9

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. If the sum and product of zeroes of a polynomial are –2, 3 respectively, then the polynomial is:

(a) $x^2 - 2x + 3$ (b) $x^2 + 2x - 3$
(c) $x^2 + 2x + 3$ (d) $x^2 - 2x - 3$

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

(a) 1 (b) 5
(c) –1 (d) 6

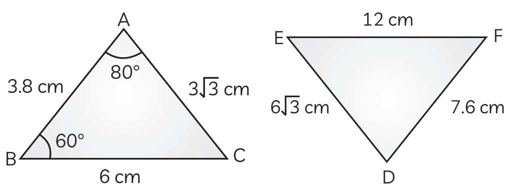
3. Find the distance 2AB, where A and B are the points (–6, 7) and (–1, –5) respectively.

(a) 28 units (b) 24 units
(c) 25 units (d) 26 units

4. For some integer m, every odd integer is of the form:

(a) m (b) $m + 1$
(c) m (d) $2m + 1$

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



(a) 60° (b) 80°
(c) 40° (d) 70°

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

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

7. Find the value of y, if the points P(7, –2) and Q(5, y) are the points of trisection of the line segment joining A(9, –1) and B(3, –7).

(a) 5 (b) –4.5
(c) 6.5 (d) 0

8. The condition on the polynomial $p(x) = ax^2 + bx + c$, $a \neq 0$, so that its zeroes are reciprocal of each other, is:

(a) $a = c$ (b) $b = c$
(c) $a = -b$ (d) $a \neq b \neq c$

9. The total number of students in class X are 54, out of which there are 32 girls and rest are boys. The class teacher has to select one class representative. She writes the name of each student on a separate card and put the cards in one bag. She randomly draw one card from the bag. What is the probability that the name written on the card is of a girl?

(a) $\dfrac{7}{27}$ (b) $\dfrac{11}{27}$
(c) $\dfrac{16}{27}$ (d) $\dfrac{4}{27}$

10. After how many places, the decimal form of the number $\frac{27}{2^3 5^4 3^2}$ will terminate?

(a) 1 (b) 2

(c) 3 (d) 4

11. 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) half

12. 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

13. What is the area of the largest triangle that can be inscribed in a semi-circle of radius r units?

(a) $\sqrt{2}\ r^2$ sq. units (b) r^2 sq. units

(c) $\frac{1}{2} r^2$ sq. units (d) $2r^2$ sq. units

14. The HCF of 96 and 404 is:

(a) 4 (b) 16

(c) 8 (d) 12

15. For a rational number $\frac{p}{q}$ to be a terminating decimal, the denominator q must be of the form $2^m 5^n$, where m, n are:

(a) Integers

(b) Natural numbers

(c) Positive integers

(d) Non-negative integers

16. The value of 2 tan 45° – sec 60° + cosec 30° is:

(a) 5 (b) 4

(c) 3 (d) 2

17. A(30, 20) and B(6, –4) are two points. The coordinates of point P in AB such that 2PB = AP, are:

(a) (14, 4) (b) (22, 9)

(c) (14, –4) (d) (–22, 9)

18. In △ABC, right angled at B, if AB = 12 cm, BC = x and AC = 13 cm, then the value of x is:

(a) 7 (b) 5

(c) –7 (d) –5

19. Calculate the value of k, if $x = k$ is a solution of the quadratic polynomial $x^2 + 4x + 3$.

(a) 1 (b) –1

(c) 3 (d) –4

20. If A(3, 4), B(7, 9) and C(x, 2) are the vertices of △ABC whose centroid is G(4, y), then the values of x and y, respectively are:

(a) 2, 5 (b) –6, 15

(c) –2, 7.5 (d) $\frac{14}{3}, \frac{15}{2}$

SECTION - B

16 marks

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

21. Calculate the least number which when divided by 15, leaves a remainder of 5, when divided by 25, leaves a remainder of 15 and when divided by 35, leaves a remainder of 25.

(a) 515 (b) 550

(c) 530 (d) 600

22. What are the values of a and b, respectively if $x = 2$ and $x = -3$ are the zeroes of the polynomial $f(x) = x^2 + (a + 1)x + b$?

