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# 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 largest number which on dividing 70 and 125 leaves remainders 5 and 8, respectively, is:

(a) 5 (b) 13
(c) 9 (d) 11

**2.** If $k + 1 = \sec^2 A(1 - \sin A)(1 + \sin A)$, then the value of $k$ is:

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

**3.** Find the length of diagonals of a rectangle AOBC whose three vertices are A(0, 3), O(0, 0) and B(5, 0).

(a) $\sqrt{23}$ units (b) 5 units
(c) $\sqrt{21}$ units (d) $\sqrt{34}$ units

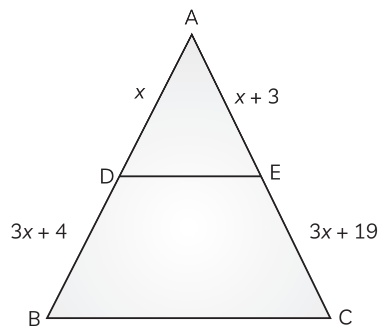
**4.** A wire, bent in the form of a square, encloses an area of 121 $cm^2$. If the same wire is bent in the form of a circle, then the circumference of the circle is:

(a) 11 cm (b) 22 cm
(c) 33 cm (d) 44 cm

**5.** If the distance between the points A(–3, –14) and B($p$, –5) is 9 units, then the value of $p$ is:

(a) 1 (b) –7
(c) –3 (d) 5

**6.** In the given figure, DE || BC. The value of $x$ is:




(a) 2 (b) 4
(c) 7 (d) 11

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

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

**8.** 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

**9.** If the diameter of a wheel is 1.54 m, then the distance covered by it in 100 revolutions is:

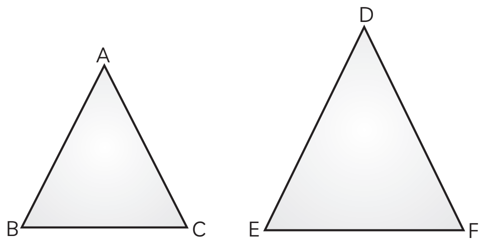
(a) 143 m (b) 275 m
(c) 484 m (d) 396 cm

**10.** 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.

**11.** 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

**12.** Evaluate the zeroes of the polynomial $2x^2 + 14x + 20$.
(a) –2, –5 (b) 2, 5
(c) –2, 5 (d) –5, 2

**13.** Given two triangles ABC and DEF. If $\triangle ABC \sim \triangle DEF$, 2AB = DE and BC = 8 cm, then find the length of EF.




(a) 10 cm (b) 12 cm
(c) 8 cm (d) 16 cm

**14.** Find the value of $(x, y)$, if centroid of the triangle with vertices $(x, 0)$, $(0, y)$ and (6, 3) is (3, 4).
(a) (3, 0) (b) (6, 6)
(c) (3, 9) (d) (–6, 8)

**15.** In which quadrant does the mid-point of the line segment joining the points (–1, 2) and (3, 4) lies?
(a) I (b) II
(c) III (d) IV

**16.** If $\frac{241}{4000} = \frac{241}{2^m \times 5^n}$, then find the value of $m + n$, where $m$ and $n$ are non-negative integers.
(a) 10 (b) 8
(c) 6 (d) 7

**17.** Evaluate the value of $\frac{1}{\tan A} + \frac{\sin A}{1 + \cos A}$, if cosec A = 2.
(a) 2 (b) 0
(c) 1 (d) –1

**18.** 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

**19.** Calculate the value of $x$, if LCM $(x, 18) = 36$ and HCF $(x, 18) = 2$.
(a) 4 (b) 8
(c) 2 (d) 6

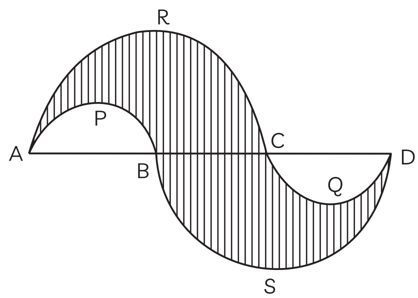
**20.** The value of $\frac{\sin^3\theta + \cos^3\theta}{\sin\theta + \cos\theta} + \sin\theta\cos\theta$ is:
(a) $\sin\theta\cos\theta$ (b) $\tan\theta$
(c) $\cot\theta$ (d) 1

