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SAMPLE TEST PAPER 01 FOR CLASS X BOARD EXAM 2021

SAMPLE ANSWERS

Max. marks: 80 **Time Allowed: 3 hrs**

General Instruction:

1. This question paper contains two parts A and B.

Part – A:

1. It consists three sections- I and II.
2. Section I has 16 questions of 1 mark each.
3. Section II has 4 questions on case study. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

Part – B:

1. Question No 21 to 26 are Very short answer Type questions of 2 mark each,
2. Question No 27 to 33 are Short Answer Type questions of 3 marks each
3. Question No 34 to 36 are Long Answer Type questions of 5 marks each.

PART - A

SECTION-I

Questions 1 to 16 carry 1 mark each.

1. Write the smallest number which is divisible by both 306 and 657.

Smallest number divisible by 306 and 657

= LCM (306, 657)

LCM (306, 657) = 22338

2. If zeroes of the polynomial $x^2 + 4x + 2a$ are α and $2/\alpha$, then find the value of a.

Product of (zeroes) roots = $\frac{c}{a} = \frac{2a}{1} = \alpha . \frac{2}{\alpha}$

or, $2a = 2$

$\therefore a = 1$

3. If the lines given by 3x + 2ky = 2 and 2x + 5y + 1 = 0 are parallel, then find the value of k.

For parallel lines (or no solution)

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

$$\Rightarrow \frac{3}{2} = \frac{2k}{5} \neq \frac{-2}{1}$$

$$\Rightarrow 4k = 15$$

$$\Rightarrow k = \frac{15}{4}$$

4. Find 10th term from end of the AP: 4, 9, 14, ..., 254.

Common difference $d = 9 - 4 = 14 - 9 = 5$

Given: Last term, $l = 254$, $n = 10$

n^{th} term from the end $= l - (n - 1) d$

$\therefore$ 10^{th} term from the end $= 254 - (10 - 1) \times 5$

$= 254 - 45 =$ **209**

5. Find whether the lines represented by 2x + y = 3 and 4x + 2y = 6 are parallel, coincident or intersecting.

Here, $a_1 = 2, b_1 = 1, c_1 = -3$
and $a_2 = 4, b_2 = 2, c_2 = -6$

If $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$, then the lines are coincident.

Clearly, $\frac{2}{4} = \frac{1}{2} = \frac{3}{6}$

Hence, lines are coincident.

6. Find the positive root of $\sqrt{3x^2+6} = 9$.

$\sqrt{3x^2+6} = 9 \Rightarrow 3x^2 + 6 = 81$

$\Rightarrow 3x^2 = 81 - 6 \Rightarrow 75$

$\Rightarrow x^2 = \frac{75}{3} \Rightarrow 25$

$\therefore x = \pm 5$

Hence, positive root = 5.

7. Find the value of k for which the roots of the equation $3x^2 - 10x + k = 0$ are reciprocal of each other.

Roots of the equation $3x^2 - 10x + k = 0$ are reciprocal of each other

$\Rightarrow$ Product of roots = 1 $\Rightarrow \frac{k}{3} = 1 \Rightarrow k = 3$

8. A chord of a circle of radius 10 cm subtends a right angle at its centre. Calculate the length of the chord (in cm).

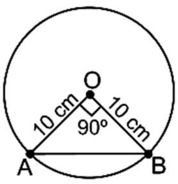
$AB^2 = OA^2 + OB^2$

[Pythagoras' theorem

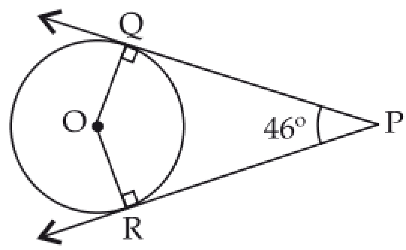
$AB^2 = 10^2 + 10^2$

$AB^2 = 2(10)^2$

$\mathbf{AB = 10\sqrt{2}\ cm}$



9. In the given figure, PQ and PR are two tangents to a circle with centre O. If ∠QPR = 46°, then calculate ∠QOR.



∠OQP = 90°

∠ORP = 90°

∠OQP + ∠QPR + ∠ORP + ∠QOR = 360°

[Angle sum property of a quad.