(a) –7, –1 (b) 5, –1

(c) 2, –6 (d) 0, –6

23. Find the diameter of the wheel which covers a distance of 88 km in 1000 revolutions.

(a) 14 m (b) 28 m

(c) 27 m (d) 20 m

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

(a) 1 (b) 0

(c) –1 (d) ∞

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

(a) 0° (b) 30°

(c) 45° (d) 90°

26. The ratio in which the line $2x + y = 4$ divides the line segment joining the points P(2, –2) and Q(3, 7) is:

(a) 4 : 7 (b) 3 : 5

(c) 2 : 9 (d) 5 : 8

27. What is the length of each side of a rhombus whose diagonals are of lengths 10 cm and 24 cm?

(a) 34 cm (b) 26 cm

(c) 25 cm (d) 13 cm

28. In the equation shown below, a and b are unknown constants.

$3ax + 4y = -2$ and $2x + by = 14$

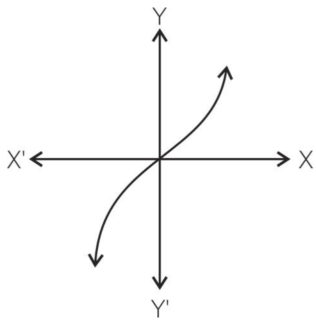
If (–3, 4) is the solution of the given equations, find the value of ab.

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

29. The simplified form of $\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta}$ is:

(a) $\cot\theta$ (b) $\tan\theta$
(c) $\sec\theta$ (d) $\text{cosec}\,\theta$

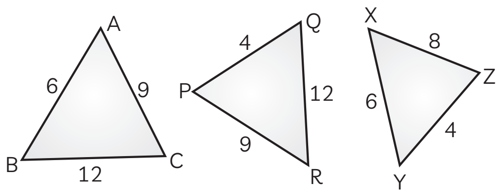
30. How many zeroes are there of $y = f(x)$ for the given graph?



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

31. In the given figure (not drawn to scale) three trianges are shown.

Which of the two triangles are similar?



(a) $\Delta ABC \sim \Delta XYZ$
(b) $\Delta PQR \sim \Delta XYZ$
(c) $\Delta ABC \sim \Delta YZX$
(d) $\Delta QPR \sim \Delta BCA$

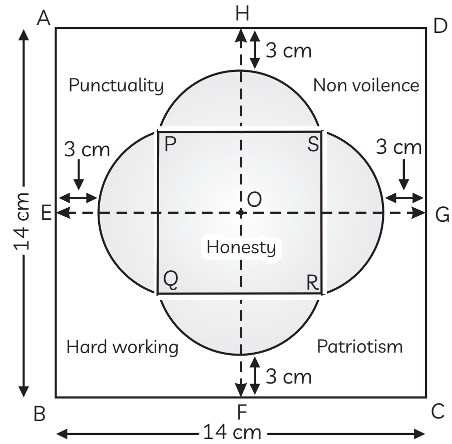
32. If LCM(25, 70) = 350, then HCF(25, 70) is:

(a) 10 (b) 5
(c) 11 (d) 12

33. What are the values of x and y respectively, if the mid-point of the line segment joining A(x, y + 1) and B(x + 1, y + 2) is $C\left(\frac{3}{2}, \frac{5}{2}\right)$.

(a) –1, 0 (b) 1, 1
(c) 5, 3 (d) 3, 8

34. *Shivani made a poster representing moral values as shown below. Here, PQRS and ABCD are squares of side 4 cm and 14 cm respectively. Four semi-circles are drawn taking sides of square PQRS as diameters. Here, E, F, G and H are mid-points of sides AB, BC, CD and DA respectively.*



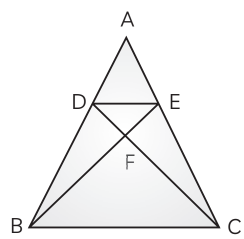
What is the area allotted to non-violence?

