1. Find the smallest odd composite number.

Sol. We know that composite number are those number which has atleast one factor other 1 and the number itself. Number 3, 5 and 7 has no other factor, so it is not composite number. Number 9 is composite

$$x = -\frac{}{4}$$

So, the required ratio is 3 : 4 internally.

3. If the graph of quadratic polynomial intersect the X-axis at two points, then find the shape of parabola.

not composite number. Number 9 is composite number, because it has factor 3×3.

2. Find the ratio in which the line $3x + y - 9 = 0$ divides the segment joining the points $(1, 3)$ and $(2, 7)$.

two points, then shape may be open upward or open downward.

4. Two cones have their heights in the ratio $1 : 4$ and radii in the ratio $4 : 1$. Find the ratio of their volumes.
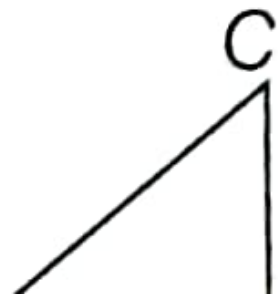
Sol. Let the radii of two cones are r_1 and r_2 and their heights are h_1 and h_2.

Then $\dfrac{r_1}{} = \dfrac{4}{}$ and $\dfrac{h_1}{} = \dfrac{1}{}$

$$= \left(\frac{4}{1}\right)^2 \times \left(\frac{1}{4}\right) = \frac{4}{1}$$

5. If $8 \tan \theta = 15$, then find $\sin \theta - \cos \theta$.

Sol. We have, $\tan \theta = \dfrac{15}{8} = \dfrac{BC}{AB}$

17   17   17

6. Find the next term of the AP 5, 2, −1, −4 .

Or

Which term of the AP 3, 15, 27, 39, ... will be 132 more than its 54th term?

ɔ1. Given, AP is 5, 2, −1, −4, ...

Here, first term a − 5

7. The length of minute hand of a clock is 7 cm. Find the area swept by the minute hand in one minute.

Or

The radii of the bases of two right circular solid cones of same height are r_1 and r_2, respectively. If both cones are melted and recast into a solid sphere of radius R. Then, find the height of each cone.

$$\therefore \qquad h = \frac{4R^3}{r_1^2 + r_2^2}$$

8. If mode of a data is 45, mean is 27, then find the median.

Sol. We know that, Mode = 3 Median − 2 Mean

$$\text{Median} = \frac{\text{Mode} + 2\,\text{Mean}}{3}$$

45 + 2 × 27

9. If radius of circle is 3 cm and tangent is drawn from an external point to the circle is 4 cm, then find the distance from centre of circle to the external point.

Sol. Given, $OQ = 3$ cm and $PQ = 4$ cm.

10. If $\triangle ABC \sim \triangle PQR$ such that $AB = 5.5$ cm, $PQ = 11$ cm and perimeter of $\triangle ABC = 70$ cm, then find the perimeter of $\triangle PQR$.

Or If two concentric circles, a chord of length 20 cm of larger circle becomes a tangent to the smaller circle whose radius is 7 cm. Find the radius of the larger circle.

$$= \sqrt{(10)^2 + (7)^2}$$

$$= \sqrt{100 + 49} = \sqrt{149} \text{ cm}$$

11. Find the probability of getting 101 marks in out of 100 marks.

Sol. In out of 100 marks, we do not get 101 marks, which is impossible event. Hence, probability of impossible event is 0.

