# 5

## 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 $(1 - p)$ is a zero of the polynomial $x^2 + px + 1 - p = 0$, then find both zeroes of the polynomial.

(a) 0, –1 (b) 1, –1
(c) 1, 0 (d) 0, 0

**2.** How many solution does the pair of equations $x + y = 1$ and $x + y = -5$ have?

(a) Unique (b) No Solution
(c) Infinitely many (d) Can't decide

**3.** Which of the following is wrong in case of representation of probability in percentage

(a) Less than 100 (b) Less than 0
(c) Less than 1 (d) Equal to 0

**4.** Calculate the point in which the pair of equation $4^{x+y} = 256$ and $256^{x-y} = 4$ will be intersected.

(a) $\left(\frac{1}{8}, \frac{17}{18}\right)$ (b) $\left(\frac{13}{8}, \frac{15}{8}\right)$
(c) $\left(\frac{17}{8}, \frac{15}{8}\right)$ (d) $\left(\frac{13}{8}, \frac{11}{8}\right)$

**5.** What is the perimeter of triangle having vertices (0, 4), (0, 0) and (3, 0)?

(a) 10 units (b) 15 units
(c) 12 units (d) 9 units

**6.** 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

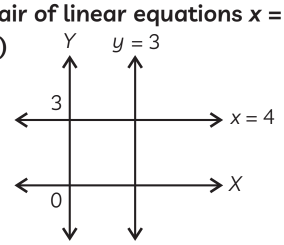
**7.** A child has a die whose 6 face show, the letters given below:

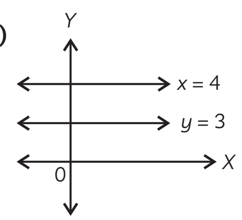
| A | B | C | A | A | B |
|---|---|---|---|---|---|

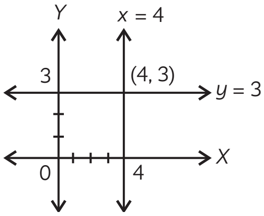
If the die is thrown once, what is the probability of getting B?

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

**8.** Show the graphical representation of given pair of linear equations $x = 4$ and $y = 3$.

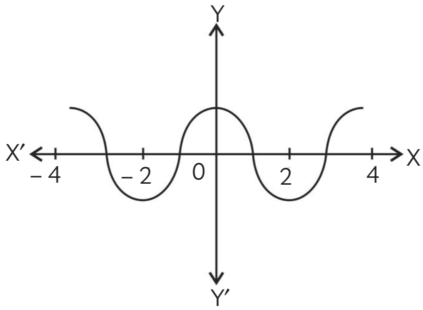
(a)



(b)


(c) 

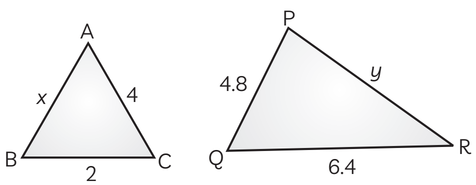

(d) None of these

**9.** **Calculate the number of zeroes lying between –2 to 2 of the polynomial $f(x)$, whose graph is shown below.**




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

**10.** **What is value of $x + y$, if $\Delta ABC$ and $\Delta PQR$ are similar?**




(a) 12.8 cm (b) 14.3 cm
(c) 12.5 cm (d) 14 cm

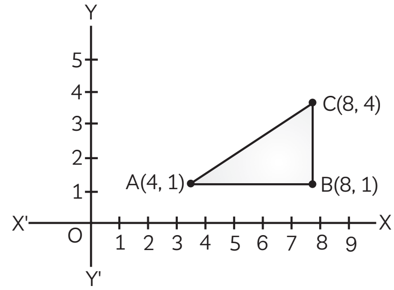
**11.** **Find the value(s) of $k$, if one of the zeroes of the polynomial $f(x) = (k^2 + 8)x^2 + 13x + 6k$ is reciprocal of the other.**

(a) 2, 4 (b) 3, 5
(c) 1, 3 (d) –1, 1

**12.** **A circle, has its centre at (–1, 3). If one end of a diameter of the circle has co-ordinates (2, 5), then find the co-ordinates of the other end of the diameter.**

(a) (–4, 1) (b) (1, 8)
(c) (0.5, 4) (d) (–1, 4)

**13.** *A boy school is standing on the school's ground at a point A having coordinates (4, 1) facing towards east. He moves 4 units in the straight line then take right and moves 3 units and stop, then he reaches his home Representation of the above situation on the coordinate axes is shown below.*