90° + 46° + 90° + ∠QOR = 360°

∠QOR = 360° – 90° – 46° – 90° = **134°**

10. If ΔABC ~ ΔRPQ, AB = 3cm, BC = 5cm, AC = 6cm, RP = 6cm and PQ = 10cm, then find QR.

ΔABC ~ ΔRPQ

$\therefore \frac{AB}{RP} = \frac{BC}{PQ} = \frac{AC}{RQ}$ **[In ~ Δs corresponding sides are proportional**

$\Rightarrow \frac{3}{6} = \frac{5}{10} = \frac{6}{QR} \quad \Rightarrow \frac{1}{2} = \frac{6}{QR}$

$\therefore$ **QR = 12 cm**

11. If cosec θ = 5/4, find the value of cot θ.

We know that, $\cot^2\theta = \text{cosec}^2\theta - 1$

$$= \left(\frac{5}{4}\right)^2 - 1 = \frac{25}{16} - 1 = \frac{25-16}{16}$$

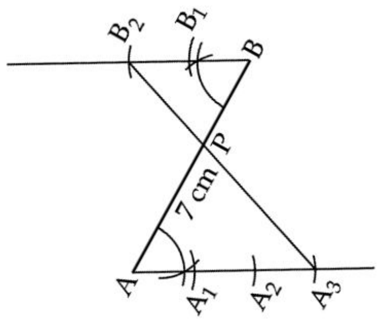
$$\cot^2\theta = \frac{9}{16} \qquad \therefore \ \mathbf{\cot\theta = \frac{3}{4}}$$

12. If $\theta = 45^0$, then find the value of $2\sec^2\theta + \text{cosec}^2\theta$.

$2\sec^2\theta + \text{cosec}^2\theta = 2\sec^2 45^0 + \text{cosec}^2 45^0$

$$= 2\left(\sqrt{2}\right)^2 + \left(\sqrt{2}\right)^2 = 4 + 2 = 6$$

13. In the below figure, if B_1, B_2,…... and A_1,A_2, A_3,….. have been marked at equal distances. In what ratio P divides AB?



Answer- 3 : 2

14. Volume and surface area of a solid hemisphere are numerically equal. What is the diameter of hemisphere?

Volume of hemisphere = Surface area of hemisphere

$$\Rightarrow \frac{2}{3}\pi r^3 = 3\pi r^2 \ \Rightarrow \ \frac{2}{3}r = 3 \ \Rightarrow \ \mathbf{r = \frac{9}{2}}$$

$\therefore$ **Diameter of hemisphere** $= 2r = 2\left(\frac{9}{2}\right)$ **= 9 cm**

15. The circumference of a circle is 22 cm. Find the area of its quadrant.

Circumference of a circle = 22 cm $2\pi r$ = 22 cm

$$2 \times \frac{22}{7} \times r = 22 \text{ cm}$$

$$r = \frac{22\times 7}{22\times 2} = \frac{7}{2} \text{ cm}$$

$$\therefore \ \text{Area of quadrant} = \frac{1}{4}\pi r^2 = \frac{1}{4}\times\frac{22}{7}\times\frac{7}{2}\times\frac{7}{2} = \mathbf{\frac{77}{8}\,cm^2}$$

16. The probability of selecting a rotten apple randomly from a heap of 900 apples is 0.18. What is the number of rotten apple in the heap?

$$\text{P(rotten apples)} = \frac{\text{No. of rotten apples}}{\text{Total apples}}$$

$$0.18 = \frac{\text{No. of rotten apples}}{900}$$

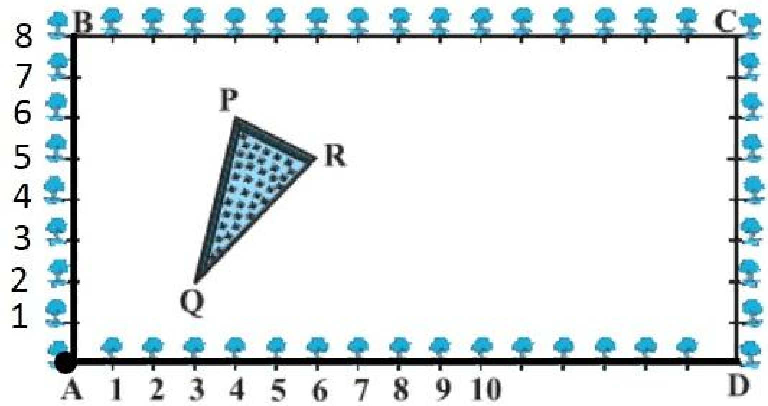
$\therefore$ **No. of rotten apples** = 900 × 0.18 = **162**

