2

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. A card is drawn from a box, which have cards marked with numbers 2 to 101, mixed thoroughly. One card is drawn from the box. What is the probability that the card taken out bears a number which is a perfect cube?

(a) $\frac{1}{20}$ (b) $\frac{7}{100}$

(c) $\frac{9}{100}$ (d) $\frac{3}{100}$

2. A chord of circle of a radius 28 cm subtends a right angle at the centre. What is the area of the minor sector?

(a) 621 cm^2 (b) 616 cm^2

(c) 718 cm^2 (d) 721 cm^2

3. Find cos θ, if 6 cot θ + 2 cosec θ = cot θ + 5 cosec θ.

(a) $\frac{5}{3}$ (b) $\frac{3}{5}$

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

4. Find the number of solutions for the pair of equations $x = 0$ and $x = 3$.

(a) one solution (b) two solutions

(c) three solution (d) No solution

5. What is the probability of getting different numbers on dice, if two dice are thrown at the same time?

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

(c) $\frac{5}{6}$ (d) $\frac{1}{4}$

6. Consider two numbers as x and y. The sum of them is 33 and their difference is 17. Find the numbers.

(a) 11 and 22 (b) 25 and 8

(c) 17 and 26 (d) 24 and 9

7. What is given $\sin A + \sin^2 A = 1$, the value of the expression $(\cos^2 A + \cos^4 A)$.

(a) 1 (b) 0

(c) – 1 (d) ∞

8. What will be the decimal expansion of the rational number $\frac{27}{1250}$?

(a) 0.0125 (b) 0.0021

(c) 0.0315 (d) 0.0216

9. Calculate the LCM of two positive integers whose product is 108 and HCF is 3.

(a) 72 (b) 36

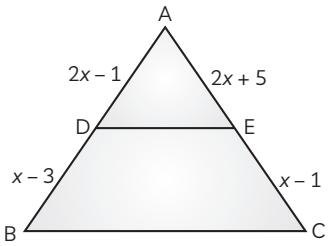
(c) 18 (d) 9

10. Calculate the HCF of p^3q^2 and p^2q, provided that p and q ae prime numbers.

(a) pq (b) pq^2

(c) q^2p (d) p^2q^2

11. Find the value of x, in the adjoining figure, if DE || BC.



(a) 8 (b) 9
(c) 10 (d) 11

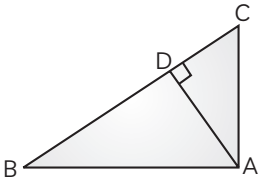
12. What is the ratio in which point P(1, 2) divides the join of A(–2, 1) and B(7, 4)?

(a) 1 : 2 (b) 2 : 1
(c) 3 : 4 (d) 2 : 3

13. Write the prime factorisation of 3825.

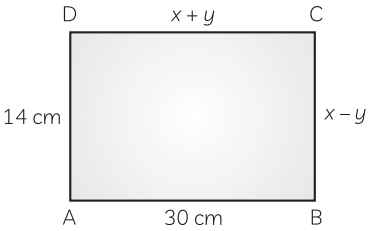
(a) $3^2 \times 5^2 \times 17$ (b) $3^3 \times 5 \times 17$
(c) $3^2 \times 5 \times 17$ (d) $3 \times 5^3 \times 17$

14. Evaluate the value of $AB^2 + CD^2$ in the given figure, if AD ⊥ BC and BD = 2, AC = 4.



(a) 16 (b) 20
(c) 4 (d) 6

15. ABCD is a rectangle with dimensions mentioned in the figure. Find the value of *y*.



(a) 21 (b) 7
(c) 22 (d) 8

16. In an isosceles right angled triangle, what is the length of the equal sides of the triangle, if its hypotenuse is $6\sqrt{2}$ cm?

(a) $3\sqrt{2}$ cm (b) 6 cm
(c) 12 cm (d) 5 cm

17. What is the value of *k* in the quadratic polynomial $3x^2 + 2kx - 3$ if $x = -\frac{1}{2}$, is one of its zero?

(a) $\frac{1}{5}$ (b) $\frac{3}{2}$
(c) $-\frac{1}{4}$ (d) $-\frac{9}{4}$

18. Two dice are thrown together. Then the probability that sum of the two numbers on the dice will be multiple of 4 is:

(a) $\frac{3}{4}$ (b) $\frac{1}{4}$
(c) $\frac{1}{2}$ (d) 0

19. What is the value of '*a*' if the mid-point of the line segment joining the points P(6, *a* –2) and Q(–2, 4) is (2, –4)?