**What is the shortest distance between his school and house?**

(a) 7 units (b) 3 units
(c) 5 units (d) 4 units

**14.** **What is the probability of getting the sum of perfect square, in a single throw of a pair of dice ?**

(a) $\frac{1}{36}$ (b) $\frac{5}{36}$
(c) $\frac{7}{36}$ (d) $\frac{11}{36}$

**15.** **In the equation shown below, $a$ and $b$ are unknown constants.**

$$3ax + 4y = -2 \text{ and } 2x + by = 14$$

**If (–3, 4) is the solution of the given equations, find the value of $ab$.**

(a) 10 (b) 6
(c) 12 (d) 15

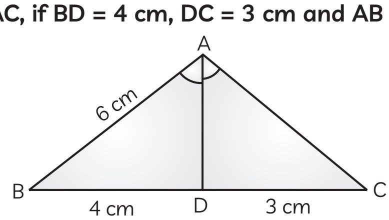
**16.** **What are the coordinates of the centroid of the triangle having vertices as $(a, b)$, $(b, c - a)$ and $(c, a - b)$?**

(a) (1, 1) (b) $\left(\frac{a+b+c}{3}, 0\right)$
(c) (0, 0) (d) $\left(0, \frac{b}{3}\right)$

**17.** **Find the positive minimum value of sec θ ?**

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

**18.** **In $\Delta ABC$, AD is the bisector of $\angle A$. Evaluate AC, if BD = 4 cm, DC = 3 cm and AB = 6 cm.**




(a) 4.5 cm (b) 6 cm
(c) 3 cm (d) 7 cm

**19.** What is the distance of the point P(3, –4) from the origin?

(a) 3 units (b) 4 units

(c) 5 units (d) 7 units

**20.** Evaluate $\left(\frac{-101}{\cos^2 A} + \frac{101}{\cot^2 A}\right)$.

(a) 101 (b) –101

(c) 1 (d) –1

## SECTION - B **16 marks**

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

**21.** The point P which divides the line segement joining the points A(2, –5) and B(5, 2) in the ratio 2 : 3 lies in which quadrant?

(a) I (b) II

(c) III (d) IV

**22.** Evaluate the zeroes of the polynomial $2x^2 - 16$?

(a) $2\sqrt{2}, -2\sqrt{2}$ (b) $\sqrt{2}, -\sqrt{2}$

(c) 4, –4 (d) 2, –2

**23.** Which of the following is a rational number between $\sqrt{2}$ and $\sqrt{3}$.

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

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

**24.** If we draw $x = a$ and $y = b$ graphically, then these two lines will intersect at:

(a) $(a, b)$ (b) $(a, o)$

(c) $(0, b)$ (d) $(-a, -b)$

**25.** Find the largest number which divide the numbers 615 and 963 leaving remainder 6 in each case.

(a) 87 (b) 75

(c) 56 (d) 88

**26.** What is the simplified form of $\cos^4\theta - \sin^4\theta$ in terms of $\sin\theta$.

(a) $1 - 2\sin^2\theta$ (b) $2\sin^2\theta + 1$

(c) $\sin^2\theta + 1$ (d) $\sin^2\theta + 2$

**27.** If $\alpha$ and $\beta$ are the zeroes of $x^2 - 8x + 1$, then the value of $\frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$ is:

(a) 7 (b) 1

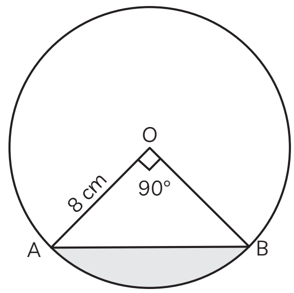
(c) 5 (d) –8

**28.** What are the co-ordinates of the point where the line $x - y = 8$ will intersect $y$-axis?

(a) (0, 8) (b) (0, –8)

(c) (–8, 0) (d) (8, 0)

**29.** Shaurya is making a greeting card for the father's day. In the card, the shaded part is folded. What is the area of the region folded in the greeting card?




