9

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

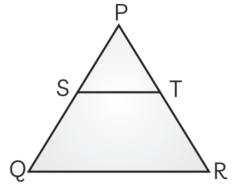
(Section A consists of 20 questions of 1 mark each. Any 16 questions are to be attempted.)

1. If $6^n - 5^n$ always end with a digit, where n is any natural number, then the desired digit is
(a) 1 (b) 5
(c) 3 (d) 7

2. For what value of k the pair of linear equations $kx - y = 2$ and $6x - 2y = 3$ has unique solution.
(a) $k = 0$ (b) $k \neq -3$
(c) $k = 3$ (d) $k \neq 3$

3. An equation whose degree is one is equation.
(a) Linear (b) Quadradic
(c) Cubic (d) Both (a) and (b)

4. In the figure below, ST || QR, $\frac{PS}{SQ} = \frac{3}{5}$ and PR = 28 cm. What is the value of PT ?



(a) 12.5 cm (b) 17.5 cm
(c) 10.5 cm (d) 13.5 cm

5. The rational number $\frac{127}{2^2 \times 5^3}$ is a:
(a) Terminating
(b) Non-terminating
(c) Non-terminating and replating
(d) Non-terminating and non-replating

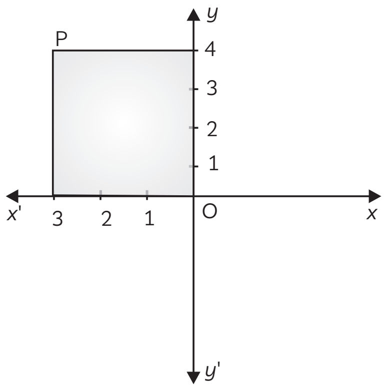
6. If in a triangle, a line divides any two sides of a triangle in the same ratio, then that line is .... to the third side.
(a) parallel (b) perpendicular
(c) equal (d) can't decide

7. What are the value(s) of y, if the points A(–1, y) and B(5, 7) lie on a circle with centre O(2, –3y).
(a) 7, 3 (b) –1, 7
(c) 1, 7 (d) 7, 2

8. On choosing a number x from the numbers 1, 2, 3 and a number y from the numbers 1, 4, 9, the probability of P(xy < 9) is:
(a) $\frac{5}{9}$ (b) $\frac{1}{9}$
(c) $\frac{4}{9}$ (d) $\frac{3}{9}$

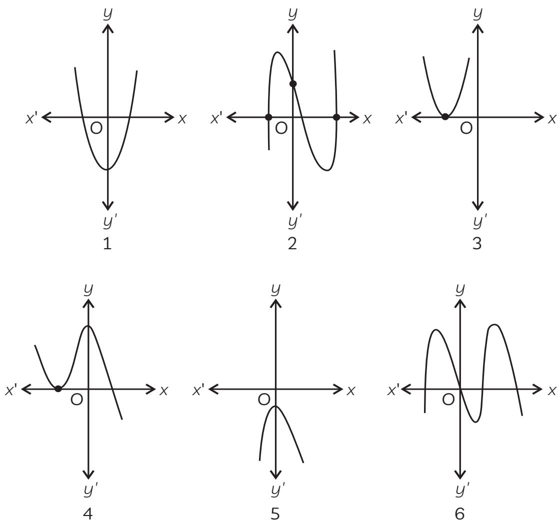
9. If $12x + 17y = 53$ and $17x + 12y = 63$, then, $x + y = ?$
(a) 4 (b) 6
(c) 8 (d) –4

10. What is the distance of the point P from the x-axis, shown on the grid?



(a) 4 (b) –4
(c) 3 (d) –3

11. The graph of a polynomial function is a smooth continuous curve. By looking at graph, we can find the number of zeros of the polynomial. Graphs are the geometrical meaning of the polynomials. They help us to understand their type, nature of its zeroes and coeffcients of its various terms.



Which of the above graph represent quadratic polynomials?

(a) 1 and 3 (b) 1, 3 and 5
(c) Only 5 (d) Only 6

12. A box contains 40 pens out of which x are non-defective. If one pen is drawn at random, the probability of drawing a non-defective pen is y. If we replace the pen drawn and then add 20 more non-defective pens in this bag the probability of drawing a non-defective pen is $4y$. Then, evaluate the value of x.

