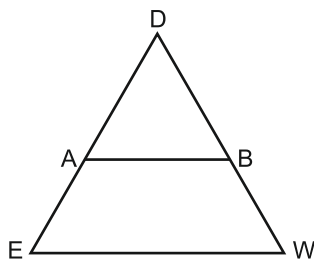


QUESTION PAPER-2 MATHEMATICS

Section-A

Section A consists of 20 questions of 1 mark each

1. The mid-point of line segment joining origin and $(-4, -2)$ is
 (a) $(2, 1)$ (b) $(1, 2)$ (c) $(-4, -2)$ (d) $(-2, -1)$
2. The value of $\tan 45^\circ \cos 60^\circ + \sin 60^\circ \cot 60^\circ$ is
 (a) $\frac{1}{2}$ (b) 2 (c) 1 (d) $\frac{1}{3}(\sqrt{3}+1)$
3. The discriminant of the quadratic equation $2x^2 - \sqrt{5}x + 1 = 0$ is
 (a) -3 (b) $\sqrt{-3}$ (c) 1 (d) -1
4. The acute angle θ satisfying $\sqrt{3} \sin \theta = \cos \theta$ is
 (a) 70° (b) 30° (c) 45° (d) 60°
5. In $\triangle DEW$, $AB \parallel EW$. If $AD = 4$ cm, $DE = 12$ cm and $DW = 24$ cm, then the value of DB is



- (a) 16 cm (b) 4 cm (c) 12 cm (d) 8 cm
6. An unbiased die is thrown, the probability of getting an even number is
 (a) 1 (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) $\frac{1}{3}$
 7. A pendulum swings through an angle of 30° and describes an arc 4.4 cm in length, then the length of the pendulum is
 (a) 8.4 cm (b) 4.4 cm (c) 10.2 cm (d) 6.8 cm
 8. If α, β are the zeroes of the polynomial $p(x) = 4x^2 + 3x + 7$, then the value of $\alpha\beta$ is
 (a) $\frac{3}{4}$ (b) $-\frac{3}{4}$ (c) $\frac{7}{4}$ (d) $\frac{7}{3}$
 9. A card is drawn from a well - shuffled deck of 52 cards. The probability of getting a king of red color is
 (a) $\frac{1}{52}$ (b) $\frac{1}{13}$ (c) $\frac{1}{26}$ (d) $\frac{3}{52}$
 10. If point P lies inside the circle, then the number of tangent(s) drawn from point P are
 (a) 0 (b) 1 (c) 2 (d) ∞

11. A quadratic polynomial whose zeros are reciprocals of the zeros of the polynomial $f(x) = ax^2 + bx + c$, $a \neq 0$, $c \neq 0$.

(a) $k\left(x^2 + \frac{bx}{c} + \frac{b}{c}\right)$ (b) $k\left(x^2 + \frac{bx}{c} + \frac{a}{c}\right)$ (c) $k\left(x^2 + \frac{bx}{c} + \frac{1}{c}\right)$ (d) $k\left(x^2 + \frac{ax}{c} + \frac{a}{c}\right)$

12. The formula for finding mean by direct method is $\frac{\sum(A \times B)}{\sum A}$, where B and A are respectively

- (a) class mark, frequency of the class (b) average frequency, class size
 (c) class size, average frequency (d) frequency of the class, class mark

13. The 17th term of an AP exceeds its 10th term by 7. Then, the common difference is

- (a) 1 (b) $\frac{7}{2}$ (c) 2 (d) $\frac{7}{6}$

14. The mode of the following data is

x_j	10	14	18	21	25
f_j	10	15	7	9	9

- (a) 16 (b) 14 (c) 12 (d) 10

15. Solve: $(x + 2)(3x - 5) = 0$.

- (a) $2, \frac{5}{3}$ (b) $2, \frac{3}{2}$ (c) $-2, 5$ (d) $-2, \frac{5}{3}$

16. The roots of the equation $2x^2 - 6x + 7 = 0$ are

- (a) real, unequal and rational (b) real, unequal and irrational
 (c) real and equal (d) imaginary

17. A ladder 15 m long makes an angle of 60° with the wall. The height of the point, where the ladder touches the wall, is