12. If $\tan^2 45° - \cos^2 30° = x \sin 45° \cos 45°$.

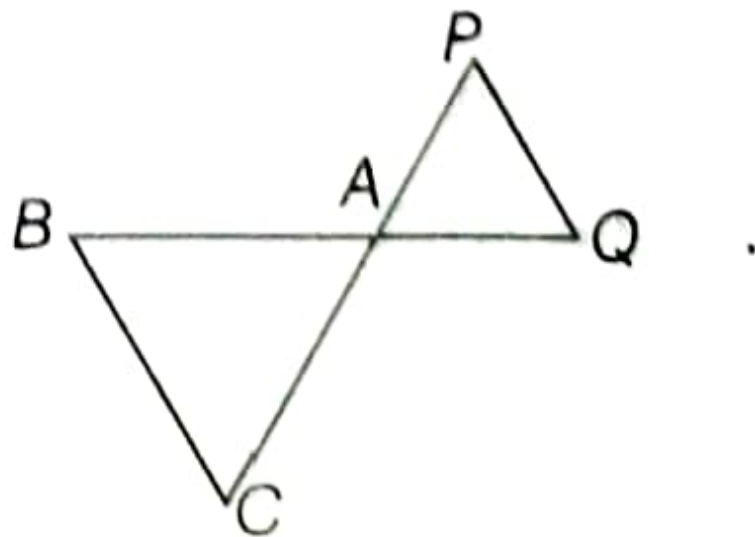is impossible event. Hence, probability of impossible event is 0.

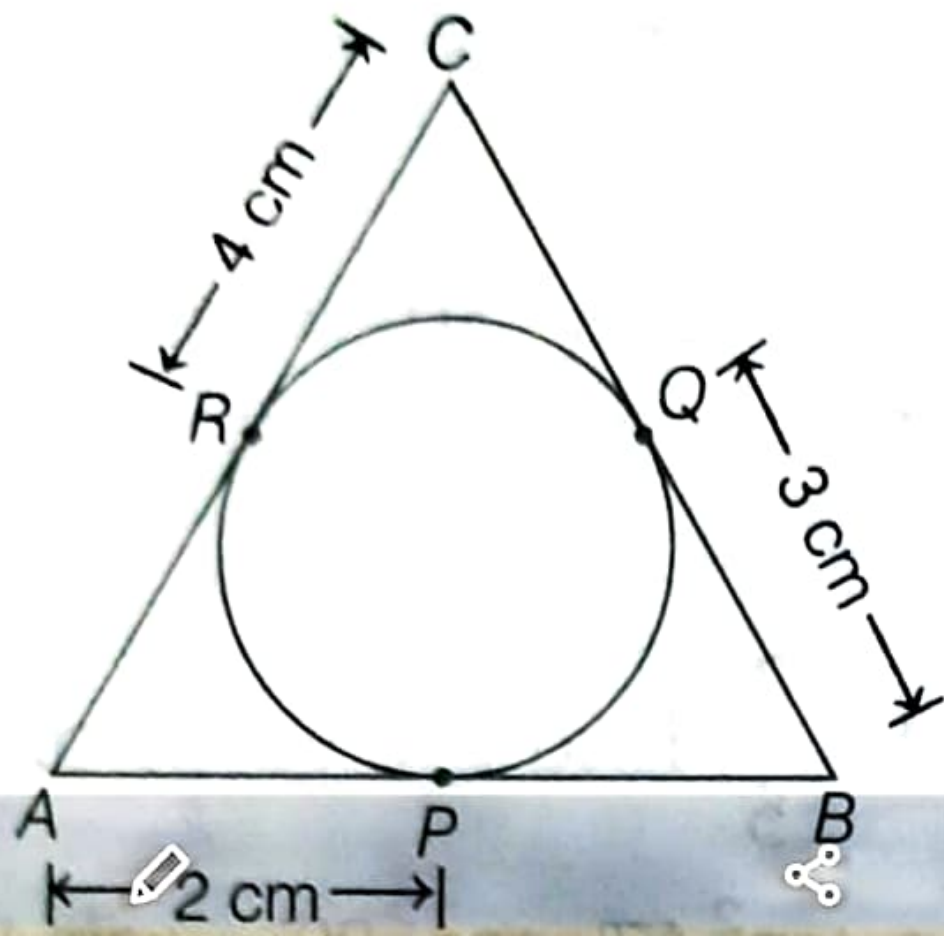**12.** If $\tan^2 45° - \cos^2 30° = x \sin 45° \cos 45°$, then find the value of x.

Or

If $\sin A = \dfrac{2}{5}$, find the value of $5 + 4\cot^2 A$.

Sol. We have, $\tan^2 45° - \cos^2 30° = x \sin 45° \cos 45°$

13. In the given figure, if $\triangle ACB \sim \triangle APQ$, $BA = 6$ cm, $BC = 8$ cm and $PQ = 4$ cm, then find the length of AQ.