(a) 4 (b) 7
(c) 6 (d) 2

13. Evaluate ab, if $a = \sec\theta - \tan\theta$ and $\theta = \sec\theta + \tan\theta$.

(a) 0 (b) –1
(c) 1 (d) 2

14. Consider two similar triangles ABC and LMN, whose perimeters are respectively 60 cm and 48 cm. If length of LM is 8 cm, the length of AB is.

(a) 10 cm (b) 6 cm
(c) 12 cm (d) 14 cm

15. HCF of two numbers 'a' and 'b' is 5 and their LCM is 200. Then, product of ab is:

(a) 40 (b) 1000
(c) 2000 (d) 500

16. For what value(s) of x, the distance between the points P(2, –3) and Q(x, 5) is 10 units?

(a) 9, 2 (b) –4, 8
(c) 10, 1 (d) 6, 3

17. What is the probability of getting a consonant, when a letter of English alphabet is chosen at random?

(a) $\frac{5}{26}$ (b) $\frac{21}{26}$
(c) $\frac{19}{26}$ (d) $\frac{17}{26}$

18. A line intersects y–axis and x–axis at the points P and Q respectively. Find the coordinates of P, if (2, –5) is the mid-point of PQ.

(a) (0, –10) (b) (4, 0)
(c) (10, 0) (d) (0, –4)

19. Find the value of x if $\dfrac{4 - \sin^2 45^\circ}{\cot x . \tan 60^\circ} = 3.5$.

(a) 0° (b) 15°
(c) 30° (d) 60°

20. What is the smallest number which when increased by 17 becomes exactly divisible by 520 and 468 ?

(a) 4680 (b) 4663
(c) 4581 (d) 4682

SECTION - B **16 marks**

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

21. Consider two numbers, whose HCF and LCM are 33 and 264 respectively. The first number is completely divisible by 2 and gives quotient 33. What is the other number?

(a) 66 (b) 132

(c) 58 (d) 73

22. The pair of eqautions $x = 0$ and $x = -2$ have

(a) One solution

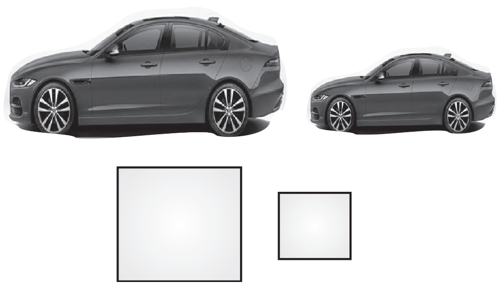
(b) Two solution

(c) Infinitely many solution

(d) No solution

23. *Scale factor is used to scale shapes in different dimensions. It is a measuring tool for similar figures who look the same but have different scales or measure. It states the scale by which a figure is bigger or smaller than original figure.*

$$\text{Scale factor} = \frac{\text{Length of image}}{\text{Actual length of object}}$$



A model of a car is made on the scale 1 : 8. If the model is 40 cm long and 20 cm wide, What is the actual length of car?

(a) 5 cm (b) 320 cm

(c) 2.5 cm (d) 160 cm

24. What is the distance between the points A($10 \cos \theta$, 0) and B(0, $10 \sin \theta$)?

(a) 15 units (b) 10 units

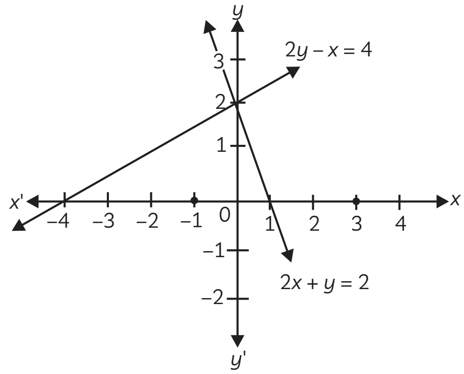
(c) 20 units (d) 1 unit

25. Find the value of $\sin 2\theta_2 + \tan 3\theta_2$, if $\tan(\theta_1 + \theta_2) = \sqrt{3}$ and $\sec(\theta_1 - \theta_2) = \frac{2}{\sqrt{3}}$.