(a) –10 (b) 10
(c) 0 (d) 7

20. After how many places of decimal, will the decimal expansion of $\frac{141}{120}$ terminate?

(a) one place (b) two place
(c) three place (d) four place

SECTION - B

16 marks

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

21. Find the diameter of a semi-circular protactor, whose perimeter is 36 cm.

(a) 7 cm (b) 14 cm
(c) 21 cm (d) 42 cm

22. If we toss two unbiased coins simultaneously then the probability of getting no head is $\frac{A}{B}$. Then $(A + B)^2$ will be equal to:

(a) 21 (b) 25
(c) 10 (d) 5

23. What is the measure of the hypotenuse of a right triangle, when its medians, drawn from the vertices of the acute angles, are 5 cm and $2\sqrt{10}$ cm

(a) $5\sqrt{8}$ cm (b) $2\sqrt{13}$ cm
(c) $6\sqrt{10}$ cm (d) $2\sqrt{7}$ cm

24. Evaluate for what value of *c* for which the system of linear equations $cx + 3y = 3$; $12x + cy = 6$ has no solution.

(a) –6 (b) 0
(c) 6 (d) 12

25. It is proposed to build a single circular park equal in area to the sum of area of two circular parks of diameters 16 m and 12 m in a locality. The radius of new park would be:

(a) 10 m (b) 5 m

(c) 20 m (d) 24 m

26. Evaluate $\frac{x}{\sqrt{a^2+x^2}}$, where $a = x \tan \theta$.

(a) $\sec^2 \theta$ (b) $\cos \theta$

(c) 0 (d) $\tan \theta$

27. Evaluate $\frac{y^2}{b^2} - \frac{x^2}{a^2}$, where $x = a \tan \theta$ and $y = b \sec \theta$.

(a) 0 (b) 1

(c) –1 (d) 3

28. A circle's circumference is equal to the sum of the circumferences of two circles having diameters 34 cm and 28 cm. What is the radius of the new circle?

(a) 31 cm (b) 62 cm

(c) 38 cm (d) 28 cm

29. What is the LCM of smallest prime and smallest composite natural number?

(a) 2 (b) 4

(c) 8 (d) 6

30. A, B and C start running in a circular track at the same time in the same direction. A completes a round in 252 s, B in 308 s and C in 198 s. After what time will they meet again at the starting point?

(a) 46 min 12 sec

(b) 42 min 6 sec

(c) 52 min 12 sec

(d) 56 min 10 sec

31. Two angles are supplementary to each other. The larger of two supplementary angles exceeds the smaller by 20°. Then, the smaller angle is.

(a) 60° (b) 80°

(c) 65° (d) 75°

32. Evaluate the simplified value of $(1 + \cot^2 \theta)(1 - \cos \theta)(1 + \cos \theta)$.

(a) 1 (b) –1

(c) $\cot \theta$ (d) $\sec^2 \theta$

33. If $\Delta ABC \sim \Delta PQR$, then evaluate the length of AC. If perimeter of ΔABC = 20 cm, perimeter of ΔPQR = 40 cm and PR = 8 cm.

(a) 4 cm (b) 6 cm

(c) 10 cm (d) 3 cm

34. On choosing a letter randomly from the letters of the word "ASSASSINATION" the probability that the letter chosen is a vowel is in the form of $\frac{6}{2x+1}$, then x is equal to:

(a) 8 (b) 7

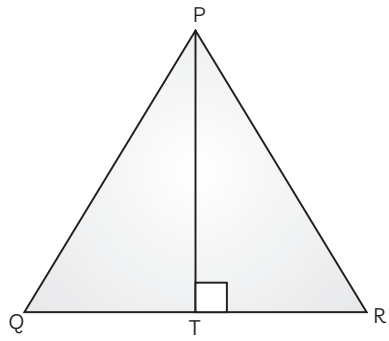
(c) 6 (d) 5

35. A man is going from his office to his house. He goes 15 m due West and then 8 m due North. What is the shortest distance between starting and the end point?

(a) 19 m (b) 20 m

(c) 18 m (d) 17 m

36. In an equilateral triangle ΔPQR, PT is an altitude. Then the value of $4PT^2$ is:



(a) $3PQ^2$ (b) $(PQ + QR)^2$

(c) PQ^2 (d) $2PQ^2$

37. Salesman was having a lot of 100 shirts of which 88 are good, 8 have minor defects and 4 have major defects. Suresh, a shopkeeper will buy only those shirts which are good. What is the probability that he will buy a shirt?

(a) $\frac{22}{25}$ (b) $\frac{23}{25}$

(c) $\frac{11}{100}$ (d) $\frac{24}{25}$

38. An arc of length of length 19 cm of a circle of radius 30 cm, subtends an angle θ at the centre O. Then value of θ is:

(a) 30° (b) 37°

(c) 45° (d) 52°

39. A girl of height 90 cm is standing near a lamp-post. Now, she starts walking away from the base of a lamp post at a speed of 1.2 m/s. If the lamp is 3.6 m above the ground, then what is the length of her shadow after 4 seconds?