(a) 38.71 cm^2 (b) 40 cm^2
(c) 36.82 cm^2 (d) 36 cm^2

35. Evaluate for $\sin^{29} x + \text{cosec}^{29} x$, if $\sin x + \text{cosec}\, x = 2$.

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

36. In the figure, if DE || BC and AD : AB = 5 : 9, then the ratio of areas of ΔDEF and ΔBFC is:



(a) 5 : 4 (b) 5 : 9
(c) 25 : 81 (d) 25 : 16

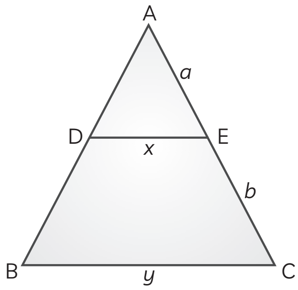
37. Form a quadratic polynomial whose zeroes are $\frac{3}{5}$ and $-\frac{1}{2}$.

(a) $x^2 - 9x + 6$ (b) $10x^2 - x - 3$
(c) $9x^2 + x + 6$ (d) $7x^2 - 3x + 4$

38. What are the coordinates of the point on the x-axis which is equidistant from the points (7, 6) and (–3, 4)?

(a) (4, 0) (b) (5, 0)
(c) (3, 0) (d) (–6, 0)

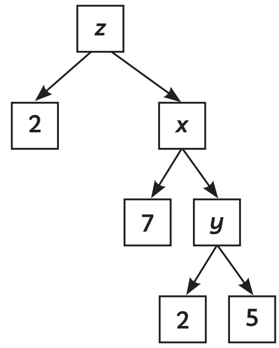
39. In the given figure, DE II BC. Which of the following is true?



(a) $x = \frac{a+b}{ay}$ (b) $y = \frac{ax}{a+b}$

(c) $x = \frac{ay}{a+b}$ (d) $\frac{x}{y} = \frac{a}{b}$

40. From the following factor tree, $x : y : z$ is equal to:



(a) 7 : 1 : 14 (b) 1 : 7 : 14

(c) 7 : 14 : 1 (d) 14 : 1 : 7

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:

For teaching the concept of probability, Mrs. Verma decided to use two dice. She took a pair of die and write all the possible outcomes on the blackboard. All possible outcomes were:

(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6)

(2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6)

(3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6)

(4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6)

(5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6)

(6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)

41. The probability that 4 will not come up on either of them is:

(a) $\frac{5}{18}$ (b) $\frac{11}{36}$

(c) $\frac{25}{36}$ (d) $\frac{6}{25}$

42. The probability that 5 will come up at least once is:

(a) $\frac{13}{18}$ (b) 0

(c) $\frac{11}{36}$ (d) $\frac{5}{18}$

43. The probability that 6 will come up on both dice is:

(a) $\frac{1}{36}$ (b) $\frac{5}{36}$

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

44. The probability that both numbers comes up are even, is:

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

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

45. The probability that both numbers comes up are prime numbers, is:

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

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

Q. 46-50 are based on Case Study–2

Case Study–2:

A book store shopkeeper gives books on rent for reading. He has variety of books in his store related to fiction, story books, quiz books etc. He takes a fixed charges for the first two days and an additional charges for each day thereafter. Radhika paid ₹ 22 for a book and kept for six days, while Reshma paid ₹ 16 when she kept for 4 days. Let the fixed charges be represented by ₹ x and charges for each day be represented by ₹ y.

46. **Represent algebraically the situation of amount paid by Reshma.**

(a) $x - 4y = 16$ (b) $x + 4y = 16$

(c) $x - 2y = 16$ (d) $x + 2y = 16$

47. **Represent algebraically the situation of amount paid by Radhika.**

(a) $x - 2y = 11$ (b) $x - 2y = 22$

(c) $x + 4y = 22$ (d) $x - 4y = 11$

48. **What are the the fixed charges for a book?**

(a) ₹ 15 (b) ₹ 9

(c) ₹ 10 (d) ₹ 13

49. **What are the charges for each extra day?**

(a) ₹ 4 (b) ₹ 3

(c) ₹ 5 (d) ₹ 6

50. **Find the total amount paid both by Radhika and Reshma, if both of them kept the books for two more extra days.**