SECTION-II

Case study based questions are compulsory. Attempt any four sub parts of each question. Each subpart carries 1 mark

17. Case Study based-1:

The Class X students of a secondary school in Krishinagar have been allotted a rectangular plot of land for their gardening activity. Sapling of Gulmohar are planted on the boundary at a distance of 1m from each other. There is a triangular grassy lawn in the plot as shown in the below figure. The students are to sow seeds of flowering plants on the remaining area of the plot.



(a) Taking A as origin, find the coordinates of the vertices of the triangle ΔPQR.
(i) P (4, 6), Q(3, 2), R(6, 5) (ii) P (3, 2), Q(4, 6), R(6, 5)
(iii) P (4, 6), Q(3, 2), R(5, 6) (iv) P (4, 6), Q(2, 3), R(6, 5)
Answer: (i) P (4, 6), Q(3, 2), R(6, 5)

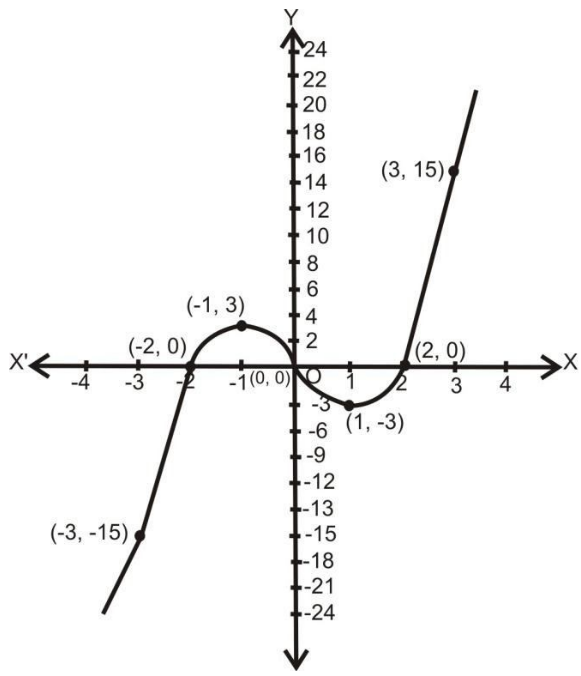
(b) What is the midpoint of side PQ, when A is the origin?
(i) (7/2, 9/2) (ii) (7/2, 4) (iii) (23/2, 9/2) (iv) none of these
Answer: (ii) (7/2, 4)

(c) What will be the coordinates of the vertices of a ΔPQR if C is the origin?
(i) P (10, 6), Q(13, 2), R(12, 5) (ii) P (12, 2), Q(10, 6), R(13, 5)
(iii) P (12, 6), Q(13, 2), R(10, 6) (iv) P (12, 2), Q(13, 6), R(10, 3)
Answer: (iv) P (12, 2), Q(13, 6), R(10, 3)

(d) What is the mid point of side QR, when C is the origin?
(i) (7/2, 9/2) (ii) (7/2, 4) (iii) (23/2, 9/2) (iv) none of these
Answer: (iii) (23/2, 9/2)

(e) The given problem is based on which mathematical concept
(i) Coordinate Geometry (ii) triangles (iii) Similarity (iv) none of these
Answer: (i) Coordinate Geometry

18. Case Study based-2: Bird-bath
One day, due to heavy storm an electric wire got bent as shown in the figure. It followed some mathematical shape of curve. Answer the following questions below.



(a) How many zeroes are there for the polynomial (shape of the wire)

(i) 2 (ii) 3 (iii) 4 (iv) 5

Answer: (i) 3

(b) Find the zeroes of the polynomial.