(a) 2 (b) 1

(c) 0 (d) –1

26. *An equation for a straight line is called a linear equation. The general representation of the straight line equation is $y = mx + b$. By the graph of pair of linear equations we can derive whether the pair of equations are consistent or inconsistent. A pair of linear equation $2x + y = 2$ and $2y - x = 4$ are represented graphically.*



The solution of given pair of linear equations $2x + y = 2$ and $2y - x = 4$ is:

(a) (0, 0) (b) (2, 0)

(c) (0, 2) (d) (2, 2)

27. Find the value of θ, if $\sqrt{3} \tan 2\theta - 3 = 0$

(a) 15° (b) 20°

(c) 30° (d) 45°

28. On choosing a number randomly from the numbers : – 2, – 1, 0, 1, 2, the probability that $x^2 < 2$ is:

(a) $\frac{4}{5}$ (b) $\frac{1}{5}$

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

29. *On a sunny afternoon, Sam and Ram were sitting idle and getting bored. So they started playing a game with a pair of dice that one of them had. Each of them started rolling the pair of dice one by one, stating one condition before rolling. If the person gets the numbers according to the condition stated by him, he wins and get a score.*

First friend says, "a doublet". Then, his probability of winning is :

(a) $\frac{1}{6}$ (b) $\frac{1}{2}$

(c) $\frac{5}{6}$ (d) $\frac{5}{18}$

30. The ratio of areas of two similar triangles is 4 : 9. Then, the ratio of their sides is:

(a) 2 : 3 (b) 3 : 2

(c) $\sqrt{3} : \sqrt{2}$ (d) $\sqrt{2} : \sqrt{3}$

31. **Evaluate the LCM of smallest composite number and smallest two-digit composite number.**

(a) 2 (b) 10

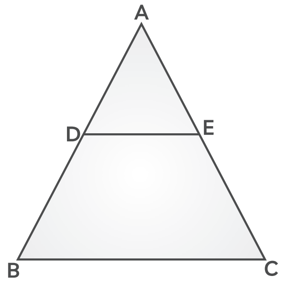
(c) 20 (d) 40

32. **Calculate the value of c for which pair of linear equations $cx - y = 2$ and $6x - 2y = 4$ will have infinitely many solutions.**

(a) 3 (b) 5

(c) –1 (d) 0

33. **In $\triangle ABC$, when $DE \parallel BC$ and $AD = x$, $DB = 3x + 4$, $AE = x + 3$ and $EC = 3x + 19$ then value of x is:**



(a) 4 units (b) 3 units

(c) 6 units (d) 2 units

34. **Evaluate the coordinates of the point which divides the line segment joining the points (8, –9) and (2, 3) internally in the ratio 1 : 2.**

(a) (6, –5) (b) (5, 5)

(c) (1, –4) (d) (2, 3)

35. **A right angled triangle has hypotenuse of length p cm and one side of length q cm. If $p - q = 1$, then the length of the third side is:**

(a) $2pq$ (b) $\sqrt{p+q}$

(c) $\sqrt{p^2+q^2}$ (d) $\sqrt{2pq}$

36. **Find the value of y, from the equations $x - y = 0.9$ and $\dfrac{11}{x+y} = 2$.**

(a) 1.2 (b) 2.1

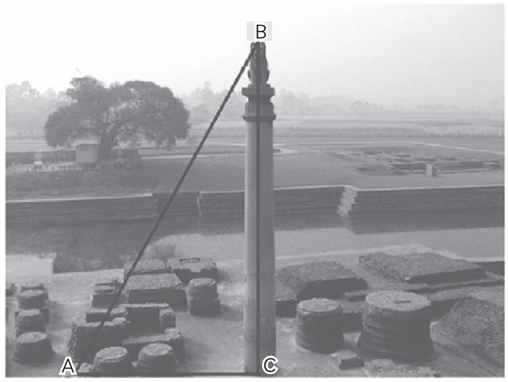
(c) 3.2 (d) 2.3

37. **Find the distance 2AB, where A and B are the points (–6, 7) and (–1, –5) respectively.**

(a) 28 units (b) 24 units

(c) 25 units (d) 26 units

38. *Pillars of Ashoka are a series of columns in Indian subcontinent. One of the Pillars of Ashoka is located in Vaishali having a single lion capital and another inside the Allahabad Fort, known as Allahabad pillar or Ashoka Stambha, shown as BC in the figure below. A point A is taken on the ground such that ΔABC forms a right- angled triangle.*



If $\sin(A + B) = 1$ and $\sin(A - B) = \dfrac{1}{2}$, $0° \le A + B \le 90°$, $A > B$, the values of A and B are:

(a) A = 30°, B = 60° (b) A = 45°, B = 45°

(c) A = 60°, B = 30° (d) A = 45°, B = 30°

39. **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 $\dfrac{a}{2} : b$.