(a) ₹ 35 (b) ₹ 52

(c) ₹ 50 (d) ₹ 58

SOLUTION

SECTION - A

1. (c) $x^2 + 2x + 3$

Explanation: A polynomial with sum (S) and product (P) of zeroes is given as

$$p(x) = x^2 - Sx + P$$

Here, $S = -2;\quad P = 3$

$\therefore \quad p(x) = x^2 + 2x + 3$

2. (d) 6

Explanation: We have,

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

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

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

$$= 5 + \sec^2\theta\cos^2\theta$$

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

$$= 5 + 1 = 6$$

3. (d) 26 units

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

$$\therefore \quad AB = \sqrt{(-6-(-1))^2 + (7-(-5))^2}$$

$$= \sqrt{(-5)^2 + (12)^2} = \sqrt{169} = 13$$

$$\therefore \quad 2AB = 2 \times 13 = 26 \text{ units}$$

4. (d) $2m + 1$

Explanation: As the number $2m$ will always be even, so if we add 1 to it then, the number will always be odd.

5. (a) 60°

Explanation: In ΔABC and ΔDEF,

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

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

$$\Delta ABC \sim \Delta DFE$$

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

$\therefore \quad \angle F = 60°$

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

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

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

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

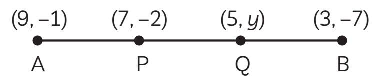
As per condition,

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

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

7. (b) –4.5

Explanation: As, P and Q are the points of trisection of line segment AB.



$\therefore \quad AP = PQ = QB$

So, Q is the mid-point of PB.

$$\therefore \quad y = \frac{-2+(-7)}{2} = \frac{-9}{2} = -4.5$$

8. (a) $a = c$

Explanation: Let one zero of the given polynomial be α.

Then, other zero $= \frac{1}{\alpha}$

We know, Product of zeroes

$$= \frac{\text{Constant term}}{\text{Coefficient of } x^2}$$

$$\Rightarrow \quad \alpha \times \frac{1}{\alpha} = \frac{c}{a}$$

$$\Rightarrow \quad 1 = \frac{c}{a}$$

$$\Rightarrow \quad a = c$$

9. (c) $\frac{16}{27}$

Explanation: Total number of students = 54

and number of girls = 32

$\therefore$ P (getting a girl name) $= \frac{32}{54} = \frac{16}{27}$

10. (d) 4

Explanation:

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

$$= \frac{3 \times 2}{(2 \times 5)^4}$$

So, the decimal form will end after four decimal places.

11. *(a) parallel*

Explanation: It is the statement of Thales theorem.

12. *(b) 1*

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

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

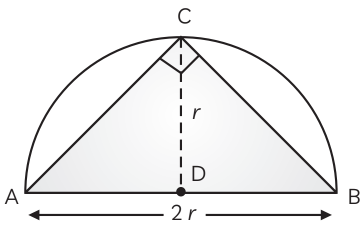
Putting these values in $\sec^2\theta - \tan^2\theta = 1$, we get $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$

Caution

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

13. *(b) r^2 sq. units*

Explanation: Take a point C on the circumference of the semi-circle and join it by the end points A and B of diameter AB.



$\therefore \quad \angle C = 90°$

[Angle in a semi-circle is a right angle]

So, ΔABC is right angled triangle.