## SECTION - B **16 marks**

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

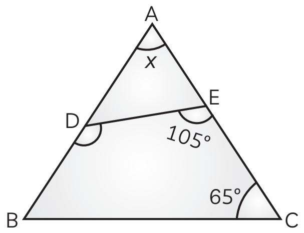
**21.** Rajesh and Mahesh are playing a game. In this game, each player throws two dice and note down the numbers on the dice. By the rules of the game, Mahesh needs to get two numbers such that their product is a perfect square, in order to win the game. What is the probability that Mahesh will win the game?
(a) $\frac{1}{9}$ (b) $\frac{2}{9}$
(c) $\frac{1}{3}$ (d) $\frac{2}{7}$

**22.** In the given figure, if AB = BC = CD = 7 cm, then the perimeter of shaded region is:




(a) 21 cm (b) 42 cm
(c) 35 cm (d) 66 cm

**23.** What is the value of $x$, if $\triangle ADE \sim \triangle ACB$, $\angle DEC = 105°$ and $\angle ECB = 65°$?




(a) 45° (b) 60°
(c) 13° (d) 40°

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

(a) 6.4 cm (b) 8.8 cm
(c) 9.6 cm (d) 7.6 cm

**25.** Find the value of $\frac{1}{\alpha}+\frac{1}{\beta}$, if $\alpha$ and $\beta$ are the zeroes of the polynomial $x^2 + x + 1$.

(a) 1 (b) 0
(c) –1 (d) 2

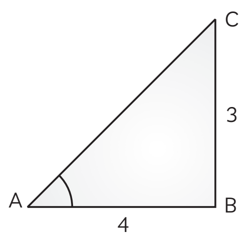
**26.** On choosing a number $x$ from the numbers 1, 2, 3 and a number $y$ from the numbers 1, 4, 9, the probability of P($xy$ < 9) is:

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

**27.** Find the value of $n$ if $a = 2^3 \times 3$, $b = 2 \times 3 \times 5$, $c = 3^n \times 5$ and LCM ($a$, $b$, $c$) = $2^3 \times 3^2 \times 5$.

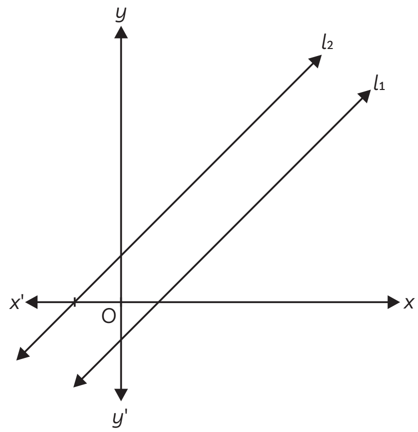
(a) 1 (b) 2
(c) 3 (d) 4

**28.** From the following figure, the value of sin A cos A + sin C cos C is:




(a) $\frac{12}{5}$ (b) $\frac{24}{25}$
(c) $\frac{7}{12}$ (d) $\frac{7}{24}$

**29.** The number of solutions of the pair of linear equations, shown in the graph is:




(a) Infinite (b) Two
(c) Unique (d) No solution

**30.** Consider a $\triangle$ABC, where DE || BC. If DE = $\frac{2}{3}$ BC and area of $\triangle$ABC = 81 cm$^2$, then the area of $\triangle$DAE is:

(a) 24 cm$^2$ (b) 16 cm$^2$
(c) 36 cm$^2$ (d) 32 cm$^2$

**31.** ABC is an isosceles triangle, which is right angled at B with AB = 4 cm. What is the length of AC?

(a) 2 cm (b) $2\sqrt{2}$ cm
(c) 4 cm (d) $4\sqrt{2}$ cm

**32.** *Amit and Prem are very good cricketers and also represented their school team at district and even state levels. One day, after their match, they measured the height of the wickets and found it to be 28 inches. They marked a point P on the ground as shown in the figure below:*


If cot P = $\frac{3}{4}$, the length of PQ is:

(a) 3 in (b) 7 in
(c) 21 in (d) 35 in

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

(a) only factor (b) LCM
(c) HCF (d) The two factors

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

(a) 7 (b) 1
(c) 8 (d) 5

**35.** An arc of length of length 19 cm of a circle of radius 30 cm, subtends an angle $\theta$ at the centre O. The value of $\theta$ is:

(a) 30° (b) 37°
(c) 45° (d) 52°

**36.** Evaluate $\sin^2\theta - \cos^2\theta$, if $\sqrt{3}\tan\theta = 3\sin\theta$, $\theta \neq 0$ and $\theta$ is an acute angle.