(c) Their angle bisectors have a ratio $a^2 : b^2$

(d) The ratio of their perimeters is $3a : b$.

40. **Evaluate one zero of $p(x) = ax^2 + bx + c$ if $a + b + c = 0$.**

(a) 0 (b) 2

(c) 1 (d) –1

SECTION - C **8 marks**

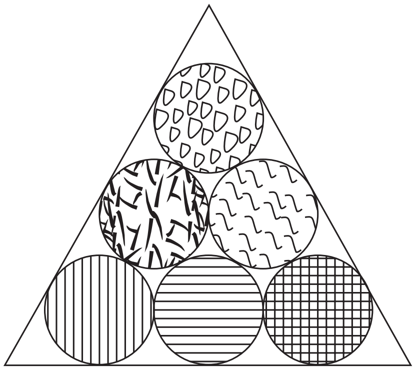
(Case Study based questions.)

(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:

Due to covid-19 lockdown, Ramesh decides to redo his house garden with some plantation work with his son. They have an equilateral triangle shaped garden and he has planted the garden with 6 different types of flowers (each of radius 1 m within a circular area). This left the remaining *part of garden (that is outside the circular plants area) with lush green grass.*



Now, comes the part of adding boundaries to corner the garden off nicely and he needs to know some calculations for it.

41. **A boundary wall of height 25 cm is to be made around the garden leaving a space of 1 m wide for a gate on one side. The total length of boundary wall is**

(a) 18 m (b) 20 m

(c) 21 m (d) 22 m

42. **The approx. area of the boundary wall is**

(a) 5.25 sq m (b) 4 .5 sq m

(c) 5 sq m (d) 5.5 sq m

43. **If the cost of making wall per square metre is ₹ 100 (including material and labour cost). The approximate, expense of making the boundary wall is**

(a) ₹ 575 (b) ₹ 450

(c) ₹ 525 (d) ₹ 550

44. **If the cost of plantation of flowers in per unit area is ₹ 140, then the cost of plantation of flowers is**

(a) ₹ 2800 (b) ₹ 2660

(c) ₹ 2521 (d) ₹ 2638

45. **The area of the garden which is covered with grass, is**

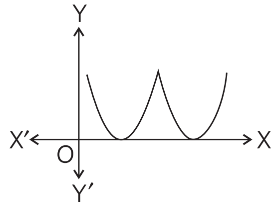
(a) 5.22 sq m (b) 11.5 sq m

(c) 18.84 sq m (d) 24.11 sq m

Q. 46-50 are based on Case Study–2.

Case Study–2:

Radha decorated the door of her house with garlands on the occassion of Diwali. Each garland forms the shape of a parabola as shown in the figure.



46. **What type of polynomial does the parabola formed by the garland represent?**

(a) linear (b) quadratic

(c) cubic (d) None of these

47. **Evaluate the number of zeroes of a quadratic polynomial.**

(a) more than 2 (b) atmost 2

(c) less than 2 (d) equal to 1

48. **A quadratic polynomial with the sum and product of its zeroes as – 1 and – 2 respectively, is:**

(a) $x^2 + x - 2$ (b) $x^2 - x - 2$

(c) $x^2 + 2x - 1$ (d) $x^2 - 2x - 1$

49. **What is the value of k, if one of the zeroes of the quadratic polynomial $(k - 2)x^2 - 2x - 5$ is -1?**

(a) 5 (b) 3

(c) –5 (d) 0

50. **If α, β are the zeroes of the polynomial $f(x) = x^2 - 7x + 12$, then find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$.**

(a) 12 (b) $\frac{-7}{12}$

(c) –7 (d) $\frac{7}{12}$

SOLUTION

SAMPLE PAPER - 9

SECTION - A

1. (a) 1

Explanation: As 6^n always end with 6 and 5^n always end with 5, So $6^n - 5^n$ always end with $6 - 5$ *i.e.,* 1.

2. (d) $k \neq 3$

Explanation: For unique solution, we have

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

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

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

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

$$\Rightarrow \quad k \neq 3$$

3. (a) Linear

4. (c) 10.5 cm

Explanation: Given: ST || QR, $\frac{PS}{SQ} = \frac{3}{5}$ and PR = 28 cm.