(a) $16(\pi - 2)\text{cm}^2$ (b) $8(\pi^2 - 2)\text{ cm}^2$

(c) $16\pi\text{ cm}^2$ (d) $\frac{7\pi}{2}\text{ cm}^2$

**30.** Evaluate : $5 + \frac{(1+\tan^2\theta)\sin\theta\cos\theta}{\tan\theta}$.

(a) 1 (b) 5

(c) –1 (d) 6

**31.** Find the value of '$p$' if the distance between the points $(4, p)$ and $(1, 0)$ is 5 units.

(a) $\pm 4$ (b) $\pm 6$

(c) $\pm 8$ (d) $\pm 7$

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

(a) 0 (b) 1

(c) 2 (d) 3

**33.** If we add 1 to the numerator and subtract 1 from the denominator, a fraction reduces to 1. It becomes $\frac{1}{2}$, if we only add 1 to the denominator. The fraction is:

(a) $\frac{1}{5}$ (b) $\frac{2}{5}$

(c) $\frac{3}{5}$ (d) $\frac{4}{5}$

**34.** If $p(x) = ax^2 + bx + c$, then $-\frac{b}{a}$ is equal to

(a) 0 (b) 1

(c) product of zeroes (d) sum of zeroes

**35.** **What is the value of $m^2 - n^2$, where m = tan θ + sin θ and n = tan θ – sin θ?**

(a) $\sqrt{\frac{m}{n}}$ (b) $4\sqrt{mn}$

(c) $\sqrt{mn}$ (d) $\sqrt{\frac{4}{mn}}$

**36.** **What is the area swept by a minute hand of a clock in 10 minutes, if the length of minute hand is 15 cm?**

(a) $\frac{\pi}{7}$ cm$^2$ (b) $32\pi$ cm$^2$

(c) $\frac{75}{2}\pi$ cm$^2$ (d) $75\pi$ cm$^2$

**37.** **Arnav plays a game in which he tosses a one rupee coin 3 times and noted its outcomes each time. Arnav wins if all the tosses give the same result i.e., three heads or three tails and looses otherwise.**


*Possible outcomes are :*

*HHH, TTT, HHT, HTH, THH, TTH, THT, HTT*

*What is the probability that Arnav will win the game?*

(a) 0 (b) 1

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

**38.** **Find the value of $k$ for which the linear equations $x + 2y = 3$ and $5x + ky = 7$, does not has a unique solution.**

(a) 5 (b) 7

(c) 2 (d) 10

**39.** **A number is selected from the numbers 1, 2 ..., 15. What is the probability that it is a multiple of 4?**

(a) $\frac{7}{15}$ (b) $\frac{2}{5}$

(c) $\frac{1}{5}$ (d) $\frac{2}{15}$

**40.** **What is the ratio of the area of a circle and an equilateral triangle whose diameter and a side, respectively are equal?**

(a) $\sqrt{2} : \pi$ (b) $\sqrt{3} : \pi$

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

## SECTION - C **8 marks**

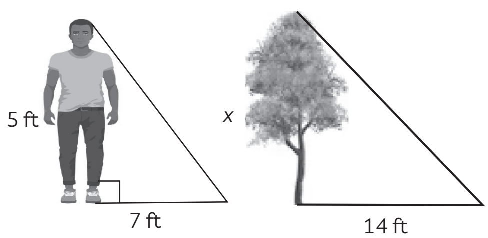
*(Section C consists of 10 questions of 1 mark each. Any 8 questions are to be attempted.)*

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

**Case Study–1:**

*Magnification of figures is a process of enlarging the apparent size, not the physical size, of something. The enlarged figure is quantified by a calculated number. If two triangles are similar then their corresponding sides are in the same ratio. Basically a bigger triangle is a enlargement of the smaller triangle. This basic rule of similar triangles is applicable in solving many real life problems like relating the height and shadow length of various objects at a particular instant in a day.*

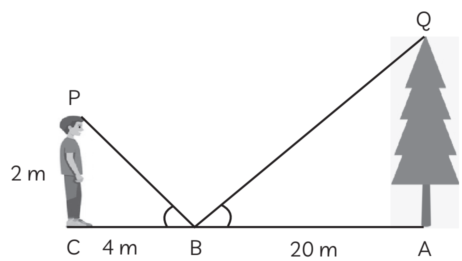
**41.** **Evaluate $x$, by considering the figure below.**




(a) 12 ft (b) 15 ft

(c) 10 ft (d) 7 ft

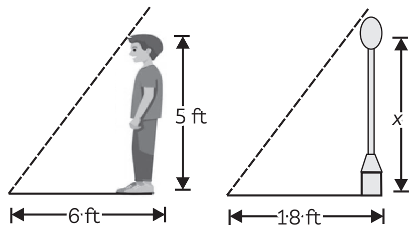
**42.** **See the figure below and evaluate the height of the tree.**