(a) 1 (b) $\frac{1}{3}$
(c) $-\frac{1}{3}$ (d) $-1$

**37.** How many zeroes will be there for the polynomial $f(x) = (x-2)^2 + 4$?

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

**38.** Calculate the minimum number by which $\sqrt{8}$ should be multipled so as to get a rational number.

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

**39.** 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°

**40.** If $\triangle ABC \sim \triangle PQR$, then evaluate the length of AC, if perimeter of $\triangle ABC$ = 20 cm, perimeter of $\triangle PQR$ = 40 cm and PR = 8 cm.

(a) 4 cm (b) 6 cm
(c) 10 cm (d) 3 cm

## SECTION - C **8 marks**

### (Case Study Based Questions.)

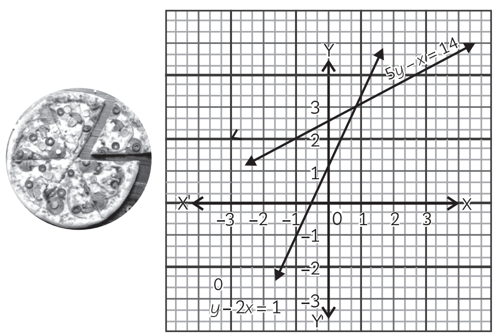
*(Section C consists of 10 questions of 1 mark each. Any 8 questions are to be attempted.)*

**Q. 41-45 are baded on Case Study–1**

**Case Study–1:**

*Sam went for an outing with his friends.They went to dominos to enjoy the delicious pizza. He was enjoying the pizza with his friends and share with them by slicing it. During slicing the pizza, he noticed that the pair of linear equations formed. (i.e., straight lines)*

*Let these pair of linear equations be $y - 2x = 1$ and $5y - x = 14$.*




**41.** What is the point of intersection of the lines represented by the equations $y - 2x = 1$ and $5y - x = 14$?

(a) (1, 3) (b) (6, 4)
(c) (–2, 3) (d) (–4, 2)

**42.** At what point, does the linear equation $y - 2x = 1$ intersect the $y$-axis?

(a) (0, 1) (b) $\left(-\frac{1}{2}, 0\right)$
(c) $\left(0, \frac{14}{5}\right)$ (d) (0, –14)

**43.** The system of linear equations $2x - 3y + 6 = 0$ and $2x + 3y - 18 = 0$:

(a) has infinitely many solutions
(b) has no solution
(c) has a unique solution
(d) May or may not have a solution

**44.** For what value(s) of $k$, the system of linear equations $2x - ky + 3 = 0$ and $3x + 2y - 1 = 0$ has no solution?

(a) –6 (b) 6
(b) $\frac{4}{3}$ (d) $-\frac{4}{3}$

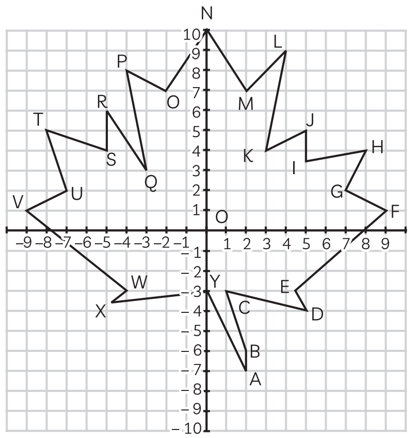
**45.** If a pair of linear equations in two variables is inconsistent, then the lines represented by two equations are:

(a) parallel
(b) intersecting
(c) always coincident
(d) Intersecting or coincident

**Q. 46-50 are baded on Case Study–2**

**Case Study–2:**

*Shyla is a very talented lady. She is always interested in doing something creative in her free time after the household work. She embroidered a leaf by knitting on her table cloth. Her son trace the design on a coordinate plane as shown below.*