By using basic proportionality theorem, we get :

$$\frac{PS}{SQ} = \frac{PT}{TR}$$

$$\Rightarrow \quad \frac{PS}{SQ} = \frac{PT}{PR - PT}$$

$$\Rightarrow \quad \frac{3}{5} = \frac{PT}{28 - PT}$$

$$\Rightarrow \quad 3(28 - PT) = 5PT$$

$$\Rightarrow \quad 84 = 5PT + 3PT$$

$$\therefore \quad PT = \frac{84}{8} = 10.5$$

Hence, the length of PT is 10.5 cm.

5. (c) Terminating

Explanation: Here, rational number is $\frac{127}{2^2 \times 5^3}$

$$= \frac{127 \times 2}{2^3 \times 5^3}$$

$$= \frac{254}{(10)^3} = 0.254$$

6. (a) parallel

Explanation: By Thales theorem.

7. (b) $-1, 7$

Explanation: As, O is the centre of circle and A, B are points on its circumference.

$$\therefore \quad OA = OB$$

$$\text{or} \quad OA^2 = OB^2$$

$$\Rightarrow \quad (2 + 1)^2 + (-3y - y)^2 = (2 - 5)^2 + (-3y - 7)^2$$

$$\Rightarrow \quad 9 + 16y^2 = 9 + 9y^2 + 49 + 42y$$

$$\Rightarrow \quad 7y^2 - 42y - 49 = 0$$

$$\Rightarrow \quad y^2 - 6y - 7 = 0$$

$$\Rightarrow \quad y^2 - 7y + y - 7 = 0$$

$$\Rightarrow \quad (y - 7)(y + 1) = 0$$

$$\Rightarrow \quad y = -1, 7$$

8. (a) $\frac{5}{9}$

Explanation: Total number of possible cases = $x \times y = 9$.

$\therefore$ Favourable cases = {(1, 1), (1, 4), (2, 1) (2, 4), (3, 1)}

$$\therefore \quad P(xy < 9) = \frac{5}{9}$$

9. (a) 4

Explanation: Here,

$$12x + 17y = 53 \quad \text{...(i)}$$

$$\text{and} \quad 17x + 12y = 63 \quad \text{...(ii)}$$

On adding (i) and (ii), we get

$$29x + 29y = 116$$

$$x + y = 4$$

10. (a) 4

Explanation: The coordinates of point P is $(-3, 4)$ i.e. $x = -3$ and $y = 4$

$\therefore$ Distance of point P from x-axis is 4 units.

11. (a) 1, 3 and 5

Explanation: As they are parabolic in shape, representing a quadratic polynomial.

12. *(a) 4*

Explanation: Case 1 :

P(getting a non defective pens is)

$$\Rightarrow \quad \frac{x}{40} = y \quad ...(i)$$

Case II. Number of non-defective pens

$$= x + 20$$

$\therefore$ Total number of pens = 60

$\therefore$ P(getting a non-defective pen)

$$\Rightarrow \quad \frac{x+20}{60} = 4y \quad ...(ii)$$

From (i) and (ii),

$$\frac{4x}{40} = \frac{x+20}{60}$$

$$\Rightarrow \quad 6x = x + 20 \Rightarrow x = 4$$

13. *(c) 1*

Explanation: Here,

$$a = \sec\theta - \tan\theta$$

and $\quad b = \sec\theta + \tan\theta$

$$\therefore \quad ab = (\sec\theta - \tan\theta)(\sec\theta + \tan\theta)$$

$$= \sec^2\theta - \tan^2\theta = 1$$

14. *(a) 10 cm*

Explanation: Since, $\Delta ABC \sim \Delta LMN$

$$\therefore \frac{\text{Perimeter of } \Delta ABC}{\text{Perimeter of } \Delta LMN} = \frac{AB}{LM}$$

$$\Rightarrow \quad \frac{60}{48} = \frac{AB}{8}$$

[By property of similar triangles]

$$\Rightarrow \quad AB = \frac{60 \times 8}{48} = 10 \text{ cm}$$

15. *(b) 1000*

Explanation: Since,

HCF × LCM = Product of two numbers

$$\therefore \quad a \times b = 5 \times 200$$

$$= 1000$$

16. *(b) –4, 8*

Explanation:

$$PQ = 10$$

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

$$\Rightarrow \quad (x-2)^2 + (5+3)^2 = 100$$

$$\Rightarrow \quad (x-2)^2 = 100 - 64$$

$$\Rightarrow \quad (x-2)^2 = 36$$

$$\Rightarrow \quad (x-2) = \pm 6$$

$$\Rightarrow \quad x = 2 \pm 6 \Rightarrow x = 8, -4$$

17. *(b)* $\frac{21}{26}$

Explanation: We know that, in English alphabet, there are 26 letters (5 vowels + 21 consonants).