(a) 1.6 m (b) 1.5 m

(c) 3 m (d) 2 m

40. Evaluate $x + y$, if $217x + 131y = 913$ and $131x + 217y = 827$.

(a) 5 (b) 4

(c) 7 (d) –8

SECTION - C

8 marks

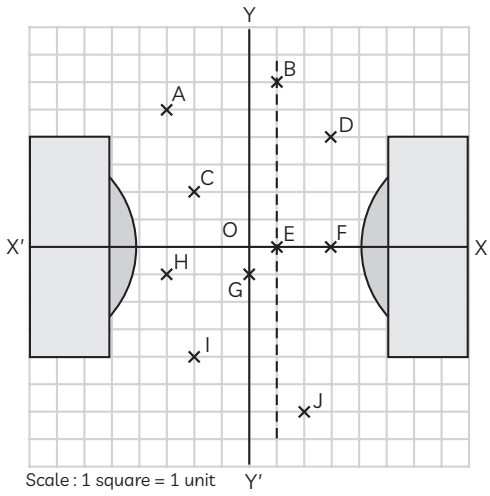
(Section C consists of 10 questions of 1 mark each. Any 8 questions are to be attempted.)

Q 41 to Q 45 Based on Case Study–1:

Case Study–1:

Interschool tournament matches of basketball are going to happen very soon. The coach is making his team practicing very hard. He guided his team, the various tactics of how to perform and their respective positions on the ground.

A coach is discussing the strategy of the game with his players. The position of players is marked with cross 'x' in the grid.



41. **If we consider O as the origin, then the point shown on the grid whose abscissa is zero, is:**

(a) E **(b) G**

(c) F **(d) H**

42. **Evaluate the distance between the player C and B.**

(a) $4\sqrt{2}$ **units** **(b)** $2\sqrt{5}$ **units**

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

43. **Which among the following is a player whose position is 6 units from *x*-axis and 2 units to the right of *y*-axis?**

(a) A **(b) J**

(c) B **(d) I**

44. **If we consider (*x*, *y*) as the coordinates of the mid-point of the line segment joining A and H, then**

(a) $x = -2, y = 3$ **(b)** $x = -3, y = -2$

(c) $x = -3, y = 2$ **(d)** $x = 2, y = 3$

45. **According to sudden requirement coach of the team decided to increase one player in the 4th quadrant without increasing the total number of players, so he decided to change the position of player F in such a way that F becomes symmetric to D *w.r.t.* *x*-axis then new position of F is**

(a) (4, 3) **(b) (–4, 3)**

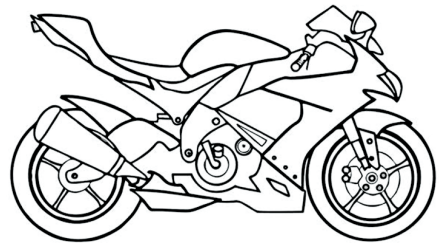
(c) (3, –4) **(d) (3, 4)**

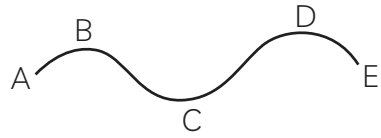
Q 46 to Q 50 Based on Case Study–2:

Case Study–2:

Somesh is driving motorcycle, in a zigzag way on the road.

His motorbike moves on a road and traces a curved path. The path traced by it is shown by the curve ABCDE.





The pattern of the path traced is in the shape of parabola.

In mathematical form, the given path followed the polynomial expression in the form

$p(x) = a_n x^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + ...$

46. **Which of the following describes the shape of the curve CDE?**

(a) Circle **(b) Straight line**

(c) Parabolic **(d) Ellipse**

47. **If the shape of the curve ABC is represented by quadratic equation $x^2 - 7x + 12$, then its zeroes are :**

(a) 3, 4 **(b) 4, –5**

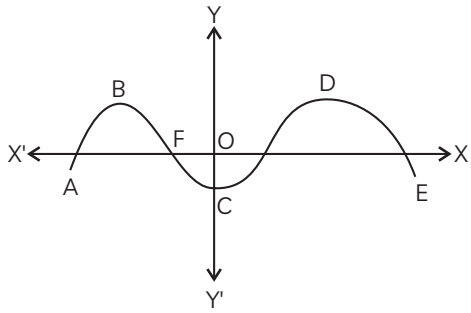
(c) 3, –5 **(d) 2, –3**

48. **What is the polynomial representation of the path traced by the bike, when zeroes are 2 and – 4,**

(a) $x^2 + 2x - 8$ **(b)** $x^2 - 2x - 8$

(c) $x^2 - 4x - 8$ **(d)** $x^2 + 2x + 8$

49. **Path of a car is shown on the coordinate axes, in graphical form.**



The number of zeroes of the given curve is:

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

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

50. **If the equation of the path ABFC is represented by $x^2 + 8x + 15$ in the part (D), then find the distance between A and F.**

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

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

SOLUTION

SAMPLE PAPER - 2

SECTION - A

1. *(d)* $\frac{3}{100}$

Explanation: Total cards from 2 to 101 are 100.