(a) 25 m (b) 40 m

(c) 20 m (d) 10 m

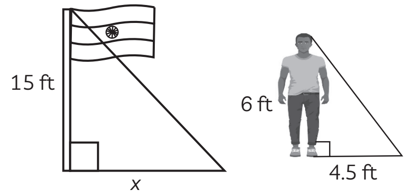
**43.** **If the shadows of a lamp-post and a at the same time of a days are 18 ft. and 6 ft. respectively then what is the height of the lamp-post.**




(a) 15 ft (b) 10 ft

(c) 12 ft (d) 18 ft

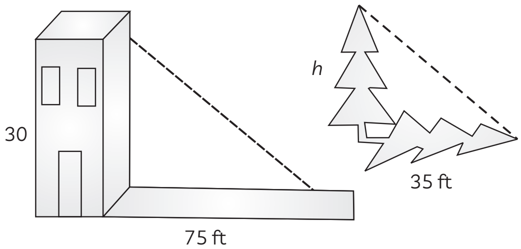
**44.** **Evaluate for $x$**




(a) 10.5 ft (b) 11.25 ft
(c) 12 ft (d) 9 ft

**45.** **What is the height of the tree i.e. $h$ m?**

(a) 20 ft (b) 12 ft
(c) 18 ft (d) 14 ft




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

**Case Study–2:**

*When we pass from crossing on a road we all see traffic lights blinking there. A traffic controller set the timmings of traffic lights in such a way that all lights are not green at the same time or specially not in the rush hour, because it can create chaos or problems. So, he take the timings of nearby places in same area and calculate LCM of all traffic stops and he easily manage the traffic by increase the duration or set at different times.*

*There are two traffic lights on a particular highway which shows green light on time of 90 seconds and 144 seconds respectively.*

**46.** **Evaluate the HCF of the timings of two green lights.**

(a) 21 (b) 18
(c) 17 (d) 22

**47.** **Calculate their LCM.**

(a) 720 (b) 750
(c) 725 (d) 700

**48.** **Factor tree of a number helps in calculating :**

(a) prime factors (b) HCF
(c) LCM (d) Both (a) and (b)

**49.** **Which of the following relation is correct ?**

(a) HCF $(a, b)$ × LCM $(a, b)$ = $\frac{a}{b}$ ?

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

(c) HCF $(a, b)$ × LCM $(a, b)$ = $a - b$

(d) HCF $(a, b)$ × LCM $(a, b)$ = $ab$

**50.** **Two numbers which do not have any factor common other than 1 are called:**

(a) Rational numbers
(b) co-prime numbers
(c) prime numbers
(d) both (a) and (c)

# SOLUTION

## SAMPLE PAPER - 5

## SECTION - A

**1.** *(a) 0, – 1*

**Explanation:** Let $\alpha$ and $\beta$ be the zeroes of the polynomial $x^2 + px + 1 - p$.

Here $\alpha = 1 - p$ (given)

We know, $\alpha + \beta = \frac{-p}{1}$

$1 - p + \beta = -p$

$\Rightarrow \beta = -1$

Put, $x = -1$ in $x^2 + px + 1 - p$, we get

$\Rightarrow \quad 1 - p + 1 - p = 0$

$\Rightarrow \quad -2p = -2$

$\Rightarrow \quad p = 1$

$\therefore \quad \alpha = 1 - 1 = 0$

Zeroes of the polynomial are 0 and – 1.

**2.** *(b) No Solution*

**Explanation:** Given equation of lines are $x + y - 1 = 0$ and $x + y + 5 = 0$

Here, $\frac{a_1}{a_2} = \frac{1}{1}$

$\frac{b_1}{b_2} = \frac{1}{1}$

$\frac{c_1}{c_2} = \frac{-1}{5}$

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

So, the given pair of equations has no solution.

**3.** *(b) less than 0*

**Explanation:** Probability cannot be negative.

**4.** *(c)* $\left(\frac{17}{8}, \frac{15}{8}\right)$

**Explanation:** Given,

$$4^{x+y} = 256 \Rightarrow 4^{x+y} = (4)^4$$

On comparing the powers, we get

$$x + y = 4 \quad \text{...(i)}$$

Also, $(256)^{x-y} = 4 \Rightarrow (4^4)^{(x-y)} = (4)^1$

On comparing the powers, we get

$$4(x - y) = 1 \Rightarrow x - y = \frac{1}{4} \quad \text{...(ii)}$$

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

$$2x = 4 + \frac{1}{4} = \frac{17}{4}$$

$$\therefore \quad x = \frac{17}{8}$$

On putting $x = \frac{17}{8}$ in eq. (i), we get

$$\frac{17}{8} + y = 4$$

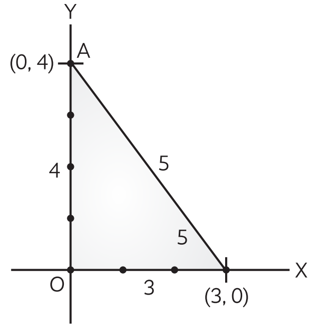
$$\therefore \quad y = 4 - \frac{17}{8} = \frac{15}{8}$$