So, total number of outcomes = 26

and number of favourable outcomes = 21

Hence, required probability = $\frac{21}{26}$

18. *(a)* (0, –10)

Explanation: Let the coordinates of P and Q be (0, y) and (x, 0) respectively.

$\because$ (2, –5) is the mid-point of PQ.

$$\therefore \quad 2 = \frac{x+0}{2}, -5 = \frac{0+y}{2}$$

$$\Rightarrow \quad x = 4, y = -10$$

$\therefore$ Points are P(0, –10) and Q(4, 0).

19. *(d) 60°*

Explanation: We have,

$$\frac{4 - \sin^2 45°}{\cot x . \tan 60°} = 3.5$$

$$\Rightarrow \quad \frac{4 - \left(\frac{1}{\sqrt{2}}\right)^2}{\cot x \sqrt{3}} = 3.5$$

$$\Rightarrow \quad \frac{4 - \frac{1}{2}}{\sqrt{3} \cot x} = 3.5$$

$$\Rightarrow \quad \frac{3.5}{\sqrt{3} \cot x} = 3.5$$

$$\Rightarrow \quad \sqrt{3} \cot x = 1$$

$$\Rightarrow \quad \cot x = \frac{1}{\sqrt{3}} = \cot 60°$$

$$\Rightarrow \quad x = 60°$$

20. *(b) 4663*

Explanation: We have,

$$520 = 2 \times 2 \times 2 \times 5 \times 13$$

$$468 = 2 \times 2 \times 3 \times 3 \times 13$$

Numbers exactly divisible by 520 and 468

$$= \text{LCM } (520, 468)$$

$$= 2^3 \times 3^2 \times 5 \times 13 = 4680$$

$\therefore$ Required number = LCM (520, 468) – 17

$$= 4680 - 17 = 4663.$$

SECTION - B

21. *(b) 132*

Explanation: HCF = 33, LCM = 264.

First number is divisible by 2 and gives quotient 33.

$\therefore$ First number = 2 × 33 = 66

Let the second number be x.

Then, $$x = \frac{\text{HCF} \times \text{LCM}}{\text{1st number}}$$

$$= \frac{33 \times 264}{66} = 132$$

Caution

➥ *Here for finding first number, use the formula, Divisor = Dividend × Quatient + Remainder*

22. *(d) No solution*

Explanation: As $x = 0$ is the line parallel to x – axis and $x = -2$ is the line parallel to y-axis at a distance of 2 units form it.

These lines do not meet anywhere. So no solution exist

23. *(b) 320 cm*

Explanation: Given scale = 1 : 8

Let, actual length of car = x cm

Then $\frac{40}{x} = \frac{1}{8} \Rightarrow x = 320$ cm

24. *(b) 10 units*

Explanation: We have,

Required distance, AB

$$= \sqrt{(10\cos\theta - 0)^2 + (0 - 10\sin\theta)^2}$$
$$= \sqrt{100\cos^2\theta + 100\sin^2\theta}$$
$$= \sqrt{100(\cos^2\theta + \sin^2\theta)}$$
$$= \sqrt{100 \times 1} = 10 \text{ units}$$

25. *(a) 2*

Explanation: $\tan(\theta_1 + \theta_2) = \sqrt{3}$ [given]

$\Rightarrow \quad \theta_1 + \theta_2 = 60°$ ...(i)

Also, $\sin(\theta_1 - \theta_2) = \frac{2}{\sqrt{3}}$

$\Rightarrow \quad \theta_1 - \theta_2 = 30°$ ...(ii)

On adding Eqn (i) and (ii) we get

$2.\theta_1 = 90°$

$\Rightarrow \quad \theta_1 = 45°$ and $\theta_2 = 15°$

$\therefore \sin 2.\theta_1 + \tan 3.\theta_2 = \sin 90° + \tan 45°$

$= 1 + 1 = 2$

26. *(c) (0, 2)*

Explanation: The graph of $2x + y = 2$ and $2y - x = 4$, shows that the two lines intersect at (0, 2)

$\therefore$ Solution of given pair of linear equations is (0, 2).