$\therefore$ Total outcomes : 100

Perfect cubes from 2 to 101 are 8, 27, 64.

$\therefore$ Favourable outcomes = 3

$\therefore$ Then, probability of getting perfect cube from 2 to 101 = $\frac{3}{100}$

2. *(b) 616 cm^2*

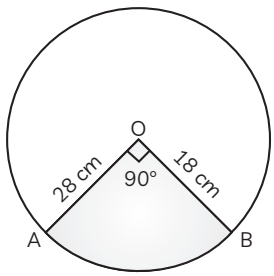
Explanation: Area of the sector of angle θ

$= \frac{\theta}{360°} \times \pi r^2$

area = $\frac{90}{360°} \times \frac{22}{7} \times 28 \times 28$ $(\because \theta = 90°)$

$= \frac{1}{4} \times \frac{22}{7} \times 28 \times 28$

$= 616\ cm^2$



3. *(b)* $\frac{3}{5}$

Explanation: Given,

$6 \cot\theta + 2 \operatorname{cosec}\theta = \cot\theta + 5 \operatorname{cosec}\theta$

$\Rightarrow \quad 5 \cot\theta = 3 \operatorname{cosec}\theta$

$\Rightarrow \quad 5 \times \frac{\cos\theta}{\sin\theta} = 3 \times \frac{1}{\sin\theta}$

$\Rightarrow \quad \cos\theta = \frac{3}{5}$

4. *(d) No Solution*

Explanation: $x = 0$ is the y-axis and $x = 3$ is the line parallel to y-axis at a distance of 3 units from it. These lines do not meet anywhere. So, no solution exists.

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

Explanation: When two dice are thrown, total number of outcomes = $6 \times 6 = 36$

Number of possible outcome for getting same numbers on both dice = 6

$\therefore$ P(getting same number on both dice) = $\frac{6}{36} = \frac{1}{6}$

Since, P(getting same numbers) + P(getting different numbers) = 1

$\Rightarrow$ P(getting different numbers) = $1 - \frac{1}{6} = \frac{5}{6}$

6. *(b) 25 and 8*

Explanation: Let the two numbers be x and y, such that $x > y$.

$\therefore \quad x + y = 33$ ...(i)

and $\quad x - y = 17$ ...(ii)

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

$2x = 50 \Rightarrow x = 25$

On putting $x = 25$ in eq. (i), we get

$25 + y = 33$

$\Rightarrow \quad y = 33 - 25 \Rightarrow y = 8$

Hence, the two numbers are 25 and 8.

7. *(a) 1*

Explanation: Given, $\sin A + \sin^2 A = 1$

$\Rightarrow \quad \sin A = 1 - \sin^2 A = \cos^2 A$

$[\because \cos^2 A + \sin^2 A = 1]$

On squaring both sides, we get

$\sin^2 A = \cos^4 A$

$\Rightarrow \quad 1 - \cos^2 A = \cos^4 A$

$\Rightarrow \cos^2 A + \cos^4 A = 1$

8. *(d) 0.0216*

Explanation: We have,

$$\frac{27}{1250} = \frac{27}{2 \times 5^4}$$

$$= \frac{27 \times 2^3}{2 \times 2^3 \times 5^4} = \frac{27 \times 8}{2^4 \times 5^4}$$

$$= \frac{216}{(10)^4} = \frac{216}{10000} = 0.0216$$

9. *(b) 36*

Explanation: Let a and b be any two positive integers. Then, we have,

$\text{LCM}(a, b) \times \text{HCF}(a, b) = a \times b$

$\Rightarrow \quad \text{LCM}(a, b) \times 3 = 108$

$\Rightarrow \quad \text{LCM}(a, b) = \frac{108}{3} = 36$

10. *(c) p^2q*

Explanation: We have,

$p^3q^2 = p \times p \times p \times q \times q$

and $\quad p^2q = p \times p \times q$

$\therefore \quad \text{HCF} = p \times p \times q = p^2q$

11. *(a) 8*

Explanation: In ΔABC, DE || BC

$\therefore \quad \frac{AD}{DB} = \frac{AE}{EC}$ [By Thales theorem]

$\Rightarrow \quad \frac{2x-1}{x-3} = \frac{2x+5}{x-1}$

$\Rightarrow (2x - 1)(x - 1) = (2x + 5)(x - 3)$

$\Rightarrow 2x^2 - 2x - x + 1 = 2x^2 + 5x - 6x - 15$

$\Rightarrow \quad 2x = 16$

$\Rightarrow \quad x = 8$

Caution

➥ *Here DE || BC, so use the Thales theorem to find the value of x.*

12. *(a) 1 : 2*

Explanation: Let the required ratio be $k : 1$.