$\therefore$ Area of largest ΔABC

$$= \frac{1}{2} \times AB \times CD$$

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

$$= r^2 \text{ sq. units}$$

14. *(a) 4*

Explanation:

We have, $96 = 2^5 \times 3$

and $404 = 2^2 \times 101$

$\therefore$ HCF (96, 404) $= 2^2 = 4$

15. *(d) Non-negative integers*

16. *(d) 2*

Explanation: $2 \tan 45° - \sec 60° + \text{cosec } 30°$

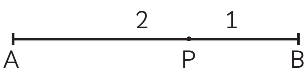
$= 2 \times 1 - 2 + 2$

$= 2$

17. *(a) (14, 4)*

Explanation: $2PB = AP$

$$\Rightarrow \frac{AP}{PB} = \frac{2}{1}$$



$\therefore$ Using section formula,

$$P(x, y) = \left(\frac{2\times6+1\times30}{2+1}, \frac{2\times(-4)+1\times20}{2+1}\right)$$

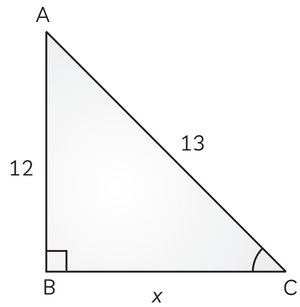
$$= \left(\frac{42}{3}, \frac{12}{3}\right) = (14, 4)$$

18. *(b) 5*

Explanation:

$\because$ ΔABC is right angled at B,

$\therefore$ Using pythagoras theorem,



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

$\Rightarrow \quad (13)^2 = (12)^2 + x^2$

$\Rightarrow \quad x^2 = 169 - 144 = 25$

$\Rightarrow \quad x = \pm\sqrt{25} = \pm5$

But length cannot be negative,

$\therefore \quad x = 5$

19. *(b) –1*

Explanation: Since, $x = k$ is a solution of given polynomial.

$\therefore \quad k^2 + 4k + 3 = 0$

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

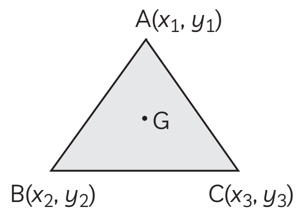
$\Rightarrow \quad k(k + 3) + 1(k + 3) = 0$

$\Rightarrow \quad (k + 3)(k + 1) = 0$

$\Rightarrow \quad k = -1 \text{ or } -3$

20. *(a) 2, 5*

Explanation: We know,



Centroid of triangle $= \left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$

$\therefore \quad (4, y) = \left(\frac{3+7+x}{3}, \frac{4+9+2}{3}\right)$

$\therefore \quad (4, y) = \left(\frac{10+x}{3}, \frac{15}{3}\right)$

$\Rightarrow \quad 4 = \frac{10+x}{3}; \quad y = \frac{15}{3}$

$\Rightarrow \quad x = 12 - 10; \quad y = 5$

$\Rightarrow \quad x = 2; \quad y = 5$

SECTION - B

21. *(a) 515*

Explanation: In each case, the remainder is 10 less than the divisor,

So, required number = LCM(15, 25, 35) – 10

$\because$ L.C.M. of 15, 25, 35 is 525.

Hence,

least number= 525 – 10 = 515

22. *(d) 0, –6*

Explanation:

Let $p(x) = x^2 + (a+1)x + b$

$\because$ 2 *and* –3 *are the zeroes of* $p(x)$.

$\therefore$ $p(2) = 0$ and $p(-3) = 0$

Now, $p(2) = (2)^2 + (a+1)(2) + b = 0$

$\Rightarrow$ $2a + b = -6$ ...(i)

And, $p(-3) = (-3)^2 + (a+1)(-3) + b = 0$

$\Rightarrow$ $-3a + b = -6$ ...(ii)

Solving equation (i) and (ii), we get

$$a = 0, b = -6$$

23. *(b) 28 m*

Explanation: Let the radius of wheel be r cm.

$\therefore$ Circumference of wheel = $2\pi r$

$\therefore$ Distance travelled by wheel in one revolution $= 2\pi r$

Distance travelled during 1000 revolutions $= 1000\,(2\pi r)$

$\Rightarrow$ $88 \times 1000 = 1000\,(2\pi r)$

$\Rightarrow$ $88 = 2 \times \frac{22}{7} \times r$

$\Rightarrow$ $r = \frac{88 \times 7}{2 \times 22} = 14$

$\therefore$ Diameter = $2r = 2 \times 14 = 28$ m

24. *(a) 1*

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

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

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

On squaring both sides, we get

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

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

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

25. *(d) 90°*

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

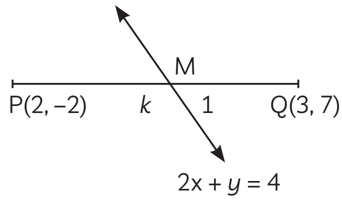
and $\sec \beta = \sqrt{2} = \sec 45°$

$\Rightarrow$ $\alpha = 45°$ and $\beta = 45°$

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

26. *(c) 2 : 9*

Explanation: Let M(x, y) be a point on the line $2x + y = 4$ which divides the line PQ in the ratio k : 1.