27. *(c) 30°*

Explanation: Here,

$\sqrt{3}\tan 2\theta - 3 = 0$

$\Rightarrow \quad \sqrt{3}\tan 2\theta = 3$

$\Rightarrow \quad \tan 2\theta = \sqrt{3}$

$\Rightarrow \quad \tan 2\theta = \tan 60°$ [$\because \tan 60° = \sqrt{3}$]

$\Rightarrow \quad 2\theta = 60°$

$\Rightarrow \quad \theta = 30°$

28. *(c)* $\frac{3}{5}$

Explanation: Clearly, number x can take any one of the five given values.

So, total number of possible outcomes = 5 We observe that $x^2 < 2$ when x takes any one of the following three values – 1, 0 and 1.

Hence, $P(x^2 < 2) = \frac{3}{5}$

29. *(a)* $\frac{1}{6}$

Explanation: Total number of possible outcomes

$= 6 \times 6 = 36$

Favourable outcomes (doublet) = 6 i.e. {(1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (5, 5), (6, 6)}

$\therefore \quad P(\text{winning}) = \frac{6}{36} = \frac{1}{6}$

30. *(a) 2 : 3*

Explanation: Consider 2 triangles as Δ ABC and Δ PQR and $\Delta ABC \sim \Delta$ PQR

$\therefore \quad \frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{AB^2}{PQ^2}$

[by property of similar Δ]

$\therefore \quad \frac{AB^2}{PQ^2} = \frac{4}{9}$ [given]

$\Rightarrow \quad \frac{AB}{PQ} = \frac{2}{3}$

31. *(c) 20*

Explanation: Smallest composite numbers is 4 and smallest two-digit composite number is 10.

Now, $\quad 10 = 2 \times 5$ and $4 = 2 \times 2$

$\therefore \quad$ LCM (4, 10) = $2 \times 2 \times 5 = 20$

32. *(a) 3*

Explanation: We have

$cx - y = 2$ ...(i)

and $\quad 6x - 2y = 4$ ...(ii)

For infinitely many solutions

$$\frac{c}{6} = \frac{-1}{-2} = \frac{2}{4}$$

$$\frac{c}{6} = \frac{1}{2} \Rightarrow c = 3$$

33. *(d) 2 units*

Explanation: Here, DE || BC

$\therefore \quad \frac{AD}{BD} = \frac{AE}{EC}$

$\Rightarrow \quad \frac{x}{3x+4} = \frac{x+3}{3x+19}$

$\Rightarrow \quad 3x^2 + 19x = 3x^2 + 4x + 9x + 12$

$\Rightarrow \quad 19x = 13x + 12$

$\Rightarrow \quad 6x = 12$

$\Rightarrow \quad x = 2$ units

34. *(a) (6, –5)*

Explanation: Let P(x, y) be the point which divides the line segment joining the points (8, –9) and (2, 3) in the ratio 1 : 2.

$\therefore$ Using section formula

$$\therefore \quad x = \frac{1\times2+2\times8}{1+2}$$
$$= \frac{2+16}{3} = \frac{18}{3} = 6$$

and
$$y = \frac{1\times3+2(-9)}{1+2}$$
$$= \frac{3-18}{3} = \frac{-15}{3} = -5$$

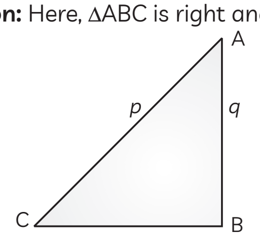
So, the required point is P(6, –5).

Caution

➥ *Be careful while putting the values in the formula, otherwise an error could occur.*

35. (a) $\sqrt{p+q}$

Explanation: Here, ΔABC is right angled at B.



$\therefore$ AC = p, AB = q and $p - q = 1$

$\therefore$ By pythagoras theorem in ΔABC,

$$AC^2 = AB^2 + BC^2$$
$$BC^2 = AC^2 - AB^2$$
$$= (AC - AB)(AC + AB)$$
$$= (p - q)(p + q)$$
$$= p + q$$
$$\therefore \quad BC = \sqrt{p+q}$$

36. (d) 2.3

Explanation: We have

$$x - y = 0.9 \qquad \text{...(i)}$$

and
$$\frac{11}{x+y} = 2$$
$$\therefore \quad x + y = \frac{11}{2} \qquad \text{...(ii)}$$
$$\Rightarrow \quad x + y = 5.5$$