14. In the given figure, if $AP = 2$ cm, $BQ = 3$ cm and $RC = 4$ cm, then calculate the perimeter of $\triangle ABC$.

15. In an isosceles right angled triangle, if the hypotenuse is $6\sqrt{2}$ cm, find the length of the sides of the triangle.

16. Evaluate the value of $\dfrac{\sin 45^\circ}{\sec 30^\circ + \csc 30^\circ}$

Or

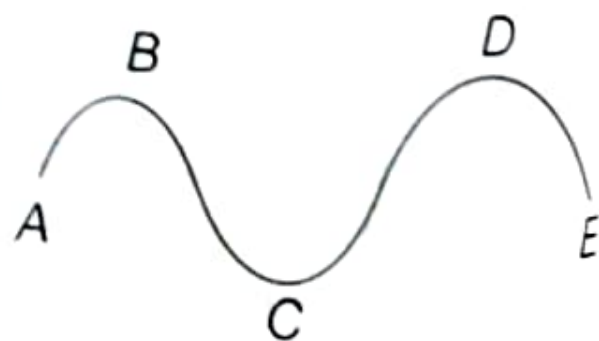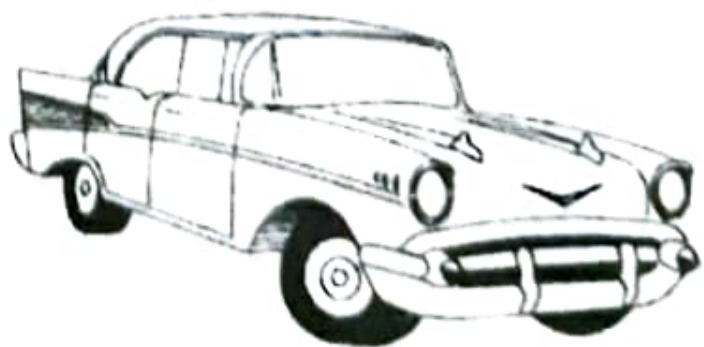If $\sin 2A = 2 \sin A$, then show that it is true for $A = 0^\circ$.

Section - II

17. Case Study I

Parabolic Path

A car moves on a highway, the path trace by the car is shown below.

The pattern of the path traced in the shape of parabolic.

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

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

(a) What is the shape of the curve CDE?

    (i) parabolic

    (ii) circle

    (iii) straight line

    (iv) ellipse

(b) If the shape of the curve ABC is represented by $x^2 - 7x + 12$, then its zeroes are

    (i) 2, $-$ 3   (ii) 3, 4
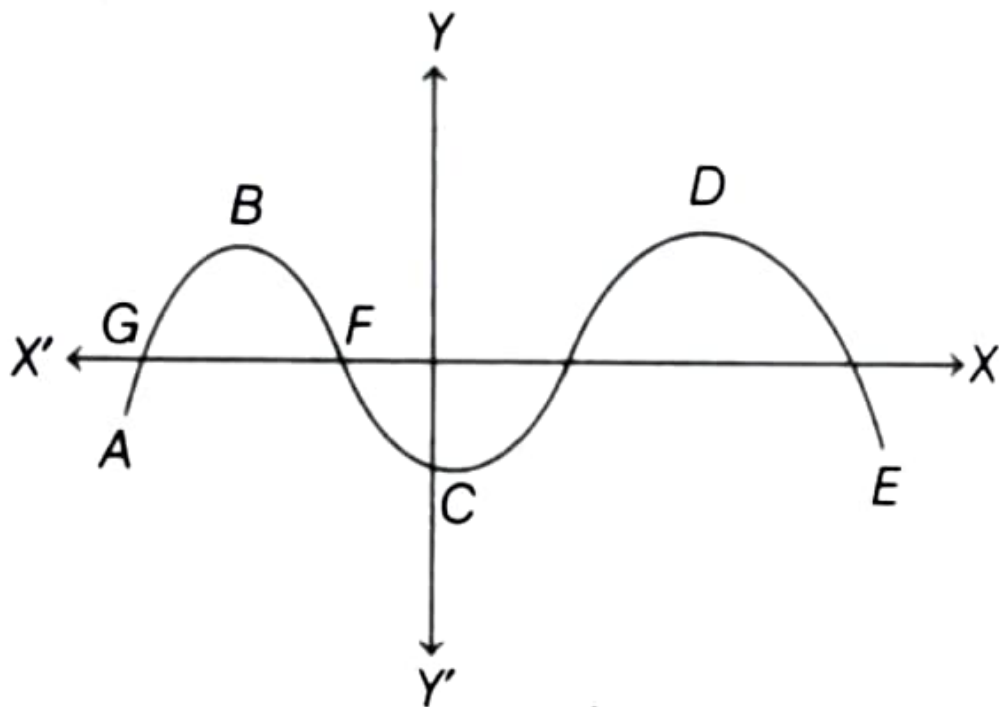
    (iii) 4, $-$ 5   (iv) 3, $-$ 5