### Caution

- *Here direct equation in terms of x and y is not given. So first form it by using given condition and then solve them to get the answer.*

**5.** *(c) 12 units*

**Explanation:** Let the vertices be A(0, 4), O (0, 0) B(3, 0).




We have

$$AB = \sqrt{(3-0)^2 + (0-4)^2}$$
$$= \sqrt{9 + 16} = \sqrt{25} = 5 \text{ units}$$

$\therefore$ Perimeter of $\Delta OAB = OA + AB + OB$

$$= 4 + 5 + 3 = 12 \text{ units}$$

### Caution

- *For finding the perimeter of triangle, first find the measurement of three sides of a triangle.*

**6.** *(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.*

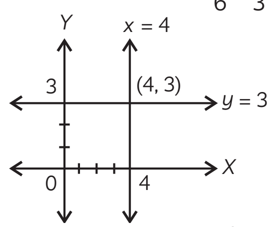
**7.** *(c)* $\frac{1}{2}$

**Explanation:** Here, total outcomes = 6

Favourable outcomes (getting B) = 2

$$\therefore \quad \text{p(getting B)} = \frac{2}{6} = \frac{1}{3}$$

**8.** *(c)*




**Explanation:** From graph we observe lines are intersecting at (4, 3)

**9.** *(c) 2*

**Explanation:** Number of zeroes lying between –2 to 2 of the polynomial $f(x)$ is 2, because between – 2 and 2, the curve cut the $x$-axis at two points.

**10.** *(b) 14.3 cm*

**Explanation:** As, ΔABC and ΔPQR are similar

$$\therefore \quad \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$$

$$\Rightarrow \quad \frac{AB}{PQ} = \frac{BC}{QR}$$

$$\Rightarrow \quad \frac{x}{4.8} = \frac{2}{6.4}$$

$$\Rightarrow \quad x = 1.5$$

$$\text{Also,} \quad \frac{AC}{PR} = \frac{BC}{QR}$$

$$\Rightarrow \quad \frac{4}{y} = \frac{2}{6.4}$$

$$\Rightarrow \quad y = 12.8$$

$$\therefore \quad x + y = 1.5 + 12.8 = 14.3 \text{ cm}$$

**11.** *(a) 2, 4*

**Explanation:** Let α, β be two zeroes of the given polynomial. Then, $\alpha = \frac{1}{\beta}$ or $\beta = \frac{1}{\alpha}$

∴ Let $\alpha, \frac{1}{\alpha}$ be the two zeroes of the given polynomial.

By relationship between zeroes and coefficients of a polynomial, we have

$$\alpha \times \frac{1}{\alpha} = \frac{6k}{k^2+8}$$

$$\Rightarrow \quad k^2 + 8 = 6k$$

$$\Rightarrow \quad k^2 - 6k + 8 = 0$$

$$\Rightarrow \quad (k-4)(k-2) = 0$$

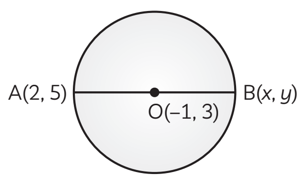
$$\Rightarrow \quad k = 4, 2$$

**12.** *(a) (–4, 1)*

**Explanation:** Since O(–1, 3) is the centre of diameter AB.

∴ O be the mid-point of AB.

Let the coordinates of B be $(x, y)$.




$$\therefore \quad -1 = \frac{2+x}{2} \text{ and } 3 = \frac{y+5}{2}$$

$$\Rightarrow \quad -2 = 2 + x \text{ and } 6 = y + 5$$

$$\Rightarrow \quad x = -4 \text{ and } y = 1$$

∴ Coordinates of other end are (–4, 1).

