 4).

Now,

$AB = \sqrt{(0-0)^2 + (4-1)^2}$

$= \sqrt{0 + (3)^2} = \sqrt{9} = 3$

Also, distance $AC = \sqrt{(3-0)^2 + (4-4)^2}$

$= \sqrt{9+0} = \sqrt{9} = 3$

$\therefore$ Distance AB = Distance AC

49. *(b) $3\sqrt{2}$ units*

Explanation: We have, B(0, 1) and C(3, 4)

$\therefore \quad BC = \sqrt{(3-0)^2 + (4-1)^2}$

$= \sqrt{9+9} = \sqrt{18}$

$= 3\sqrt{2}$

50. *(c) an isosceles right angled triangle*

Explanation: ΔABC is an isosceles right angles triangle as AB = AC and $\angle BAC = 90°$