(c) The path trace by the car, whose zeroes are 2 and -4, is

(i) $x^2 - 4x - 8$

(ii) $x^2 + 2x - 8$

(iii) $x^2 + 2x + 8$

(iv) $x^2 - 2x + 8$

(d) The given path is show on the coordinate axes, which is shown below.

Find the number of zeroes of the given curve.
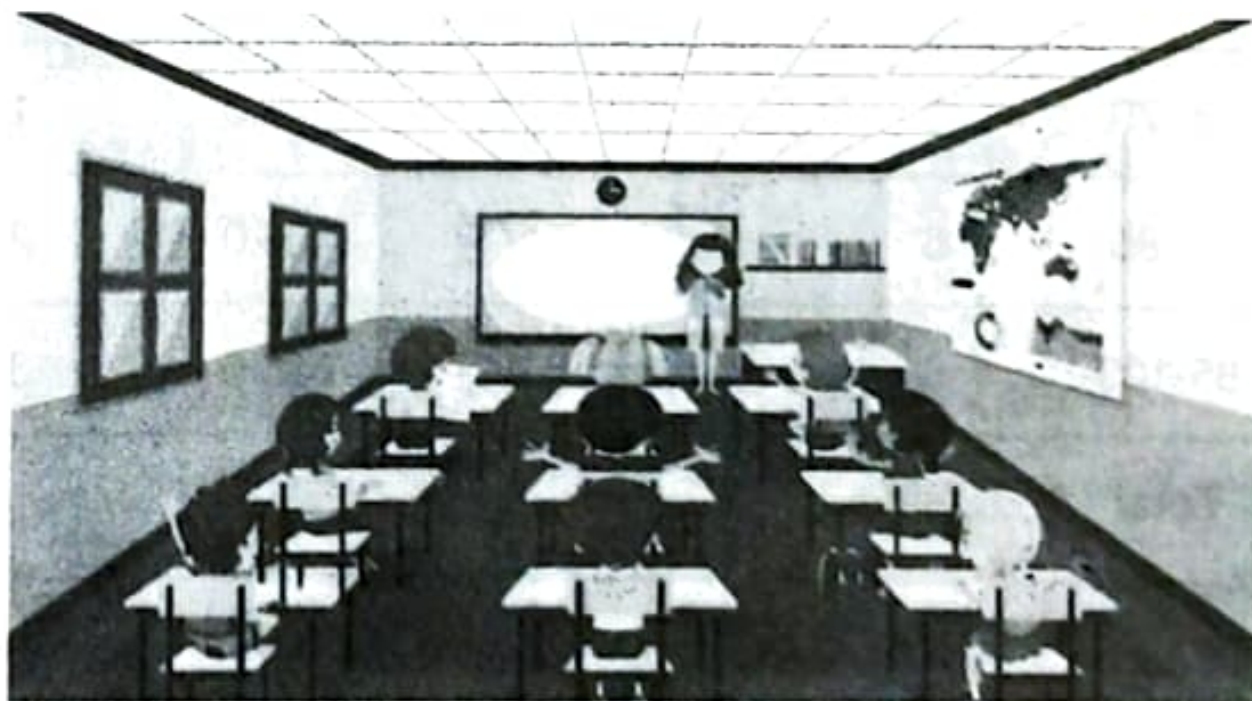
(i) 3

(ii) 2

(iii) 4

(iv) 1

(e) If the path ABC trace by the car in above question is represented by $x^2 + 8x + 15$, then find the distance between G and F.