Adding eq. (i) *and* (ii), we get

$$2x = 6.4$$
$$\Rightarrow \quad x = 3.2$$
$$\therefore \quad y = 5.5 - 3.2 = 2.3$$

37. (d) 26 units

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

$$\therefore \quad AB = \sqrt{(-6-(-1))^2 + (7-(-5))^2}$$
$$= \sqrt{(-5)^2 + (12)^2} = \sqrt{169}$$
$$= 13$$
$$\therefore \quad 2AB = 2 \times 13 = 26 \text{ units}$$

38. (c) A = 60°, B = 30°

Explanation: It is given that sin (A + B) = 1 $\Rightarrow$ A + B = 90°, as sin 90° = 1

Also, $\sin(A - B) = \frac{1}{2}$

$\Rightarrow$ A – B = 30°, as $\sin 30° = \frac{1}{2}$

Therefore, A + B = 90° and A – B = 30°

Solving, we get, 2A = 120° or A = 60°

$\Rightarrow$ B = 90° – 60° = 30°

Therefore, A = 60°, B = 30°

39. (a) Their altitudes have 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 $a : b$.

40. (c) 1

Explanation: Given,

$$a + b + c = 0$$

For $x = 1$,

$$p(1) = a + b + c = 0$$

$\therefore$ 1 is a zero of $p(x) = ax^2 + bx + c$.

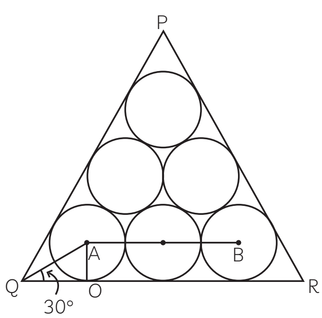
SECTION - C

41. (c) 21 m

Explanation: Distance from A to B

= 1 + 2 + 1

= 4 m



In ΔOAQ,

$$\tan 30° = \frac{OA}{OQ}$$
$$\frac{1}{\sqrt{3}} = \frac{1}{OQ}$$
$$\Rightarrow \quad OQ = \sqrt{3} = 1.73$$

$\therefore$ Side of equilateral triangle

= 4 + 1.73 + 1.73

= 7.46 m

Perimeter of equilateral = 7.46 × 3

= 22.38

Now, 1 m boundary is left for gate

$\therefore$ Length of boundary = 22.38 – 1

= 21.38 m

= 21 m

42. *(a) 5.25 sq m*

Explanation:

Area of boundary wall, A = $21 \times \frac{25}{100}$

$= \frac{21}{4} = 5.25$ sq m

43. *(c) ₹ 525*

Explanation:

Cost of making wall = Area × Rate

= 5.25 ×100

= ₹ 525

44. *(d) ₹ 2638*

Explanation:

Area of 6 circles of radius 1 m = $6 \times \pi(1)^2$

= 6π sq m

Total cost = 140 × 6 × 3.14

= ₹ 2637.6 = ₹ 2638

45. *(E) (a) 5.22 sq m*

Explanation:

Area of garden covered with grass = Area of triangle – Area of six circles.

$$= \frac{\sqrt{3}}{4} \times (7.5)^2 - 6\pi$$

$$\text{Cost} = \frac{1.73 \times 7.5 \times 7.5}{4} - 6 \times 3.14$$

= 24.09 – 18.84

= 5.22 sq m

46. *(b) quadratic*

Explanation: A parabola represents a quadratic polynomial.

47. *(b) atmost 2*

Explanation: A quadratic polynomial has atmost two zeroes.

48. *(a) $x^2 + x - 2$*

Explanation: A quadratic polynomial is written as

x^2 – (sum of zeroes)x + product of zeroes

So, required polynomial

$= x^2 - (-1)x + (-2)$

$= x^2 + x - 2$

49. *(a) 5*

Explanation: Let $p(x) = (k - 2)x^2 - 2x - 5$

Since (–1) is a zero of the given polynomial.

So, $p(-1) = 0$

$(k - 2)(-1)^2 - 2(-1) - 5 = 0$

$\Rightarrow k - 2 + 2 - 5 = 0$

$\Rightarrow k = 5$

50. *(d) $\frac{7}{12}$*

Explanation: $\alpha + \beta = -\frac{b}{a} = 7$, $\alpha\beta = \frac{c}{a} = 12$.

Now $\frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha+\beta}{\alpha\beta} = \frac{7}{12}$