**46.** **Find the ratio in which C divides the line joining W and E.**

(a) 5 : 4 (b) 5 : 3

(c) 2 : 5 (d) 1 : 1

**47.** **What is the ratio in which $x$-axis divides the line joining the points P and D?**

(a) 1 : 1 (b) 4 : 5

(c) 2 : 1 (d) 8 : 3

**48.** **What is the ratio in which $y$-axis divides the line joining the points L and U?**

(a) 1 : 4 (b) 7 : 9

(c) 4 : 7 (d) 9 : 2

**49.** **What is the distance of point K from the origin?**

(a) 3 units (b) 5 units

(c) 7 units (d) 10 units

**50.** **From the given points, the mid-point of which doesn't lie on $y$-axis?**

(a) U and G (b) P and L

(c) Q and K (d) U and F

# SOLUTION

## SAMPLE PAPER - 5

## SECTION - A

**1.** *(b) 13*

**Explanation:**

Required number = HCF (70 – 5, 125 – 8)

= HCF (65, 117)

$\because$ 65 = 5 × 13

and 117 = $3^2$ × 13

$\therefore$ Required number = 13.

**2.** *(a) 0*

**Explanation:** We have,

$$k + 1 = \sec^2 A(1 - \sin A)(1 + \sin A)$$

$$= \sec^2 A(1 - \sin^2 A)$$

$$[\because (a - b)(a + b) = a^2 - b^2]$$

$$= \sec^2 A \,.\, \cos^2 A$$

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

$$= \frac{1}{\cos^2 A} \times \cos^2 A$$

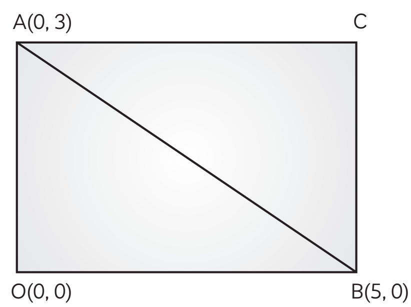
$$\left[\because \sec\theta = \frac{1}{\cos\theta}\right]$$

$$\Rightarrow \quad k + 1 = 1$$

$$\Rightarrow \quad k = 0$$

**3.** *(d) $\sqrt{34}$ units*

**Explanation:** Length of diagonal = AB = $\sqrt{(5-0)^2 + (0-3)^2} = \sqrt{25+9} = \sqrt{34}$




**Concept Applied**

➥ *Diagonals of a rectangle are equal in length.*

**4.** *(d) 44 cm*

**Explanation:** Let $a$ be the side of the square.

Then, $a^2 = 121 \text{ cm}^2$ [Given]

$\therefore$ $a = \sqrt{121} = 11$

Perimeter of square = $4a = 4 \times 11 = 44$ cm

= Circumference of the circle

**5.** *(c) –3*

**Explanation:**

$\because$ AB = 9 units

$\therefore$ Using distance formula,

$$\sqrt{(p+3)^2 + (-5+14)^2} = 9$$

$\Rightarrow$ $(p + 3)^2 + (9)^2 = 81$ [squaring both sides]

$\Rightarrow$ $(p + 3)^2 + 81 = 81$

$\Rightarrow$ $(p + 3)^2 = 0$

$\Rightarrow$ $p + 3 = 0 \Rightarrow p = -3$

**6.** *(a) 2*

**Explanation:** DE || BC

$\therefore$ By Thale's theorem,

$$\frac{AD}{BD} = \frac{AE}{CE}$$

$\Rightarrow$ $\dfrac{x}{3x+4} = \dfrac{x+3}{3x+19}$

$\Rightarrow$ $x(3x + 19) = (3x + 4)(x + 3)$

$\Rightarrow$ $3x^2 + 19x = 3x^2 + 13x + 12$

$\Rightarrow$ $6x = 12 \Rightarrow x = 2$

**7.** *(a) 0*

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

**8.** *(c) 6*

**Explanation:** There are 13 letters 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,

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

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

$\Rightarrow$ $2x = 12$

$\Rightarrow$ $x = 6$

**9.** *(c) 484 m*

**Explanation:** Diameter of wheel = 1.54 m

$\therefore$ Radius of wheel = $\dfrac{1.54}{2}$ m

Now, Distance covered by it in one revolution

= Circumference of the wheel

$\therefore$ Distance covered by it in 100 revolutions

= 100 × Circumference of wheel

= $100 \times 2\pi r$

= $100 \times 2 \times \dfrac{22}{7} \times \dfrac{1.54}{2}$

= 484 m

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

**Explanation:** We have,

$50 = 2 \times 5^2$

$48 = 2^4 \times 3$

Time after which they beep together

= 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.