  (i) 2

  (ii) 3

  (iii) 1

  (iv) can not be determined

18. Case Study II

Students Studying in Class Room

In a mathematic class, a teacher explain the concept for determine the mean by defining the formula $\bar{x} = \dfrac{\Sigma f_i x_i}{\Sigma f_i}$.

Further, a teacher give one example for explaining the above concepts.

The marks obtained by 30 students of class X of a certain school in a mathematics paper consisting of 100 marks are presented in table below

Class interval	10-25	25-40	40-55	55-70	70-85	85-100
Number of Students	2	3	7	6	6	6

(a) Find the average marks obtained by the students.

    (i) 61   (ii) 62

    (iii) 63   (iv) 64

(b) Find the cumulative frequency value in the interval (40-55).

(i) 5   (ii) 12

(iii) 2   (iv) 18

(c) Through cumulative frequency table, which central measurement can be determined.

(i) mean   (ii) mode

(iii) median   (iv) None of these

(d) Find the lower limit of the median class.

(i) 55   (ii) 40

(iii) 70   (iv) 25

(e) Find the upper limit of modal class.

(i) 40   (ii) 55
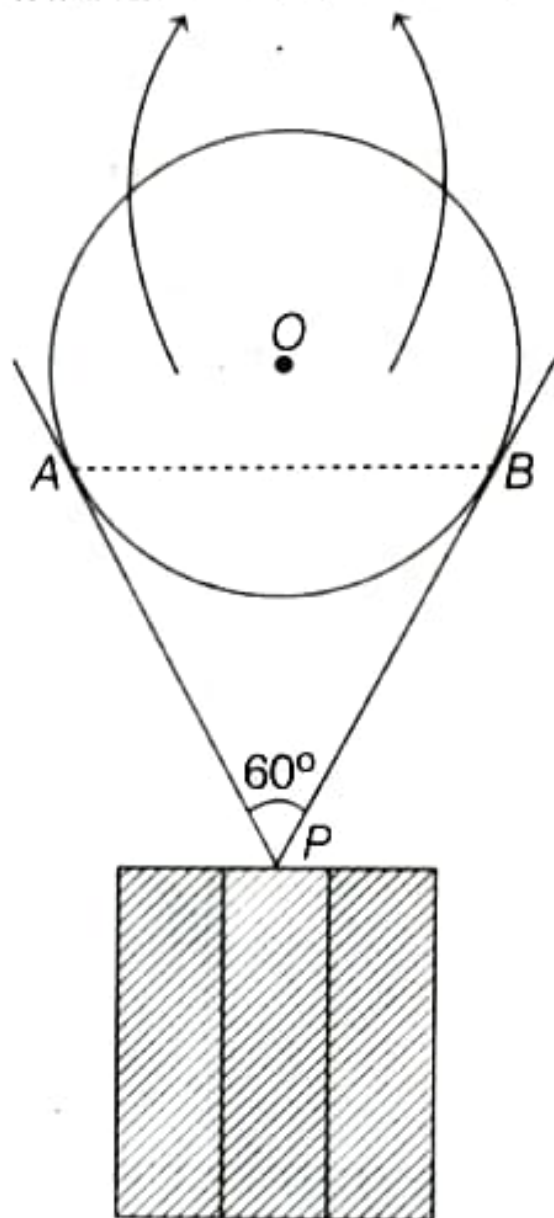
(iii) 70   (iv) 25

19. Case Study III

Campaign About Diabities Awareness

As a part of a campaign, a huge ballon with message of "AWARENESS OF DIABITIES" was displayed from the terrace of a tall building.

It was held by string of length 8 m each, which inclined at an angle of 60° at the point, where it was tied as shown in the figure.