**13.** *(c) 5 units*

**Explanation:** From the given figure, shortest distance between school and house = AC

$$= \sqrt{(8-4)^2 + (4-1)^2}$$

[using distance formula]

$$= \sqrt{4^2 + 3^2} = \sqrt{16+9}$$

$$= \sqrt{25} = 5 \text{ units}$$

**14.** *(c)* $\frac{7}{36}$

**Explanation:** Total number of outcomes = 36

Favourable outcomes are {(1, 3), (2, 2), (3, 1), (3, 6), (6, 3), (4, 5), (5, 4)}

∴ Required probability = $\frac{7}{36}$

**15.** *(a) 10*

**Explanation:** We have,

$$3ax + 4y = -2 \quad \text{...(i)}$$

$$\text{and} \quad 2x + by = 14 \quad \text{...(ii)}$$

Since (3, 4) is the solution of these equations

∴ From (i) we get,

$$3a \times (-3) + 4 \times 4 = -2$$

$$\Rightarrow \quad -9a = -2 - 16 = -18$$

$$\Rightarrow \quad a = 2$$

And from (ii) we get,

$$2(-3) + b \times 4 = 14$$

$$\Rightarrow \quad 4b = 14 + 6 = 20$$

$$\Rightarrow \quad b = 5$$

$$\therefore \quad ab = 10$$

**16.** *(b)* $\left(\frac{a+b+c}{3}, 0\right)$

**Explanation:** Here, $x_1 = a$, $y_1 = b - c$, $x_2 = b$, $y_2 = c - a$, $x_3 = c$ and $y_3 = a - b$

We know centroid, $G = \left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$

$$= \left(\frac{a+b+c}{3}, \frac{b-c+c-a+a-b}{3}\right)$$

$$= \left(\frac{a+b+c}{3}, 0\right)$$

**17.** *(c) 1*

**Explanation:** The positive minimum value of sec θ is 1

**18.** *(a) 4.5 cm*

**Explanation:** In ΔABC, AD is the bisector of ∠A.

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

$$\Rightarrow \quad \frac{4}{3} = \frac{6}{AC}$$

$$\Rightarrow \quad 4\,AC = 18$$

$$\therefore \quad AC = \frac{9}{2}\text{ cm} = 4.5\text{ cm}$$

**19.** *(c) 5 units*

**Explanation:** Coordinates of origin are (0, 0).

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

$$= \sqrt{9+16} = \sqrt{25} = 5\text{ units}$$

**20.** *(b) –101*

**Explanation:** We have, $\frac{-101}{\cos^2 A} + \frac{101}{\cot^2 A}$

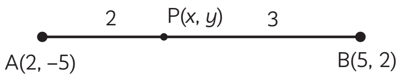
$$= \left(\frac{-101}{\cos^2 A} + \frac{101 \times \sin^2 A}{\cos^2 A}\right) = \frac{-101\,(1-\sin^2 A)}{\cos^2 A}$$

$$= \frac{-101\cos^2 A}{\cos^2 A} = -101 \quad [\because \sin^2 A + \cos^2 A = 1]$$

## SECTION - B

**21.** *(a) IV*

**Explanation:**




By section formula, coordinates of P are

$$P(x, y) = \left(\frac{5\times2+3\times2}{2+3}, \frac{2\times2+3\times-5}{2+3}\right)$$

$$= \left(\frac{10+6}{5}, \frac{4-15}{5}\right)$$

$$= \left(\frac{16}{5}, \frac{-16}{5}\right)$$

Here, x – coordinate is (+)ve and y-coordinate is (–) ve.

∴ Point P lies in IV quadrant

**22.** *(a)* $2\sqrt{2}, -2\sqrt{2}$

**Explanation :** For zeroes, put $2x^2 - 16 = 0$

$$\Rightarrow \quad 2x^2 = 16$$

$$\Rightarrow \quad x^2 = \frac{16}{2} = 8$$

$$\Rightarrow \quad x = \pm\sqrt{8} = \pm 2\sqrt{2}$$

Hence, zeroes of $2x^2 - 16$ are $2\sqrt{2}$ and $-2\sqrt{2}$

**23.** *(d)* $\frac{3}{2}$

**Explanation:** We know,

$$\sqrt{2} = \frac{1.4}{4}$$

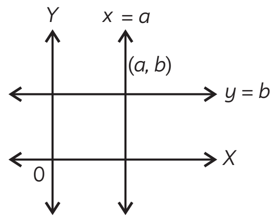
and $\sqrt{3} = 1.732$

Clearly, 1.5 lie between 1.414 and 1.732.

Therefore, $\frac{3}{2}$ is a required rational number.