(i) 2, 0, -2 (ii) 2, -2, -5 (iii) -2, 2, -5.5 (iv) None of these

Answer: (i) 2, 0, -2

(c) Find the quadratic polynomial whose zeroes are -3 and 4.

(i) $x^2 + 4x + 2$ (ii) $x^2 – x – 12$

(iii) $x^2 – 7x – 12$ (iv) None of these

Answer: (ii) $x^2 – x – 12$

(d) Name the type of expression of the polynomial?

(i) quadratic (ii) cubic (iii) linear (iv) bi-quadratic

Answer: (ii) cubic

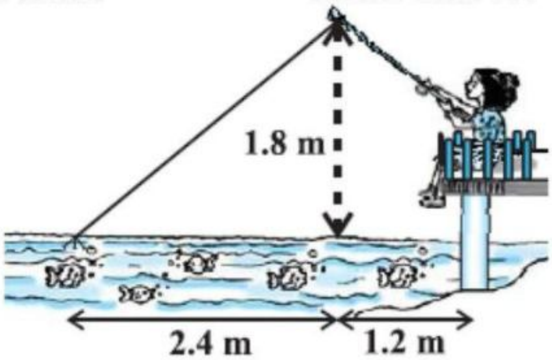
(e) If one zero of the polynomial $x^2 – 5x – 6$ is 6 then find the other zero.

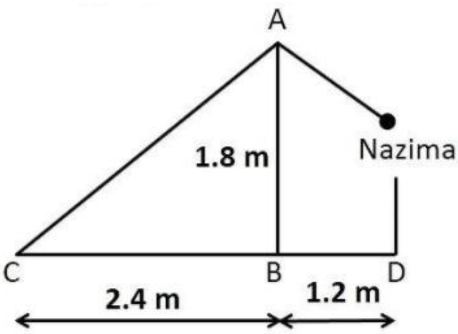
(i) 1 (ii) -1 (iii) 2 (iv) -2

Answer: (ii) -1

19. Case Study based-3:

Nazima is fly fishing in a stream. The tip of her fishing rod is 1.8 m above the surface of the water and the fly at the end of the string rests on the water 3.6 m away and 2.4 m from a point directly under the tip of the rod. how much string does she have out. She is pulling the string at the rate of 5 cm per second. Nazima’s friend observe her position and draw a rough sketch by using A, B, C and D positions of tip, point directly under the tip of the rod, fish and Nazima’s position (see the below figure). Assuming that her string (from the tip of her rod to the fly) is taut, answer the following questions:





(a) What is the length AC?

(i) 2 m (ii) 3 m (iii) 4 m (iv) 5 m

Answer: (ii) 3 m

(b) What is the length of string pulled in 12 seconds?

(i) 6 m (ii) 0.3 m (iii) 0.6 m (iv) 3 m

Answer: (iii) 0.6 m

(c) What is the length of string after 12 seconds?

(i) 2.4 m (ii) 2.7 m (iii) 2 m (iv) 2.2 m

Answer: (i) 2.4 m

(d) What will be the horizontal distance of the fly from her after 12 seconds?

(i) 2.7 m (ii) 2.78 m (iii) 2.58 m (iv) 2.2 m

Answer: (ii) 2.78 m

(e) The given problem is based on which concept?

(i) Triangles (ii) Co-ordinate geometry (iii) Height and Distance (iv) None of these

Answer: (i) Triangles

20. Case Study based-4:

A group of students decided to make a project on Statistics. They are collecting the heights (in cm) of their 51 girls of Class X-A, B and C of their school. After collecting the data, they arranged the data in the following less than cumulative frequency distribution table form:

Height (in cm)	Number of girls
Less than 140	4
Less than 145	11
Less than 150	29
Less than 155	40
Less than 160	46
Less than 165	51

(a) What is the lower limit of median class?
(i) 145 (ii) 150 (iii) 155 (iv) 160
Answer: (i) 145

(b) What is the upper limit of modal class?
(i) 145 (ii) 150 (iii) 155 (iv) 160
Answer: (ii) 150