A(–2, 1) P(1, 2) B(7, 4)

k 1

Then, using section formula,

$$\frac{7k-2}{k+1} = 1$$

$\Rightarrow \quad 7k - 2 = k + 1 \Rightarrow 6k = 3$

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

$\therefore$ Required ratio $= \frac{1}{2} : 1 = 1 : 2$

13. *(a) $3^2 \times 5^2 \times 17$*

Explanation: We have

$3825 = 3 \times 3 \times 5 \times 5 \times 17$

$= 3^2 \times 5^2 \times 17$

14. *(b) 20*

Explanation : In right angled ΔBDA :

$(AB)^2 = (AD)^2 + (BD)^2$ ...(i)

[by Pythagoras theorem]

In right angled ΔCDA,

$(AC)^2 = (CD)^2 + (AD)^2$ ...(ii)

On subtracting Eq. (ii) from Eq. (i), we get

$(AB)^2 - (AC)^2 = (BD)^2 - (CD)^2$

$\therefore \quad (AB)^2 + (CD)^2 = (BD)^2 + (AC)^2$

$= 4 + 16 = 20$

15. *(d) 8*

Explanation:

We have, $\quad x + y = 30$ ...(i)

$\{\because$ ABCD is a rectangle$\}$

and $\quad x - y = 14$ ...(ii)

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

$2x = 44 \Rightarrow x = 22$

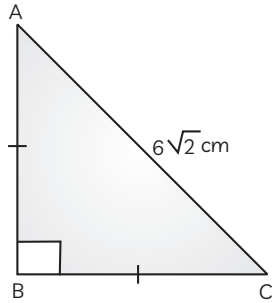
Putting $x = 22$ in equation (i), we get

$y = 30 - 22 = 8$

$\therefore \quad x = 22, y = 8$

16. *(b) 6 cm*

Explanation: Let ABC be a right angled triangle, right angled at B having AB = BC



In right angled ΔABC

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

[by Pythagoras theorem]

$\Rightarrow \quad (6\sqrt{2})^2 = (AB)^2 + (AB)^2 \quad [\because BC = AB]$

$\Rightarrow \quad 36 \times 2 = 2(AB)^2$

$\Rightarrow \quad AB^2 = 36$

On taking square root both sides, we get

$$AB = 6 \text{ cm}$$

Hence, the length of equal sides of a triangle is 6 cm.

Caution

➥ *Drawing of a correct figure, according to the conditions mentioned in the question, make it easy for solution.*

17. *(d)* $-\frac{9}{4}$

Explanation :

As $x = -\frac{1}{2}$ is a zero of $3x^2 + 2kx - 3$

$$\therefore \quad 3\left(-\frac{1}{2}\right)^2 + 2k\left(-\frac{1}{2}\right) - 3 = 0$$

$$\Rightarrow \quad \frac{3}{4} - k - 3 = 0$$

$$\Rightarrow \quad k = \frac{3}{4} - 3 = \frac{-9}{4}$$

18. *(b)* $\frac{1}{4}$

Explanation: Let E be the event of getting the sum of two numbers as a multiple of 4.

i.e., E = {(1, 3), (2, 2), (2, 6), (3, 1), (3, 5), (4, 4), (5, 3), (6, 2), (6, 6)}

$\therefore \quad n(E) = 9$

Here, total number of events, $n(S) = 36$

$$\therefore \text{ Required probability} = \frac{n(E)}{n(S)} = \frac{9}{36}$$

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

19. *(a) –10*

Explanation:

P(6, *a* –2) R(2, –4) Q(–2, 4)

As R is mid-point of PQ.

$\therefore$ Using mid-point formula, we have

$$y = \frac{y_1 + y_2}{2}$$

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

$$\Rightarrow \quad a + 2 = -8$$

$$\Rightarrow \quad a = -10$$

20. *(c) three place*

Explanation: $\frac{141}{120} = \frac{3 \times 47}{2^3 \times 3 \times 5} = \frac{47}{2^3 \times 5}$

When, $x = p/q$ is a rational number such that prime factorisation of q is of the form $2^m \times 5^n$, where m, n are non-negative integers, then, x has a decimal expansion which terminates after k places of decimals where k is the larger of m and n.