(a) △ABC is a/an
   (i) isosceles
   (ii) equilateral
   (iii) right triangle
   (iv) right angled isosceles

(b) What is the length of AB?
   (i) 8 m   (ii) 6 m
   (iii) 7 m   (iv) 9 m

(c) If the perpendicular distance from the centre of the circle to the chord AB is 3 cm, then find the radius of the circle.
   (i) 3 m   (ii) 4 m
   (iii) 5 m   (iv) 6 m

(d) Find the distance between the centre of circle and vertex of triangle P.
   (i) 9.43 cm   (ii) 9.8 cm
   (iii) 9.9 cm   (iv) 10.1 cm

(e) The area of △APP is
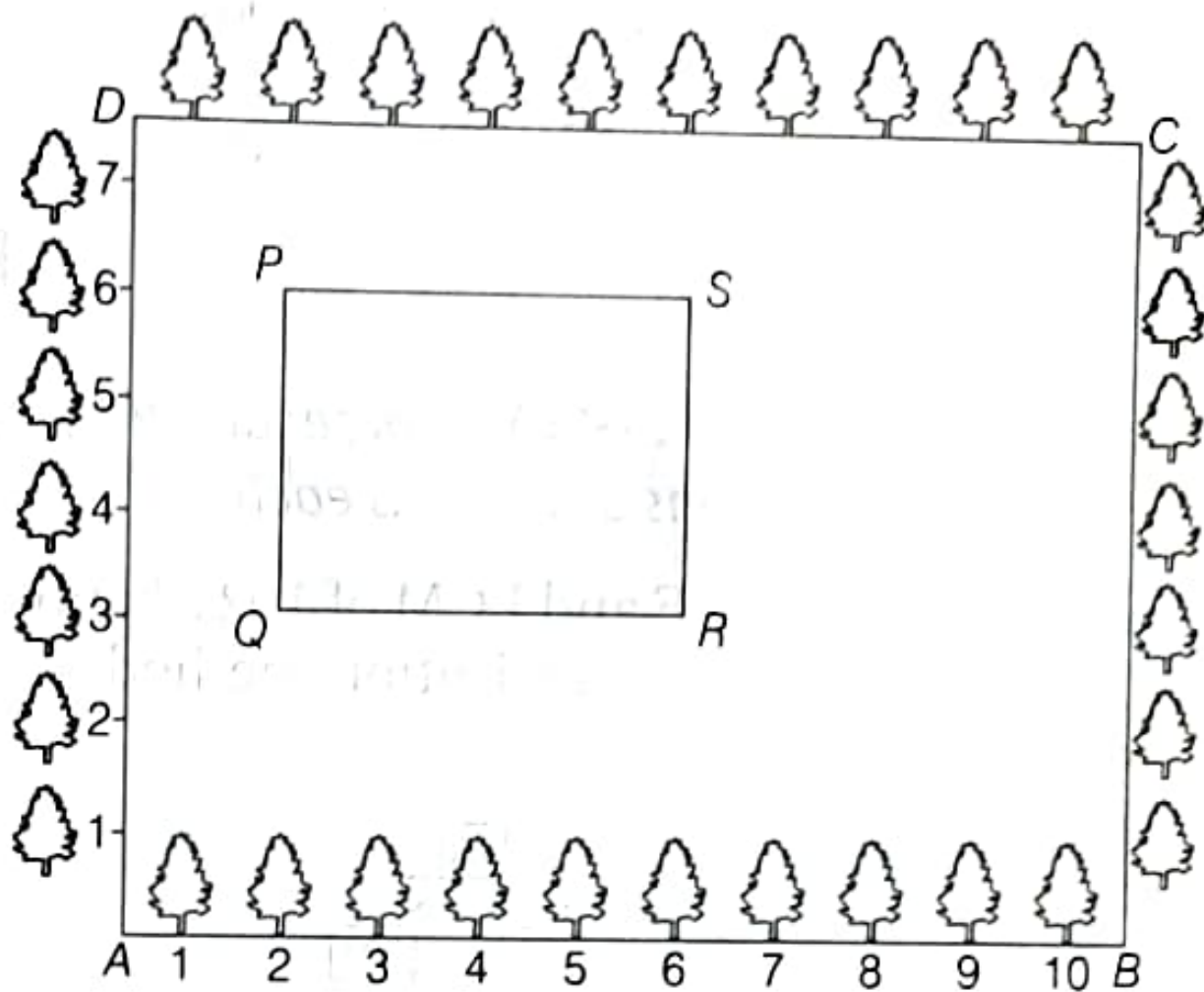   (i) $25\sqrt{3}$ m   (ii) $29\sqrt{3}$ m
   (iii) $30\sqrt{3}$ (iv) $16\sqrt{3}$ m