(c) What is the mean of lower limits of median and modal class?
(i) 145 (ii) 150 (iii) 155 (iv) 160
Answer: (i) 145

(d) What is the width of the class?
(i) 10 (ii) 15 (iii) 5 (iv) none of these
Answer: (iii) 5

(e) The median is :
(i) 149.03 cm (ii) 146.03 cm (iii) 147.03 cm (iv) 148.03 cm
Answer: (i) 149.03 cm

PART – B

(Question No 21 to 26 are Very short answer Type questions of 2 mark each)

21. Given that $\sqrt{5}$ is irrational, prove that $2\sqrt{5} - 3$ is an irrational number.

Let us assume, to the contrary, that $2\sqrt{5} - 3$ is a rational number

$\therefore \; 2\sqrt{5} - 3 = \frac{p}{q}$, where p and q are integers and $q \neq 0$

$$\Rightarrow \quad \sqrt{5} = \frac{p + 3q}{2q} \quad .....(1)$$

Since p and q are integers

$\therefore \; \frac{p+3q}{2q}$ is a rational number

$\therefore \; \sqrt{5}$ is a rational number which is contradiction as $\sqrt{5}$ is an irrational number

Hence our assumption is wrong and hence $2\sqrt{5} - 3$ is an irrational number.

22. How many natural numbers are there between 200 and 500, which are divisible by 7?

203, 210, 217, ..., 497

Here $a = 203$, $d = 210 - 203 = 7$, $a_n = 497$

$\therefore$ $a + (n-1)d = a_n$

$203 + (n-1)7 = 497$

$(n-1)7 = 497 - 203 = 294$

$n - 1 = \frac{294}{7} = 42 \therefore n = 42 + 1 = \mathbf{43}$

$\therefore$ **There are 43 natural nos. between 200 and 500 which are divisible by 7.**

23. If $\sin\theta = 1/2$, then show that $3\cos\theta - 4\cos^3\theta = 0$.

$\sin\theta = \frac{1}{2}$

$\sin\theta = \sin 30^\circ \Rightarrow \theta = 30^\circ$

L.H.S. $= 3\cos\theta - 4\cos^3\theta$

$= 3\cos 30^\circ - 4\cos^3(30^\circ)$

$= 3\left(\frac{\sqrt{3}}{2}\right) - 4\left(\frac{\sqrt{3}}{2}\right)^3 = \frac{3\sqrt{3}}{2} - 4\left(\frac{3\sqrt{3}}{8}\right)$

$= \frac{3\sqrt{3}}{2} - \frac{3\sqrt{3}}{2} = \mathbf{0 = R.H.S.}$

24. Three vertices of a parallelogram taken in order are (-1, 0), (3, 1) and (2, 2) respectively. Find the coordinates of fourth vertex.

Let A(–1, 0), B(3, 1), C(2, 2) and D(x, y) be the vertices of a parallelogram ABCD taken in order. Since, the diagonals of a parallelogram bisect each other.

$\therefore$ Coordinates of the mid-point of AC
= Coordinates of the mid-point of BD

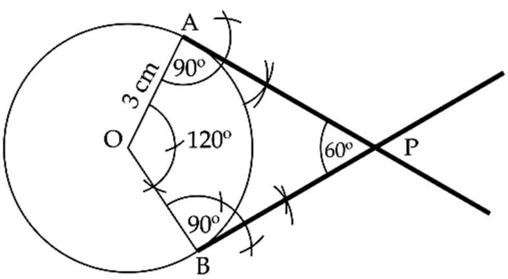
$\Rightarrow \left(\frac{-1+2}{2}, \frac{0+2}{2}\right) = \left(\frac{3+x}{2}, \frac{1+y}{2}\right)$

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

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

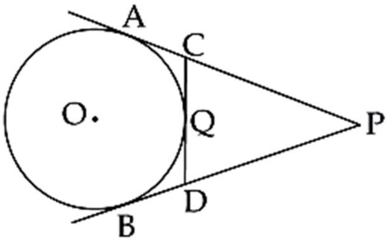
Hence, coordinates of the fourth vertex, **D(–2, 1)**.