Here, $k = 3$

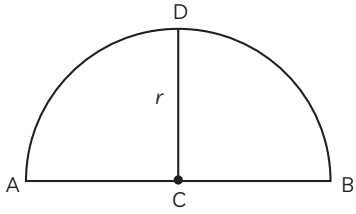
Hence, $\frac{141}{120}$ will terminate after 3 places of decimal

SECTION - B

21. *(b) 14 cm*

Explanation: Perimeter of a semicircular protactor = Perimeter of a semi-circle

$$= (2r + \pi r) \text{ cm}$$



Given, $2r + \pi r = 36$

$$\Rightarrow \quad r\left(2 + \frac{22}{7}\right) = 36$$

$$\Rightarrow \quad r\left(\frac{36}{7}\right) = 36 \Rightarrow r = 7 \text{ cm}$$

$\therefore$ Diameter = $2r = 2 \times 7 = 14$ cm.

22. *(b) 25*

Explanation: If we toss two unbaised coins simultaneously, the possible outcomes that will be obtained are : HH, HT, TH, TT.

$\therefore$ Total number of outcomes = 4

No head will be obtained if the event TT occurs.

$\therefore$ Number of favourable outcomes = 1

$\therefore$ Required probability = $\frac{1}{4}$

But, given probability = $\frac{A}{B}$

So, A = 1 and B = 4

Therefore, $(A + B)^2 = (1 + 4)^2 = (5)^2 = 25$

23. *(b)* $2\sqrt{13}$ *cm*

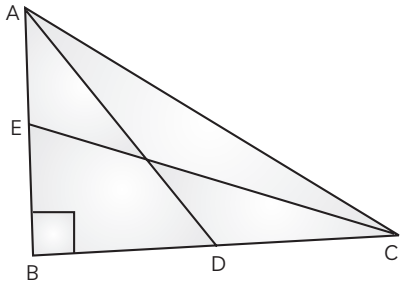
Explanation: Consider the right triangle ABC with $\angle B = 90°$

$$\therefore \quad AC^2 = AB^2 + BC^2$$

Also, AD and CE are medians

[where $BE = \frac{1}{2}$ AB and $BD = \frac{1}{2}$ BC]

$$\Rightarrow \quad AC^2 = 4BE^2 + 4BD^2$$



$= 4(CE^2 - BC^2) + 4(AD^2 - AB^2)$

$= 4CE^2 + 4AD^2 - 4(BC^2 + AB^2)$

$\Rightarrow \quad AC^2 = 4CE^2 + 4AD^2 - 4AC^2$

$\Rightarrow \quad 5AC^2 = 4CE^2 + 4AD^2$

Hence,

5 (hypotenuse)^2= 4 [sum of squares of medians of right tirangle]

$= 4\left[(5)^2 + \left(2\sqrt{10}\right)^2\right]$

$\Rightarrow$ hypotenuse $= \sqrt{\frac{4(25+40)}{5}} = \sqrt{52}$

$\therefore$ hypotenuse $= 2\sqrt{13}$ cm

24. *(a) –6*

Explanation: The given system of linear equations is

$cx + 3y - 3 = 0;\ 12x + cy - 6 = 0$

For no solution, $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$\frac{c}{12} = \frac{3}{c} \neq \frac{-3}{-6}$

Now, $\frac{c}{12} = \frac{3}{c} \Rightarrow c^2 = 36 \Rightarrow c = \pm 6$

Also, $\frac{3}{c} \neq \frac{-3}{-6} \Rightarrow \frac{3}{c} \neq \frac{1}{2} \Rightarrow c \neq 6$

$\therefore \quad c = -6$

25. *(a) 10 m*

Explanation: Radic of 2 circular parks will are $R_1 =$ = 8 m, $R_2 =$ = 6 m

Let, R be the radius of new circular park,

If the areas of two circles with radius R_1 and R_2 is equal to the area of circle with radius R, then

$R^2 = R_1^2 + R_2^2 = 8^2 + 6^2$

$= 64 + 36 = 100$

$R = 10$ m

26. *(b) cos θ*

Explanation: As $\tan\theta = \frac{a}{x}$

$\therefore$ Perpendicular = a and Base = x

$\Rightarrow$ Hypotenuse = $\sqrt{a^2 + x^2}$

So, $\frac{x}{\sqrt{a^2 + x^2}} = \frac{\text{Base}}{\text{Hypotenuse}} = \cos\theta$

27. *(b) 1*

Explanation: We have, $x = a\tan\theta$ and $y = b\sec\theta$.

$\Rightarrow \quad \tan\theta = \frac{x}{a}$ and $\sec\theta = \frac{y}{b}$

Putting these values in $\sec^2\theta - \tan^2\theta = 1$, we get $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$

Caution

➥ *Use the values of x and y and appropriate indentity to get the answer.*

28. *(a) 31 cm*

Explanation: Let the radius of new circle be r. Then

$2\pi r = 2\pi\left(\frac{34}{2}\right) + 2\pi\left(\frac{28}{2}\right)$

$\Rightarrow \quad r = 17 + 14 = 31$ cm

29. *(b) 4*

Explanation: Smallest prime number = 2

Smallest composite natural number = $4 = 2^2$

$\therefore$ LCM of 2, 4 is 4.