Then, using section formula,

$$M(x, y) = \left(\frac{3k+2}{k+1}, \frac{7k-2}{k+1}\right)$$

Since, point M also lies on the line $2x + y = 4$.

$\therefore$ $2\left(\frac{3k+2}{k+1}\right) + \left(\frac{7k-2}{k+1}\right) = 4$

$\Rightarrow$ $6k + 4 + 7k - 2 = 4k + 4$

$\Rightarrow$ $13k + 2 = 4k + 4$

$\Rightarrow$ $9k = 2$

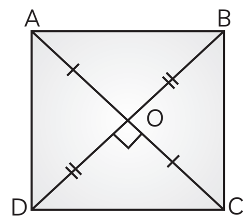
$\Rightarrow$ $k = \frac{2}{9}$

$\therefore$ Required ratio = $k : 1$

$= \frac{2}{9} : 1 = 2 : 9$

27. *(d) 13 cm*

Explanation:



Consider a rhombus ABCD with AC = 10 cm and BD = 24 cm

Since, diagonals of rhombus bisect each other at right angle

$\therefore$ $OA = OC = \frac{1}{2} AC = 5$ cm;

$OB = OD = \frac{1}{2} BD = 12$ cm

and $\angle AOB = 90°$

$\therefore$ In ΔAOB,

$AB^2 = OA^2 + OB^2$

$= (5)^2 + (12)^2 = 25 + 144 = 169$

$\Rightarrow$ $AB = \sqrt{169} = 13$ cm

28. *(a) 10*

Explanation: We have,

$3ax + 4y = -2$ ...(i)

and $2x + by = 14$ ...(ii)

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

$\therefore$ 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,

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

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

$\Rightarrow \quad b = 5$

$\therefore \quad ab = 10$

29. *(b) tan θ*

Explanation: We have,

$$\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \frac{\sin\theta(1-2\sin^2\theta)}{\cos\theta(2\cos^2\theta - 1)}$$

$$= \tan\theta \times \frac{\cos 2\theta}{\cos 2\theta}$$

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

$$= \tan\theta \times 1 = \tan\theta$$

30. *(b) 1*

Explanation: Graph intersect the x-axis at only one point *i.e.*, origin.

Hence, this curve (graph) has only one zero.

31. *(c) ΔABC ~ ΔYZX*

Explanation: In ΔABC and ΔYZX,

$$\frac{AB}{YZ} = \frac{6}{4} = \frac{3}{2}$$

$$\frac{AC}{YX} = \frac{9}{6} = \frac{3}{2}$$

$$\frac{BC}{ZX} = \frac{12}{8} = \frac{3}{2}$$

∴ ΔABC ~ ΔYZX [By SSS similarity criterion]

Caution

➥ *Take the ratio of the corresponding sides to find the two similar triangles.*

32. *(b) 5*

Explanation: We know,

HCF × LCM = Product of two numbers

HCF × 350 = 25 × 70

$$\Rightarrow \quad HCF = \frac{25 \times 70}{350} = 5$$

33. *(b) 1, 1*

Explanation: Since $C\left(\frac{3}{2}, \frac{5}{2}\right)$ is the mid-point of AB.

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

and $\frac{5}{2} = \frac{y+1+y+2}{2} \Rightarrow 5 = 2y + 3 \Rightarrow 2y = 2$

$\Rightarrow \quad y = 1$

$\therefore \quad x = 1, y = 1$

34. *(a) 38.71 cm²*

Explanation: Area of square ABCD = $(\text{side})^2$

$$= (14)^2 = 196 \text{ cm}^2$$

We know that the lines through the mid-points of opposite sides of a square divide the square into four squares that are congruent to each other.