25. Draw a pair of tangents to a circle of radius 3 cm which are inclined to each other at an angle of 60°.



$\therefore$ **PA & PB are the required tangents.**

26. In the given figure, PA and PB are tangents to the circle from an external point P. CD is another tangent touching the circle at Q. If PA = 12cm, QC = QD = 3cm, then find PC + PD.



PA = PB = 12 cm ...(*i*)

QC = AC = 3 cm ...(*ii*)

QD = BD = 3 cm ...(*iii*)

To find: PC + PD

= (PA – AC) + (PB – BD)

= (12 – 3) + (12 – 3) **[From (*i*), (*ii*) & (*iii*)**

= 9 + 9 = **18 cm**

(Question no 27 to 33 are Short Answer Type questions of 3 marks each)

27. Find the greatest number of six digits exactly divisible by 18, 24 and 36.

LCM of 18, 24 and 36

$18 = 2 \times 3^2$

$24 = 2^3 \times 3$

$36 = 2^2 \times 3^2$

LCM (18, 24, 36) $= 2^3 \times 3^2 \Rightarrow 72$

The largest 6 digit number is 999999

$\therefore$ The required number = 999999 – 63

= 999936.

```
   13888   Quotient
72 ) 999999
    −72
     279
    −216
      639
     −576
       639
      −576
        639
       −576
         63 → Remainder
```

28. If the roots of the quadratic equation $(a - b)x^2 + (b - c)x + (c - a) = 0$ are equal, prove that $2a = b + c$.

Here 'a' $= a - b$, 'b' $= b - c$, 'c' $= c - a$

D = 0 **[Roots are equal**

$b^2 - 4ac = 0$

$\Rightarrow (b - c)^2 - 4(a - b)(c - a) = 0$

$\Rightarrow b^2 + c^2 - 2bc - 4(ac - a^2 - bc + ab) = 0$

$\Rightarrow b^2 + c^2 - 2bc - 4ac + 4a^2 + 4bc - 4ab = 0$

$\Rightarrow 4a^2 + b^2 + c^2 - 4ab + 2bc - 4ac = 0$

$\Rightarrow (-2a)^2 + (b)^2 + (c)^2 + 2(-2a)(b) + 2(b)(c) + 2(c)(-2a) = 0$

$\Rightarrow [(-2a) + (b) + (c)]^2 = 0$

[$\because x^2 + y^2 + z^2 + 2xy + 2yz + 2zx = (x + y + z)^2$

Taking square-root on both sides

$-2a + b + c = 0$

$\Rightarrow b + c = 2a$ $\therefore$ $\mathbf{2a = b + c}$

OR

Solve for x: $\dfrac{1}{(x-1)(x-2)} + \dfrac{1}{(x-2)(x-3)} = \dfrac{2}{3}, x \neq 1, 2, 3$

$$\frac{1}{(x-1)(x-2)} + \frac{1}{(x-2)(x-3)} = \frac{2}{3}$$

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

$$\Rightarrow \quad \frac{2x-4}{(x-1)(x-2)(x-3)} = \frac{2}{3}$$

$$\Rightarrow \quad \frac{2(x-2)}{(x-1)(x-2)(x-3)} = \frac{2}{3}$$

$\Rightarrow \quad (x-1)(x-3) = 3$

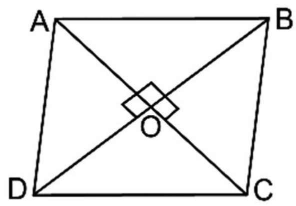
$\Rightarrow \quad x^2 - 3x - x + 3 - 3 = 0$

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

$\Rightarrow \quad x = 0 \quad$ or $\quad x - 4 = 0$

$\therefore \quad \mathbf{x = 0}$ or $\mathbf{x = 4}$

29. ABCD is a rhombus. Prove that $AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$.



$AC \perp BD$

$\therefore$ $OA = OC$ and $OB = OD$ ...[**∵ Diagonals of a rhombus bisect each other at right angles**