30. *(a) 46 min 12 sec*

$\therefore \quad 252 = 2^2 \times 3^2 \times 7$

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

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

$\therefore$ Required time = LCM (252, 308, 198)

$= 2^2 \times 3^2 \times 7 \times 11$

$= 2772$ s

Now, 1 min = 60 s

$\Rightarrow \quad 1\text{ s} = \frac{1}{60}$ min

$\therefore \quad 2772\text{ s} = \frac{2772}{60}$ min = 46 min 12s

Caution

➥ *While solving such type of questions, be peculiar about what is to be calculated i.e., HCF or LCM.*

31. *(b) 80°*

Explanation: Let the supplementary angles be x and y ($x > y$).

Now, $x + y = 180°$ ...(i)

and $x - y = 20°$ ...(ii)

From (ii), $y = x - 20°$ ...(iii)

Substituting the value of y from (iii) in (i), we get

$x + x - 20° = 180°$

$\Rightarrow \quad 2x = 200°$

$\Rightarrow \quad x = 100°$

Substituting $x = 100°$ in (iii), we get

$y = 100° - 20° = 80°$

Hence, the smaller angle is 80°.

32. *(a) 1*

Explanation: We have :

$(1 + \cot^2\theta)(1 - \cos\theta)(1 + \cos\theta)$

$= (1 + \cot^2\theta)(1 - \cos^2\theta) = \text{cosec}^2\theta \times \sin^2\theta$

$= \dfrac{1}{\sin^2\theta} \times \sin^2\theta = 1$

33. *(a) 4 cm*

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

$\therefore \quad \dfrac{AC}{PR} = \dfrac{\text{Perimeter of } \Delta ABC}{\text{Perimeter of } \Delta PQR}$ (by property)

$\Rightarrow \quad \dfrac{AC}{8} = \dfrac{20}{40}$

$\Rightarrow \quad AC = \dfrac{20 \times 8}{40} = 4 \text{ cm}$

34. *(c) 6*

Explanation: There are 13 letter in the word 'ASSASSINATION'

$\therefore$ Total number of outcomes = 13

There are 6 vowels in the word 'ASSASSINATION'

$\therefore$ Required probability $= \dfrac{6}{13}$

But given that,

$\dfrac{6}{2x+1} = \dfrac{6}{13}$

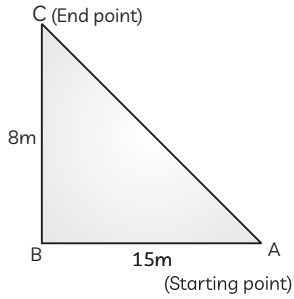
$\Rightarrow \quad 2x + 1 = 13$

$\Rightarrow \quad 2x = 13$

$\Rightarrow \quad x = 6$

35. *(d) 17 m*

Explanation: Let the shortest distance be AC.



By Pythagoras theorem, we have,

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

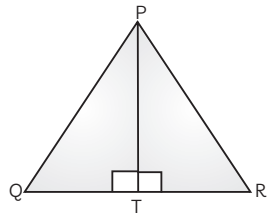
$= 15^2 + 8^2$

$= 225 + 64 = 289$

$\Rightarrow \quad AC = 17 \text{ m}$

36. *(a) 3 PQ^2*

Explanation: PT is an altitude of an equilateral ΔPQR.



Altitude of an equilateral triangle bisects the base.

$\therefore \quad QT = TR$ (as $PT \perp QR$)

In ΔPQT

$PQ^2 = PT^2 + QT^2$ (by pythagoras theorem)

$\therefore \quad PQ^2 = PT^2 + \left(\dfrac{QR}{2}\right)^2 \quad \left(\because QT = \dfrac{QR}{2}\right)$

$\Rightarrow \quad PQ^2 - \dfrac{PQ^2}{4} = PT^2 \quad (\because PQ = QR = PR)$

$\Rightarrow \quad 3PQ^2 = 4PT^2 \text{ or } 4PT^2 = 3PQ^2$

37. *(a) $\dfrac{22}{25}$*

Explanation: Total number of shirts = 100

Number of good shirts = 88

$\therefore$ P(Sumesh buys a good shirt) =

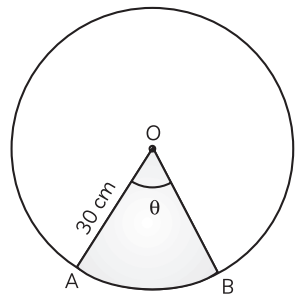
$\dfrac{88}{100} = \dfrac{22}{25}$

38. *(b) 37°*

Explanation: Radius of circle = 30 cm

Length of an $\overset{\frown}{AB} = \dfrac{\theta}{360°} \times 2\pi r$

where, θ is the angle subtended by the arc AB at the centre of circle.