**11.** *(b)* $\dfrac{1}{4}$

**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)}

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

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

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

$= \dfrac{1}{4}$

**12.** *(a) –2, –5*

**Explanation:** Let

$p(x) = 2x^2 + 14x + 20$

$= 2(x^2 + 7x + 10)$

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

[by splitting the middle term]

$= 2[x(x + 5) + 2(x + 5)]$

$= 2(x + 2)(x + 5)$

To determine the zeroes, Put $p(x) = 0$

$\Rightarrow$ $2(x + 2)(x + 5) = 0$

$\therefore$ $x = -2$ and $x = -5$

Hence, the zeroes of the given polynomial are –2 and –5.

**13.** *(d) 16 cm*

**Explanation:** $\because$ $\Delta ABC \sim \Delta DEF$ [Given]

$\therefore$ $\dfrac{AB}{DE} = \dfrac{BC}{EF}$

$\Rightarrow$ $\dfrac{AB}{2AB} = \dfrac{8}{EF}$ [$\because$ DE = 2AB]

$$\Rightarrow \quad \frac{1}{2} = \frac{8}{EF}$$

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

**14.** *(c) (3, 9)*

**Explanation:** Since, (3, 4) is the centroid of a triangle with vertices ($x$, 0), (0, $y$) and (6, 3).

$$\therefore \quad 3 = \frac{x+0+6}{3} \text{ and } 4 = \frac{0+y+3}{3}$$

$$\Rightarrow \quad x = 3 \text{ and } y = 9$$

$$\therefore \quad (x, y) = (3, 9)$$

**15.** *(a) I*

**Explanation:**

Mid-point of line segment

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

$\therefore$ (1, 3) lies in quadrant I.

**16.** *(b) 8*

**Explanation:** Given

$$\frac{241}{4000} = \frac{241}{2^m \times 5^n}$$

$$\Rightarrow \quad \frac{241}{2^5 \times 5^3} = \frac{241}{2^m \times 5^n}$$

On comparing, we have $m = 5$, $n = 3$

$$\therefore \quad m + n = 5 + 3 = 8$$

**17.** *(a) 2*

**Explanation:** Given: cosec A = 2 $\Rightarrow$ A = 30°

$$\therefore \frac{1}{\tan A} + \frac{\sin A}{1+\cos A} = \frac{1}{\tan 30^\circ} + \frac{\sin 30^\circ}{1+\cos 30^\circ}$$

$$= \frac{1}{\frac{1}{\sqrt{3}}} + \frac{\frac{1}{2}}{1+\frac{\sqrt{3}}{2}}$$

$$= \sqrt{3} + \frac{\frac{1}{2}}{\frac{2+\sqrt{3}}{2}}$$

$$= \sqrt{3} + \frac{1}{2+\sqrt{3}} \times \frac{2-\sqrt{3}}{2-\sqrt{3}}$$

$$= \sqrt{3} + \frac{2-\sqrt{3}}{4-3}$$

$$= \sqrt{3} + 2 - \sqrt{3} = 2$$

**Caution**

- *Learning of trigonometric values for some standard angles is needed.*

**18.** *(a) 4*

**Explanation:** Let one of the zeroes of the polynomial be $\alpha$.

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

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

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

$$\Rightarrow \quad k - 1 = 3$$

$$\Rightarrow \quad k = 4$$

**19.** *(a) 4*

**Explanation:** We have,

$$\text{LCM}(x, 18) \times \text{HCF}(x, 18) = x \times 18$$

$$\Rightarrow \quad 36 \times 2 = 18x$$

$$\Rightarrow \quad x = \frac{36 \times 2}{18}$$

$$\therefore \quad x = 4$$

**20.** *(d) 1*

**Explanation:** We have,

$$\frac{\sin^3\theta + \cos^3\theta}{\sin\theta + \cos\theta} + \sin\theta\cos\theta$$