In rt. ΔAOB,

$AB^2 = OA^2 + OB^2$ **...[Pythagoras' theorem**

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

$$AB^2 = \frac{AC^2}{4} + \frac{BD^2}{4} = \frac{AC^2 + BD^2}{4}$$

$4AB^2 = AC^2 + BD^2$

$AB^2 + AB^2 + AB^2 + AB^2 = AC^2 + BD^2$

$\therefore \quad \mathbf{AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2}$

[∵ In a rhombus, all sides are equal

30. Prove that: $\dfrac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} + \dfrac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = \dfrac{2}{2\sin^2\theta - 1}$

L.H.S. $= \dfrac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} + \dfrac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta}$

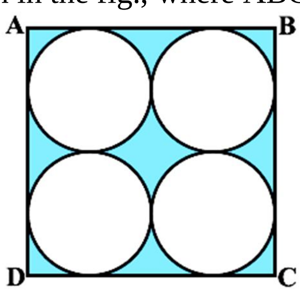
$$= \frac{(\sin\theta - \cos\theta)^2 + (\sin\theta + \cos\theta)^2}{(\sin\theta + \cos\theta)(\sin\theta - \cos\theta)}$$

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

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

$$= \frac{\mathbf{2}}{\mathbf{2\sin^2\theta - 1}} = \textbf{R.H.S.}$$

31. Find the area of the shaded region in the fig., where ABCD is a square of side 28 cm.



Here $r = \frac{28}{4} = 7$ cm

Area of the shaded region

$= \text{ar(square)} - 4\text{(circle)}$

$= (\text{side})^2 - 4\,(\pi r^2)$

$= (28)^2 - 4 \times \frac{22}{7} \times 7 \times 7$

$= 784 - 616 = \mathbf{168\ cm^2}$

32. The mean of the following frequency distribution is 62.8. Find the missing frequency x.

Class	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	5	8	*x*	12	7	8

Class	*Frequency* (f_i)	x_i	f_ix_i
0–20	5	10	50
20–40	8	30	240
40–60	x	50	$50x$
60–80	12	70	840
80–100	7	90	630
100–120	8	110	880
	$\Sigma f_i = 40 + x$		$\Sigma f_ix_i = 2640 + 50x$

$\therefore$ Mean $= \frac{\Sigma f_ix_i}{\Sigma f_i}$ $\Rightarrow$ Mean = 62.8

$\therefore \frac{62.8}{1} = \frac{2640 + 50x}{40 + x}$

$\Rightarrow 2512 + 62.8x = 2640 + 50x$

$\Rightarrow 62.8x - 50x = 2640 - 2512$

$\Rightarrow 12.8x = 128$ $\therefore x = \frac{128}{12.8} = \mathbf{10}$

33. Cards numbered from 11 to 60 are kept in a box. If a card is drawn at random from the box, find the probability that the number on the drawn card is (i) an odd number (ii) a perfect square number (iii) divisible by 5.

Total number of cards = 60 – 11 + 1 = 50

(*i*) Odd nos. are 11, 13, 15, 17, ... 59 = 25 no.

$\therefore$ P(an odd number) $= \frac{25}{50} = \mathbf{\frac{1}{2}}$

(*ii*) Perfect square numbers are
16, 25, 36, 49 = 4 numbers

$\therefore$ P(a perfect square no.) $= \frac{4}{50} = \mathbf{\frac{2}{25}}$

(*iii*) "Divisible by 5" numbers are 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, = 10 numbers

$\therefore$ P(divisible by 5) $= \frac{10}{50} = \mathbf{\frac{1}{5}}$

(Question no 34 to 36 are Long Answer Type questions of 5 marks each.)

34. The area of a rectangle gets reduced by 9 square units, if its length is reduced by 5 units and breadth is increased by 3 units. If we increase the length by 3 units and the breadth by 2 units, the area increases by 67 square units. Find the dimensions of the rectangle.