20. Case Study IV

Tree Platation to Control Pollution

The class X students of a secondary school in Krishnagar have been alloted a rectangular plot of land for this gardening activity

Sapling of Gulmohar are planted on the boundary at a distance of 1 m from each other. There is a rectangular gracy lawn in the plot as shown in above figure.

The students sowing seeds of flowering plants on the remaining area of the plot.

(a) Find the coordinates of point Q and S are

    (i) (2, 3), (6, 6)   (ii) (3, 2), (6, 6)

    (iii) (2, 3), (5, 5)   (iv) None of these

(b) Find the distance between the vertices of diagonal Q and S

    (i) 3   (ii) 5   (iii) 6   (iv) 7

(c) Find the width of rectangle $PQRS$.

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

(d) If the point G divides the line QR in the ratio $1 : 2$, then the coordinate of G is

    (i) (10, 3)   (ii) $\left(\dfrac{10}{3}, 3\right)$

    (iii) $\left(3, \dfrac{10}{3}\right)$ (iv) None of these

(e) Find the area of the rectangle field $PQRS$.

    (i) 8 sq units   (ii) 10 sq units

    (iii) 12 sq units   (iv) 14 sq units

Directions (Q.Nos. 21-26) *These are Very Short Answer Type questions of 2 marks each.*

21. Find the HCF and LCM of 10224 and 1608 using prime factorisation method.

22. Check whether the given quadratic equation $2x^2 + 5\sqrt{3}x + 6 = 0$ has real roots and if so, find the roots.

23. A boy noted the number of cars passing through a spot on a road for 100 periods each of 3 min and summarised it in the table given below. Find the mode of the data.

Number of cars	f
0-10	7
10-20	14
20-30	13
30-40	12
40-50	20
50-60	11
60-70	15
70-80	8

Or

The Arithmetic Mean of the following frequency distribution is 50. Find the value of p.

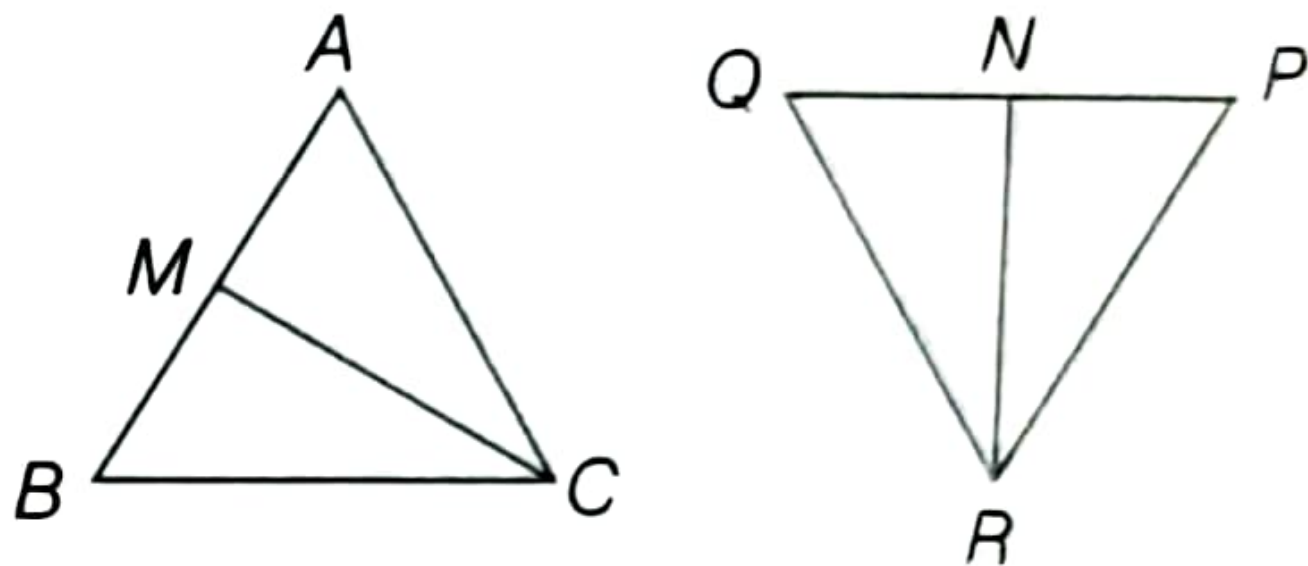| Class interval	0-20	20-40	40-60	60-80	80-100
Frequency	17	p	32	24	19