$$= \frac{(\sin\theta + \cos\theta)(\sin^2\theta + \cos^2\theta - \sin\theta\cos\theta)}{\sin\theta + \cos\theta} + \sin\theta\cos\theta$$

$$[\because a^3 + b^3 = (a+b)(a^2 + b^2 - ab)]$$

$$= (\sin^2\theta + \cos^2\theta - \sin\theta\cos\theta) + \sin\theta\cos\theta$$

$$= (1 - \sin\theta\cos\theta) + \sin\theta\cos\theta$$

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

$$= 1$$

# SECTION - B

**21.** *(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 $\frac{2}{9}$

**22.** *(d) 66 cm*

**Explanation:** Perimeter of shaded region = Length of semi-circular arc APB + Length of semi-circular arc ARC + Length of semi-circular arc BSD + Length of semi-circular arc CQD

$$= \pi\left(\frac{AB}{2}\right)+\pi\left(\frac{AC}{2}\right)+\pi\left(\frac{BD}{2}\right)+\pi\left(\frac{CD}{2}\right)$$

$$= \pi\left(\frac{7}{2}\right)+\pi\left(\frac{14}{2}\right)+\pi\left(\frac{14}{2}\right)+\pi\left(\frac{7}{2}\right)$$

$$= \pi(3.5 + 7 + 7 + 3.5)$$

$$= \frac{22}{7} \times 21$$

$$= 66 \text{ cm}$$

**23.** *(d) 40°*

**Explanation:**

$\because \quad \Delta ADE \sim \Delta ACB$ [Given]

$\therefore \quad \angle ACB = \angle ADE = 65°$

Also, $\angle AED = 180° - 105° = 75° = \angle ABC$

In $\Delta ADE$,

$\angle ADE + \angle AED + \angle DAE = 180°$

$\Rightarrow \quad 65° + 75° + \angle DAE = 180°$

$\Rightarrow \quad \angle DAE = 180° - 140° = 40°$

**24.** *(b) 8.8 cm*

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

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

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

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

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

$$\Rightarrow \quad x = 8.8$$

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

**25.** *(c) –1*

**Explanation:** $\alpha$ and $\beta$ are the zeroes of the polynomial $x^2 + x + 1$.

$\therefore \quad \alpha + \beta = -1$

and $\quad \alpha\beta = 1$

Now $\quad \dfrac{1}{\alpha}+\dfrac{1}{\beta} = \dfrac{\alpha+\beta}{\alpha\beta} = -1$

**26.** *(a)* $\frac{5}{9}$

**Explanation:** Total number of possible cases = $3 \times 3 = 9$.

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

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

**27.** *(b) 2*

**Explanation:** We have,

$a = 2^3 \times 3,\ b = 2 \times 3 \times 5,\ c = 3^n \times 5$

$\therefore \quad \text{LCM }(a, b, c) = 2^3 \times 3^n \times 5$

$\Rightarrow \quad 2^3 \times 3^n \times 5 = 2^3 \times 3^2 \times 5$

$\Rightarrow \quad n = 2$

**28.** *(b)* $\frac{24}{25}$

**Explanation:** In $\Delta ABC$, using Pythagoras theorem,

$$AC^2 = AB^2 + BC^2$$
$$= 4^2 + 3^2$$
$$= 16 + 9 = 25$$

$$\therefore \quad AC = \sqrt{25} = 5$$

Now,

$$\sin A \cos A + \sin C \cos C = \frac{BC}{AC} \times \frac{AB}{AC} + \frac{AB}{AC} \times \frac{BC}{AC}$$

$$= 2 \times \frac{BC}{AC} \times \frac{AB}{AC}$$

$$= 2 \times \frac{3}{5} \times \frac{4}{5} = \frac{24}{25}$$

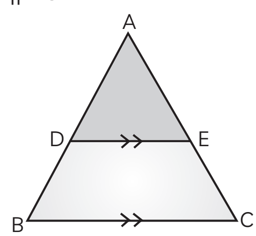
**29.** *(d) No solution*

**Explanation:** In the graph, the pair of linear equations represent parallel lines. Since, parallel lines never intersect, so they have no solution.