∴ Area of square HOGD

$$= \frac{1}{4} \text{(area of square ABCD)}$$

$$= \frac{1}{4} \times 196 = 49 \text{ cm}^2$$

Required area = Area of square HOGD

$-\frac{1}{4}$ [Area of square PQRS

+ 2 × Area of circle with radius 2 cm]

$$= 49 - \frac{1}{4}\left[16 + 2\left(\frac{22}{7} \times 2 \times 2\right)\right]$$

$$= 49 - 10.29$$

$$= 38.71 \text{ cm}^2$$

35. *(a) 2*

Explanation: $\sin x + \text{cosec } x = 2$

$\Rightarrow \quad \sin x + \frac{1}{\sin x} = 2$

$\Rightarrow \quad \sin^2 x + 1 = 2\sin x$

$\Rightarrow \quad \sin^2 x + 1 - 2\sin x = 0$

$\Rightarrow \quad (\sin x - 1)^2 = 0$

$\sin x = 1$

$\Rightarrow \quad \sin^{29} x = 1$

Also, $\quad \text{cosec } x = \frac{1}{\sin x} = \frac{1}{1} = 1$

$\Rightarrow \quad \text{cosec}^{29} x = 1$

$\therefore \quad \sin^{29} x + \text{cosec}^{29} x = 1 + 1 = 2$

36. *(c) 25 : 81*

Explanation:

$\because \quad DE \parallel BC$

$\therefore \quad \angle EDC = \angle ECB$ [Alternate angles]

Now, in ΔDEF and ΔCBF,

$\angle DFE = \angle CFB$

[Vertically opposite angles]

$\angle EDF = \angle FCB$ [Proved above]

$\therefore \quad \Delta DEF \sim \Delta CBF$

$$\therefore \quad \frac{ar(\Delta DEF)}{ar(\Delta CBF)} = \left(\frac{DE}{BC}\right)^2 \quad ...(i)$$

Also, $\quad \Delta ADE \sim \Delta ABC \quad [\because DE \parallel BC]$

$$\therefore \quad \frac{AD}{AB} = \frac{AE}{AC} = \frac{DE}{BC} \quad ...(ii)$$

From (i) and (ii), we get

$$\frac{ar(\Delta DEF)}{ar(\Delta CBF)} = \left(\frac{AD}{AB}\right)^2$$

$$= \left(\frac{5}{9}\right)^2 = \frac{25}{81}$$

37. *(b)* $10x^2 - x - 3$

Explanation: Given zeroes are $\frac{3}{5}$ and $-\frac{1}{2}$.

$\therefore$ Their sum $= \frac{3}{5} + \left(-\frac{1}{2}\right)$

$= \frac{6-5}{10} = \frac{1}{10}$

and product $= \frac{3}{5}\left(-\frac{1}{2}\right) = \frac{-3}{10}$

$\therefore$ Required polynomial is $x^2 - \frac{1}{10}x - \frac{3}{10}$,

or $10x^2 - x - 3$.

38. *(c)* *(3, 0)*

Explanation: Since y–coordinate of a point on x-axis is zero,

$\therefore$ Let the point on x-axis be P(x, 0) and given points are A(7, 6) and B(–3, 4).

$\therefore$ PA = PB

$\Rightarrow \sqrt{(x-7)^2 + (0-6)^2} = \sqrt{(x+3)^2 + (0-4)^2}$

Squaring both sides, we have

$\Rightarrow (x-7)^2 + 36 = (x+3)^2 + 16$

$\Rightarrow x^2 - 14x + 49 + 36 = x^2 + 6x + 9 + 16$

$\Rightarrow -20x = -60 \Rightarrow x = 3$

$\therefore$ Required point is (3, 0).