**24.** *(a) (a, b)*

**Explanation:**




**25.** *(a) 87*

**Explanation:** The required number is the HCF of (615 – 6) and (963 – 6) *i.e.*, HCF of 609 and 957

We have, 609 = 3 × 7 × 29

and 957 = 3 × 11 × 29

∴ HCF (609, 957) = 3 × 29 = 87

∴ Required number = 87

**26.** *(a)* $1 - 2\sin^2\theta$

**Explanation:** $\cos^4\theta - \sin^4\theta = (\cos^2\theta - \sin^2\theta)(\cos^2\theta + \sin^2\theta)$

$$= (1 - \sin^2\theta - \sin^2\theta) \times 1$$

$$= (1 - 2\sin^2\theta)$$

**27.** *(a) 7*

**Explanation:** Here,

$$p(x) = x^2 - 8x + 1$$

And α and β are the zeroes of p(x)

$$\therefore \quad \alpha + \beta = \frac{-(-8)}{1} = 8$$

$$\therefore \quad \alpha\beta = \frac{1}{1} = 8$$

$$= \frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$$

$$= \frac{\alpha+\beta-(\alpha\beta)^2}{\alpha\beta}$$

$$= \frac{8-(1)^2}{1} = 7$$

**28.** *(b) (0, – 8)*

**Explanation:** The given line will intersect y-axis when x = 0.

$\therefore \quad 0 - y = 8$

$\Rightarrow \quad y = -8$

Required coordinates = (0, –8).

### ⚠ Caution

➥ *The point where the line intersect the y-axis is a point where x-coordinate is zero.*

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

**Explanation:** We have, radius = 8 cm and $\theta = 90°$

$\therefore$ Area of minor segment

$$= \text{Area of sector OAB} - \text{Area of } \Delta AOB$$

$$= \frac{\theta}{360°} \times \pi r^2 - \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{90°}{360°} \times \pi \times (8)^2 - \frac{1}{2} \times 8 \times 8$$

$$= 16\pi - 32 = 16\,(\pi - 2)\text{ cm}^2$$

**30.** *(d) 6*

**Explanation:** We have,

$$5 + \frac{(1 + \tan^2\theta)\sin\theta\cos\theta}{\tan\theta}$$

$$= 5 + \frac{\sec^2\theta\sin\theta\cos\theta}{\frac{\sin\theta}{\cos\theta}}$$

$$\left[\because 1 + \tan^2\theta = \sec^2\theta, \tan\theta = \frac{\sin\theta}{\cos\theta}\right]$$

$$= 5 + \frac{\sec^2\theta\cos^2\theta\,.\sin\theta}{\sin\theta}$$

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

$$= 5 + 1 = 6$$

**31.** *(a) $\pm 4$*

**Explanation:** According to the given condition

$\sqrt{(1-4)^2 + (0-p)^2} = 5$ [By distance formula]

$\Rightarrow \quad \sqrt{9 + p^2} = 5$

On squaring both sides, we get

$9 + p^2 = 25$

$\Rightarrow \quad p^2 = 16$

$\Rightarrow \quad p = \pm 4$

**32.** *(a) 0*

**Explanation:** The given polynomial is

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

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

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

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

Which is not possible, as square root of negative number is imaginary

Hence, this polynomial has no zeroes.

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

**Explanation:** Let the fraction be $\frac{x}{y}$

$\therefore$ A.T.Q.

$$\frac{x+1}{y-1} = 1$$

or $\quad x - y = -2 \quad$ ... (i)

And, $\quad \frac{x}{y+1} = \frac{1}{2}$

$\Rightarrow \quad 2x - y = 1 \quad$ ...(ii)

On applying (i)–(ii), we get

$$\begin{array}{r} x - y = -2 \\ 2x - y = -1 \\ - \quad + \quad\quad - \\ \hline -x = -3 \end{array}$$

$x = 3$

$\therefore \quad y = 3 + 2 = 5$

$\therefore \quad \text{Fraction} = \frac{3}{5}$

**34.** *(d) Sum of zeroes*

**Explanation:** Here $p(x) = ax^2 + bx + c$

$$= -\frac{x^2 + b}{a}\frac{x + c}{a}$$

But the general equation of a quadratic equation with $\alpha$ and $\beta$ as roots are

$x^2 - (\alpha + \beta)x + \alpha\beta = 0 \quad$ ...(i)

$\therefore \quad$ Sum of roots or $(\alpha + \beta) = -\frac{b}{a}$

**35.** *(b) $4\sqrt{mn}$*

**Explanation:** Given, $m = \tan\theta + \sin\theta$, $n = \tan\theta - \sin\theta$

$\therefore \quad m^2 - n^2 = (\tan\theta + \sin\theta)^2 - (\tan\theta - \sin\theta)^2$