- (a) $15\sqrt{3}$ m (b) $\frac{15\sqrt{3}}{2}$ m (c) $\frac{15}{2}$ m (d) 15 m

18. In a right circular cone, the cross-section made by a plane parallel to the base is

- (a) sphere (b) hemisphere (c) circle (d) semi-circle

Directions In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)
 (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
 (c) Assertion (A) is true but Reason (R) is false
 (d) Assertion (A) is false but Reason (R) is true

19. **Assertion (A) :** The system of equations $x + y - 8 = 0$ and $x - y - 2 = 0$ has a unique solution.
Reason (R) : The system of equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution, when $\frac{a_1}{a_2} = \frac{b_1}{b_2}$.
20. **Assertion (A) :** If the median and mode of a frequency distribution are 150 and 154 respectively, then its mean is 148.
Reason (R) : Mean, median and mode of a frequency distribution are related as

$$\text{Mode} = 3 \text{ Median} - 2 \text{ Mean}$$

Section-B

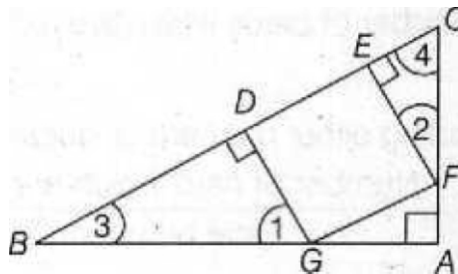
Section B consists of 5 questions of 2 marks each

21. If $x = a \cos \theta$ and $y = b \sin \theta$, then find $b^2x^2 + a^2y^2$.
22. Show that $\frac{2}{5\sqrt{3}}$ is an irrational number.

OR

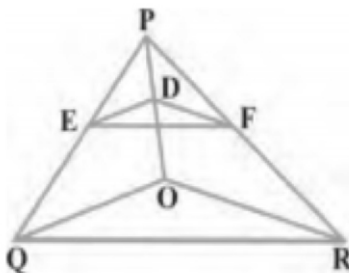
Show that $6 - 2\sqrt{3}$ is irrational.

23. If α and β are the zeroes of the polynomial $p(x) = 5x^2 - 7x + 1$, then find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$.
24. Solve : $\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}$, $x \neq -1, -2, -4$
25. In the given figure, if DEFG is a square and $\angle BAC = 90^\circ$, then show that $DE^2 = BD \times EC$.



OR

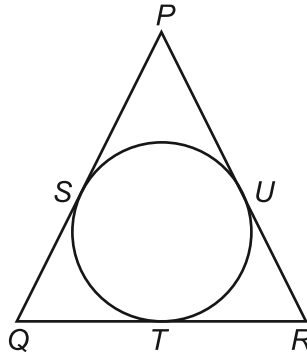
In the figure, $DE \parallel OQ$ and $DF \parallel OR$, show that $EF \parallel QR$.



Section-C

Section C consists of 6 questions of 3 marks each

26. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find:
 (i) the length of the arc
 (ii) area of the sector formed by the arc
 (iii) area of the segment formed by the corresponding chord
27. In the given figure, if $PQ = PR$ prove that $QT = TR$ i.e. QR is bisected at T .



28. A die is thrown once. Find the probability of getting
 (i) an even prime number. (ii) a number divisible by 2.

OR

A card is drawn at random from a well-shuffled pack of 52 cards. Find the probability that the card drawn is neither a red card nor a queen.

29. The following table shows the age distribution of cases of a certain disease admitted during a year in a particular hospital.

Age (in yr)	5-14	15-24	25-34	35-44	45-54	55-64
Number of cases	6	11	21	23	14	5

Find the mode of following distribution.

30. Solve for x and y using elimination method
 $10x + 3y = 75$, $6x - 5y = 11$

OR

Solve for x and y using substitution method

$$11x + 15y + 23 = 0, 7x - 2y - 20 = 0$$

31. Two pillars of, equal height are on either sides of a road, which is 100 m wide. The angles of the top of the pillars are 60° and 30° at a point on the road between the pillars. Find the position of the point between the pillars. Also, find the height of each pillar.

Section-D

Section D consists of 4 questions of 5 marks each

32. From a solid cylinder whose height is 2.8 cm and diameter is 1.8 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm^2 .

OR

Water in a canal, 6 m wide and 1.5 m deep is flowing with a speed of 10 km/h. How much area will it irrigate in 30 min, if 8 cm of standing water is needed?