Let length of given rectangle be x and breadth be y

$\therefore$ Area of rectangle $= xy$

According to the first condition,

$$(x-5)(y+3) = xy-9$$

$$\Rightarrow \quad 3x-5y = 6 \quad ...(i)$$

According to the second condition,

$$(x+3)(y+2) = xy+67$$

$$\Rightarrow \quad 2x+3y = 61 \quad ...(ii)$$

Multiplying eqn. (i) by 3 and eqn. (ii) by 5 and then adding,

$$9x-15y = 18$$

$$10x+15y = 305$$

$$\therefore \quad x = \frac{323}{19} \Rightarrow 17$$

Substituting this value of x in eqn. (i),

$$3(17)-5y = 6$$

$$\Rightarrow \quad 5y = 51-6$$

$$\therefore \quad y = 9$$

Hence, perimeter $= 2(x+y) \Rightarrow 2(17+9) \Rightarrow 52$ units.

35. The angle of elevation of a cloud from a point 60m above a lake is 30^0 and the angle of depression of the reflection of the cloud in the lake is 60^0 find the height of the cloud from the surface of the lake.

Let the height of the cloud from the surface of lake EC = H m = EF (image in water) and A be the point, the distance between A and perpendicular of cloud AD = x m

In ΔACD, $\tan 30° = \frac{DC}{AD}$

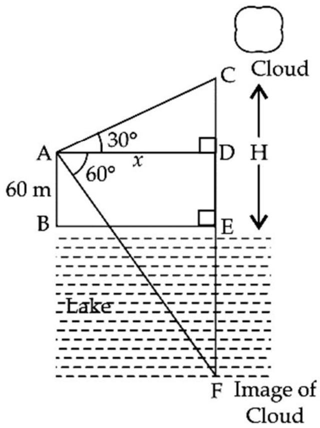
$$\frac{1}{\sqrt{3}} = \frac{H-60}{x}$$

$$x = \sqrt{3}H - 60\sqrt{3} \quad ...(i)$$

In rt. ΔADF,

$$\tan 60° = \frac{DF}{AD}$$

$$\sqrt{3} = \frac{H+60}{x}$$



$$x = \frac{H+60}{\sqrt{3}} \quad ...(ii)$$

Comparing (i) and (ii), we have

$$\sqrt{3}H - 60\sqrt{3} = \frac{H+60}{\sqrt{3}}$$

$\Rightarrow$ 3H – 180 = H + 60

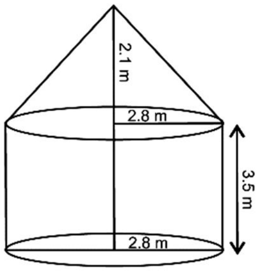
$\Rightarrow$ 3H – H = 60 = 180

$\Rightarrow$ 2H = 240

$\Rightarrow$ H = 120

$\therefore$ **Height of the cloud = 120 m**

36. Due to heavy floods in a state, thousands were rendered homeless. 50 schools collectively offered to the state government to provide place and the canvas for 1500 tents to be fixed by the governments and decided to share the whole expenditure equally. The lower part of each tent is cylindrical of base radius 2.8 m and height 3.5 m, with conical upper part of same base radius but of height 2.1 m. If the canvas used to make the tents costs Rs. 120 per sq. m, find the amount shared by each school to set up the tents.



Let r and h be the radius and height of cylindrical part respectively and l be the slant height of conical part.

Slant height of conical part (l),

$= \sqrt{(2.1)^2 + (2.8)^2}$ **[By Pythagoras' theorem**

$\therefore \quad l = \sqrt{4.41 + 7.84} = \sqrt{12.25} = 3.5$ m

Area of Canvas/tent

= C.S. area of cylindrical part + C.S. area of conical part

$= 2\pi rh + \pi rl$ **[∵ $r = 2.8$ m, $h = 3.5$ m, $l = 3.5$ m**

$= \pi r(2h + l)$

$= \frac{22}{7} \times 2.8\ [2(3.5) + 3.5]$

$= 22 \times 0.4\ (7.0 + 3.5)$

$= 8.8\ (10.5) = 92.4$ m^2

ar. of canvas for 1,500 tents = $(92.4 \times 1{,}500)$ m^2

= 1,38,600 m^2

Cost of 1,500 tents @ 120 per m^2

= 1,38,600 × ₹120 per m^2 = ₹1,66,32,000

Share of each School = $\frac{\text{Total Cost}}{\text{No. of Schools}}$

$= \frac{₹1,66,32,000}{50}$ = **₹3,32,640**