$= 4\tan\theta\ \sin\theta \quad$ ...(i)

Now,

$4\sqrt{mn} = 4\sqrt{(\tan\theta + \sin\theta)(\tan - \sin\theta)}$

$= 4\sqrt{\tan^2\theta - \sin^2\theta}$

$= 4\sin\theta\sqrt{\sec^2\theta - 1} = 4\sin\theta\tan\theta$

...(ii)

From (i) and (ii)

$m^2 - n^2 = 4\sqrt{mn}$

**36.** *(c) $\frac{75}{2}\pi\ cm^2$*

**Explanation:** Angle made by minute hand in 10 min $= \frac{360 \times 10}{60} = 60°$

$\therefore$ Area swept by the minute hand in 10 min

$$= \frac{60°}{360°} \times \pi r^2 = \frac{\pi \times 15 \times 15 \times 60°}{360°} = \frac{75}{2}\pi$$

[$\because$ length of minute hand = $r$ = 15 cm]

**37.** *(c)* $\frac{1}{4}$

**Explanation:** The tosses gives the same result, when it is HHH or TTT.

$\therefore$ Favourable number of outcomes = 2

Total number of outcomes = 8

$\therefore$ P(winning the game) = $\frac{2}{8} = \frac{1}{4}$

**38.** *(d) 10*

**Explanation:** For unique solution, we have

$$\frac{1}{5} \neq \frac{2}{k} \Rightarrow k \neq 10$$

So, if, k = 10, then the given system of linear equations will not have unique solution.

**39.** *(c)* $\frac{1}{5}$

**Explanation:** Numbers divisible by 4 from 1 to 15 are 4, 8, 12.

$\therefore$ Number of favourable cases = 3

Number of total outcomes = 15

$\therefore$ Required probability = $\frac{3}{15} = \frac{1}{5}$

**40.** *(c)* $\pi : \sqrt{3}$

**Explanation:** Let the radius of the circle be '*r*' units and the side of an equilateral triangle be '*a*' units

So, $2r = a$ [Given]

Area of circle, $A_1 = \pi r^2$

Area of triangle, $A_2 = \frac{\sqrt{3}}{4} \times a^2 = \frac{\sqrt{3}}{4} \times (2r)^2$

$\therefore \quad A_1 : A_2 = \pi r^2 : \frac{\sqrt{3}}{4} \times 4r^2 = \pi : \sqrt{3}$

## SECTION - C

**41.** *(c) 10 ft*

**Explanation:** Clearly, given triangles are similar, therefore

$$\frac{5}{x} = \frac{7}{14} \Rightarrow x = 10 \text{ ft}$$

**42.** *(d) 10 m*

**Explanation:** Clearly, given triangles are similar, therefore $\frac{2}{\text{Height of tree}} = \frac{4}{20}$

$\Rightarrow$ Height of tree = 10 m

**43.** *(a) 15 ft*

**Explanation:** Since, given triangles are similar, therefore $\frac{6}{18} = \frac{5}{x} \Rightarrow x = 15$ ft

**44.** *(b) 11.25 ft*

**Explanation:** In the given figure, triangles are similar therefore

$$\frac{15}{6} = \frac{x}{4.5}$$

$$\Rightarrow \quad x = \frac{15 \times 4.5}{6} = 11.25 \text{ ft}$$

**45.** *(d) 14 ft*

**Explanation:** Since, the triangles are similar, therefore

$$\frac{30}{h} = \frac{75}{35}$$

$$\Rightarrow \quad h = \frac{30 \times 35}{75} = 14 \text{ ft}$$

**46.** *(b) 18*

**Explanation:** Using the method of prime factorisation of 90 and 144, we have

$$90 = 2 \times 3^2 \times 5$$

and $144 = 2^4 \times 3^2$

$\therefore$ $\text{HCF} = 2^1 \times 3^2$

$= 2 \times 9 = 18$

**47.** *(a) 720*

**Explanation:** As LCM × HCF = product of two numbers

$\therefore \quad \text{LCM} = \frac{90 \times 144}{18} = 720$

**48.** *(a) prime factors*

**Explanation:** Factor free is used for determining the prime factors of a number.

**49.** *(d) HCF (a, b) × LCM (a, b) = ab*

**50.** *(b) co-prime numbers*

**Explanation:** Two numbers which do not have any common factor other than 1, are called co-prime number.