33. Draw the graphs of the equations $5x - y - 5 = 0$ and $3x - y = 3$. Determine the coordinates of the vertices of the triangle formed by these lines and Y-axis.
34. There is a small island in the middle of a 100 m wide river and a tall tree stands on the island. P and Q are points directly opposite to each other on two banks, and in line with the tree. If the angles of elevation of the top of the tree from P and Q are respectively 30° and 45° , find the height of the tree.

OR

An aeroplane when flying at a height of 4000m from the ground passes vertically above another aeroplane at an instant when the angles of the elevation of the two planes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the aeroplanes at that instant.

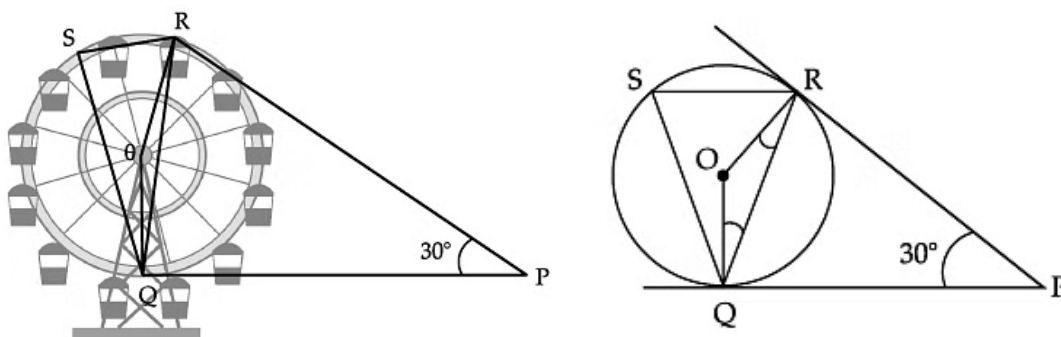
35. Diagonals AC and BD of a trapezium ABCD with $AB \parallel DC$ intersect each other at the point O. Using similarity criterion for two triangles, show that $\frac{OA}{OC} = \frac{OB}{OD}$

Section-E

Case study based questions are compulsory

36. A Ferris wheel (or a big wheel in the United Kingdom) is an amusement ride consisting of a rotating upright wheel with multiple passenger-carrying components (commonly referred to as passenger cars, cabins, tubs, capsules, gondolas, or pods) attached to the rim in such a way that as the wheel turns, they are kept upright, usually by gravity.

After taking a ride in Ferris wheel, Aarti came out from the crowd and was observing her friends who were enjoying the ride. She was curious about the different angles and measures that the wheel will form. She forms the figure as given below.

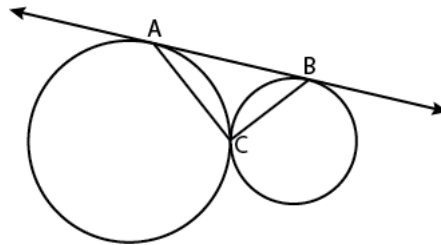


On the basis of above information, answer the following questions.

- In the given figure, find $\angle ROQ$.
- In the given figure, find $\angle RSQ$.
- In the given figure, find $\angle RQP$.

OR

In the given figure, two circles touch each other at C and AB is a tangent to both the circles. Find $\angle ACB$.



37. Ram asks the labour to dig a well up to a depth of 15 m. Labour charges Rs. 100 for first metre and increase Rs. 25 for each subsequent metres. As labour was uneducated, he claims Rs. 400 for the whole work.

On the basis of above information, answer the following questions.

- (i) Find the AP sequence that is formed by the labour charge. (1)
- (ii) Find the labour charge to dig the well. (1)
- (iii) How much money would Ram save if labour agree with Rs. 400 for the whole work? (2)

OR

Find the sum of AP sequence that is formed by the labour charge. (2)

38. To enhance the reading skills of grade X students, the school nominates you and two of your friends to set up a class library. There are two sections- Section A and Section B of grade X. There are 32 students in section A and 36 students in section B.



On the basis of above information, answer the following questions.

- (i) What is the minimum number of books you will acquire for the class Library, so that they can be distributed equally among students of Section A or Section B?
- (ii) Express 36 as product of it primes.
- (iii) Find the HCF of the numbers 867 and 255.

OR

If LCM of 12 and 42 is $10m + 4$, then find the value of m.