39. *(c)* $x = \frac{ay}{(a+b)}$

Explanation: Since, DE || BC

Then, $\angle ADE = \angle ABC$

and, $\angle AED = \angle ACB$

[Alternate pair of angles]

$\therefore$ $\Delta ADE \sim \Delta ADC$ [by AA similarity]

$\therefore$ $\frac{AE}{AC} = \frac{DE}{BC}$

[$\because$ Corresponding sides of similar triangles are proportional]

$\frac{a}{AE + EC} = \frac{x}{y}$

$\frac{a}{a+b} = \frac{x}{y}$

or, $x = \frac{ay}{a+b}$

40. *(b)* *1 : 7 : 14*

Explanation:

We have, $y = 2 \times 5 = 10$

$x = 7 \times y = 7 \times 10 = 70$

$z = 2 \times x = 2 \times 70 = 140$

So, $x : y : z = 10 : 70 : 140 = 1 : 7 : 14$

SECTION - C

41. *(c)* $\frac{25}{36}$

Explanation: Possible cases in which 4 will come up in either of the two dice are (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (1, 4), (2, 4), (3, 4), (5, 4), (6, 4)

$\therefore$ Number of such cases = 11

Also, total number of cases = 36

$\therefore$ Probability (4 will come up on either of them) $= \frac{11}{36}$

So, P(4 will not come up one either of them)

$= 1 - \frac{11}{36} = \frac{25}{36}$

42. *(c)* $\frac{11}{36}$

Explanation: Favourable cases when 5 will come up atleast once are:

(1, 5), (2, 5), (3, 5), (4, 5), (5, 5), (5, 1), (5, 2), (5, 3), (5, 4), (6, 5), (5, 6).

$\therefore$ Number of favourable cases = 11

Also Total number of cases = 36

$\therefore$ P(5 will come up at least once) $= \frac{11}{36}$

43. *(a)* $\frac{1}{36}$

Explanation: Favourable cases of 6 will come up on both dice is (6, 6).

$\therefore$ P(6 will come up on both dice) $= \frac{1}{36}$

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

Explanation:

Here, favourable cases are:

(2, 2), (2, 4), (2, 6), (4, 2), (4, 6), (4, 4), (6, 2), (6, 4), (6, 6).

$\therefore$ Number of favourable cases = 9

$\therefore$ P(both numbers are even) $= \frac{9}{36} = \frac{1}{4}$

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

Explanation: Here, favourable cases are:

(3, 5), (5, 3), (2, 3), (3, 2), (2, 5), (5, 2), (2, 2), (3, 3), (5, 5).

$\therefore$ Number of favourable cases = 9

$\therefore$ P(prime numbers on both dice) $= \frac{9}{36} = \frac{1}{4}$

46. *(d)* $x + 2y = 16$

Explanation: Algebraic representation of the situation of amount paid by Reshma is given by

$$x + 2y = 16$$

47. *(c)* $x + 4y = 22$

Explanation: Algebraic representation of the situation of amount paid by Radhika is given by $x + 4y = 22$.

48. *(c)* ₹ *10*

Explanation: We have,

$$x + 4y = 22 \quad \text{...(i)}$$

and $$x + 2y = 16 \quad \text{...(ii)}$$

Multiplying (ii) by 2 and then subtracting it from (i), we get

$$x + 4y - 2x - 4y = 22 - 32$$

$\Rightarrow \quad -x = -10 \Rightarrow x = 10$

$\therefore$ Fixed charges for a book is ₹ 10.

49. *(b)* ₹ *3*

Explanation: We have,

$$x + 4y = 22 \text{ and } x = 10$$

$\therefore \quad 4y = 22 - 10 = 12 \Rightarrow y = 3$

$\therefore$ Charges for each extra day is ₹ 3.

50. *(c)* ₹ *50*

Explanation: Amount paid by Radhika

$= x + 4y + 2y = x + 6y$

$= 10 + 6 \times 3 =$ ₹ 28

Amount paid by Reshma

$= x + 2y + 2y$

$= x + 4y$

$= 10 + 4 \times 3$

$=$ ₹ 22

$\therefore$ Total amount paid by both

$=$ ₹ (28 + 22) = ₹ 50