24. Prove that

$$(\tan^2 A - \tan^2 B) = \frac{(\sin^2 A - \sin^2 B)}{\cos^2 A \cos^2 B}$$

$$= \frac{\cos^2 B - \cos^2 A}{\cos^2 B \cos^2 A}.$$

Or

If $\sqrt{3} \tan 2\theta - 3 = 0$, then find the value of $\cos\theta$.

25. In the following figure, CM and RN are respectively the medians of $\triangle ABC$ and $\triangle PQR$.

If $\triangle ABC \sim \triangle PQR$, then prove that $\triangle AMC \sim \triangle PNR$.

26. Two opposite angular points of a square $ABCD$ are $A(-1, 2)$ and $C(3, -2)$. Find the coordinates of the remaining angular points of the square.

27. The angles of a triangle are in AP. If the greatest angle equals to the sum of the other two, then find the angles. Also, conclude that find these angles are multiple of which angle.

Or

A sum of ₹ 1000 is invested at 8% simple interest per annum. Calculate the interest at the end of 1, 2, 3, ... years. Is the sequence of interests an AP? Find the interest at the end of 30 yr.

28. In a violent storm, a tree got bent by the wind. The top of the tree meets the ground at an angle of 30°, whose distance of 30 m from the root. At what height from the bottom did the tree get bent? What was the original height of the tree?

[take, $\sqrt{3} = 1.73$]

29. A car has wheels which are 80 cm in diameter. How many complete revolutions does each wheel make in 10 min when the car is travelling at a speed of 66 km/h?

30. Prove that, if a, b, c and d are positive rationals such that, $a + \sqrt{b} = c + \sqrt{d}$, then either $a = c$ and $b = d$ or b and d are squares of rationals.

31. Two dice are thrown at the same time. Find the probability that the sum of the two numbers appearing on the top of the dice is (i) 8 (ii) 13 (iii) less than or equal to 12.

Or

From a pack of 52 playing cards jacks, queens, kings and aces of red colour are removed. From the remaining, a card is drawn at random. Find the probability that the card drawn is (i) a black queen (ii) a red card (iii) a ten .

32. Draw the graphs of the equations $5x - y = 5$ and $3x - y = 3$. Determine the coordinates of the vertices of the triangle formed by these lines and Y-axis.

34. Ram and Shyam together have 55 marbles. Both of them lost 5 marbles each and the product of the number of marbles they row have is 164. Find out how many marbles they had to start with?

33. Prove that

$$\frac{(1 + \cot A + \tan A)(\sin A - \cos A)}{(\sec^3 A - \operatorname{cosec}^3 A)} = \sin^2 A \cos^2 A.$$

35. Construct a tangent to a circle of radius 5 cm from a point on the concentric circle of radius 7 cm and measure its length. Also, verify the measurements of actual calculation.

36. From a solid cylinder whose height is 12 cm and diameter is 10 cm, a conical cavity of same height and same diameter is hollowed out. Find the volume and total surface area of the remaining solid.

Or

A right angled triangle whose sides are 3 cm and 4 cm (other than hypotenuse) is made to revolve about its hypotenuse. Find the volume and surface area of the double cone so formed. [Choose the value of π as found appropriate.]