$\therefore \quad 19 = \dfrac{\theta}{360} \times 2 \times \dfrac{22}{7} \times 30$

$\Rightarrow \quad \dfrac{19 \times 7 \times 180}{22 \times 30} = \theta$

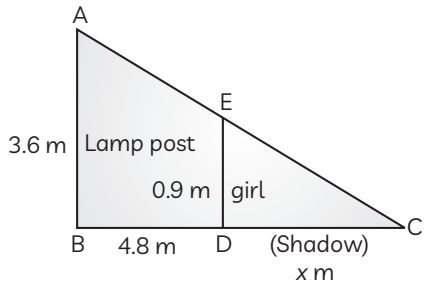
$\Rightarrow \quad 36.27° = \theta$

$\Rightarrow \quad \theta \simeq 37°$

39. *(a) 1.6 m*

Explanation : Here, AB is a lamp post and ED is the girl.

Speed of girl = 1.2 m/s



$\therefore$ In 4 seconds, travelled distance
$= 1.2 \times 4 = 4.8$ m

$\therefore$ After 4 seconds, she reaches at D.

$\therefore$ BD = 4.8 m

Let CD be the length of her shadow.

Now, $\angle ABD = \angle EDC = 90°$

$\therefore$ AB || ED

Hence, by BPT

$$\frac{AB}{ED} = \frac{BC}{DC}$$

$$\frac{3.6}{0.9} = \frac{4.8 + x}{x}$$

$$\Rightarrow \quad 4x = 4.8 + x$$

$$\Rightarrow \quad x = 1.6 \text{ m}$$

40. *(a) 5*

Explanation: We have,

$217x + 131y = 913$ ...(i)

$131x + 217y = 827$ ...(ii)

Adding (i) and (ii), we get

$348x + 348y = 1740$

$$\Rightarrow \quad x + y = \frac{1740}{348} = 5$$

Caution

➥ *Here, add the two given equations and cancel out common terms on both sides or to get the desired result. Don't indulge in lengthy calculations.*

SECTION - C

41. *(b) G*

Explanation: The abscissa, *i.e.*, *x*-coordinate of G is 0 as it lies on *y*-axis.

42. *(a)* $4\sqrt{2}$ *units*

Explanation: Distance between C(–3, 2) and B (1, 6)

$$= \sqrt{(1+3)^2 + (6-2)^2} = \sqrt{16+16}$$

$$= 4\sqrt{2} \text{ units.}$$

43. *(b) J*

Explanation: Coordinates of the required player are (2, –6) or (2, 6) and J is at (2, –6).

44. *(c)* $x = -2, y = 2$

Explanation: Let (x, y) is the mid-point of A (–3, 5) and H(–3, – 1).

So, $$x = \frac{-3-3}{2} = \frac{-6}{2} = -3$$

and $$y = \frac{5-1}{2} = \frac{4}{2} = 2$$

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

45. *(c) (3, –4)*

Explanation: If player F is shifted to IV Quadrant symmetric to D *w.r.t.* *x*-axis, then coordinates of F are (3, –4).

46. *(c) parabolic*

Explanation: The shape of the curve CDE is parabolic.

47. *(a) 3, 4*

Explanation: Let $p(x) = x^2 - 7x + 12$

$= x^2 - (4 + 3)x + 12$

$= x^2 - 4x - 3x + 12$

$= x(x - 4) - 3(x - 4)$

$= (x - 3)(x - 4)$

For finding the zeroes, put $p(x) = 0$

$$\Rightarrow \quad (x - 3)(x - 4) = 0$$

$$\Rightarrow \quad x = 3, 4$$

48. *(a)* $x^2 + 2x - 8$

Explanation: Given zeroes are $\alpha = 2$ and $\beta = -4$

Now, the equation is

$x^2 - (\alpha + \beta)x + \alpha\beta = x^2 - (2 - 4)x + (2)(-4)$

$= x^2 + 2x - 8$

49. *(d) 4*

Explanation: In the given graph, we see that curve intersect the *x*-axis at four points. So the number zeroes of the curve is 4.

50. *(b) 2*

Explanation: Let $g(x) = x^2 + 8x + 5$

$= x^2 + (5 + 3)x + 15$

$= x^2 + 5x + 3x + 15$

$= x(x + 5) + 3(x + 5)$

$= (x + 3)(x + 5)$

For find the zeroes, put $g(x) = 0$

$$\Rightarrow \quad (x + 3)(x + 5) = 0$$

$$\Rightarrow \quad x = -3, -5$$

$\therefore$ The distance between A and F

$= |-5 - (-3)|$

$= |-5 + 3|$

$= |-2| = 2$