**30.** *(c) 36 cm²*

**Explanation:** Here, $DE = \frac{2}{3}$ BC

And DE || BC




$\therefore \quad \Delta ADE \sim \Delta ABC$

(by AA similarity)

$$\therefore \quad \frac{AD}{AB} = \frac{AE}{AC} = \frac{DE}{BC}$$

Also,

$$\frac{ar(\triangle ADE)}{ar(\triangle ABC)} = \frac{DE^2}{BC^2} = \left(\frac{2}{3}\right)^2$$

$$= \frac{4}{9}$$

$$\Rightarrow \quad \frac{ar(\Delta ADE)}{81} = \frac{4}{9}$$

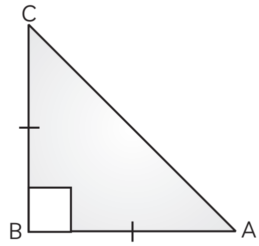
$$\Rightarrow \quad ar(\Delta DAE) = 36 \text{ cm}^2$$

**31.** *(d)* $4\sqrt{2}$ *cm*

**Explanation:** Since $\Delta ABC$ is an isosceles,

then, $AB = BC$.

$\therefore$ $AB = BC = 4$ cm




Using Pythagoras theorem, we have

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

$$= (4)^2 + (4)^2$$

$$= 16 + 16$$

$$\Rightarrow \quad AC^2 = 32$$

$$AC = \sqrt{32} = 4\sqrt{2} \text{ cm}$$

**32.** *(c) 21 in*

**Explanation:** It is given that $QR = 28$ in and $\cot P = \frac{3}{4}$.

We know that, $\cot P = \frac{\text{Base}}{\text{Perpendicular}}$

$$= \frac{PQ}{QR} = \frac{PQ}{28}.$$

Therefore, $\frac{PQ}{28} = \frac{3}{4} \Rightarrow PQ = \frac{28 \times 3}{4} = 21$ in.

**33.** *(c) HCF*

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

**34.** *(c) 8*

**Explanation :** We have,

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

Now, sum of the zeroes = 7

Since, one of the zero is – 1.

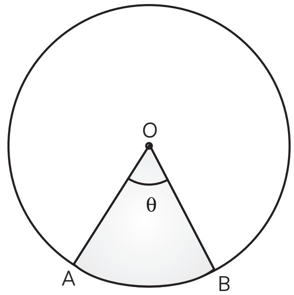
$\therefore$ Other zero = 7 – (– 1) = 7 + 1 = 8

**35.** *(b) 37°*

**Explanation: Radius of circle = 30 cm**

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

where, $\theta$ is the angle subtended by the arc AB at the centre of circle.




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

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

$$\Rightarrow \quad 36.27° = \theta$$

$$\Rightarrow \quad \theta \simeq 37°$$

**36.** *(b)* $\frac{1}{3}$

**Explanation:** We have, $\sqrt{3} \tan\theta = 3\sin\theta$

$$\Rightarrow \quad \sqrt{3}\frac{\sin\theta}{\cos\theta} = 3\sin\theta$$

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

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

$$\therefore \quad \cos\theta = \frac{1}{\sqrt{3}} \quad \text{...(i)}$$

Now, $\sin^2\theta - \cos^2\theta = 1 - \cos^2\theta - \cos^2\theta$

$$= 1 - 2\cos^2\theta$$

$$= 1 - 2 \times \left(\frac{1}{\sqrt{3}}\right)^2 \text{ [Using (i)]}$$

$$= 1 - \frac{2}{3} = \frac{1}{3}$$

**37.** *(a) 0*

**Explanation:** The given polynomial is

$$f(x) = (x - 2)^2 + 4$$

For zeroes, put $f(x) = 0$

$$\Rightarrow \quad (x - 2)^2 + 4 = 0$$

$$\Rightarrow \quad (x - 2)^2 = -4$$

Which is not possible,

Hence, this polynomial has no zeroes.

**38.** *(a)* $\sqrt{2}$

**Explanation:** The smallest number will be $\sqrt{2}$.

Because, $\sqrt{8} \times \sqrt{2} = \sqrt{16} = 4$, which is rational.

**39.** *(d) 60°*

**Explanation:** We have,

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

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

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

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

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

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

$$\Rightarrow \quad x = 60°$$

**40.** *(a) 4 cm*

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

$$\therefore \quad \frac{AC}{PR} = \frac{\text{Perimeter of } \Delta ABC}{\text{Perimeter of } \Delta PQR}$$

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

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

# SECTION - C

**41.** *(a) (1, 3)*

**Explanation:** From the graph, it is clear that lines are intersecting at a point (1, 3).

$\therefore$ Point of intersection of lines is (1, 3).

**42.** *(a) (0, 1)*

**Explanation:** From the figure, it is clear that the equation $y - 2x = 1$ is intersecting $y$-axis at (0, 1).

**43.** *(c) has a unique solution*

**Explanation:** We have system of linear equations

$$2x - 3y + 6 = 0$$

and $$2x + 3y - 18 = 0$$

$$\therefore \quad \frac{a_1}{a_2} = \frac{2}{2} = 1, \quad \frac{b_1}{b_2} = -\frac{3}{3} = -1$$

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

$\therefore$ It has a unique solution.

**44.** *(d)* $-\frac{4}{3}$

**Explanation:** Given system of linear equations

$$2x - ky + 3 = 0 \text{ and } 3x + 2y - 1 = 0$$

For no solution, we have,

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

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

$$\Rightarrow \quad \frac{2}{3} = -\frac{k}{2}$$

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

**45.** *(a) parallel*

**Explanation:** When two lines are parallel then the pair of the linear equations is inconsistent *i.e.*, no solution.

**46.** *(b) 5 : 3*

**Explanation:** Clearly, the coordinates of W, C and E are (–4, –3), (1, –3) and (4, –3), respectively.

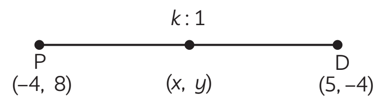
Since, WC = 5 units and CE = 3 units

$\therefore$ C divides the line joining W and E in the ratio 5 : 3.

**47.** *(c) 2 : 1*

**Explanation:** Clearly, the coordinates of P and D are (–4, 8) and (5, –4) respectively.

Let the $x$-axis divides the join of P and D at point $(x, y)$ in the ratio of $k : 1$.




Then, $$y = \frac{-4k+8}{k+1}$$

But $(x, y)$ lies on $x$-axis, therefore $y = 0$

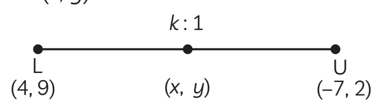
$\Rightarrow -4k + 8 = 0 \Rightarrow 4k = 8 \Rightarrow k = 2$

Thus, the required ratio is 2 : 1.

**48.** *(c) 4 : 7*

**Explanation:** Clearly, the coordinates of L and U are (4, 9) and (–7, 2) respectively.

Let the $y$-axis divides the join of L and U at the point $(x, y)$ in the ratio $k : 1$.




Then, $$x = \frac{-7k+4}{k+1}$$

But $(x, y)$ lies on $y$-axis, therefore $x = 0$

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

$$\Rightarrow \quad 7k = 4$$

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

Thus, the required ratio is 4 : 7.

**49.** *(b) 5 units*

**Explanation:** Coordinates of K are (3, 4), therefore its distance from origin

$$= \sqrt{3^2 + 4^2} = \sqrt{9 + 16} = \sqrt{25} = 5 \text{ units}$$

**50.** *(d) U and F*

**Explanation:** Clearly the coordinates of U and G are (–7, 2) and (7, 2) respectively, therefore their mid-point is (0, 2), which lies on $y$-axis.

Also, the coordinates of P and L are (–4, 8) and (4, 9) respectively, therefore their mid-point is $\left(0, \frac{17}{2}\right)$, which also lies on $y$-axis.

And, the coordinates of Q and K are (–3, 3) and (3, 4) respectively, therefore, thier mid-point is $\left(0, \frac{7}{2}\right)$ which also lies on $y$-axis.

Lastly, the coordinates of U and F are (–7, 2) and (9, 1) respectively, therefore, their mid-point is $\left(1, \frac{3}{2}\right)$ which doesn't lie on $y$-axis.