SAMPLE PAPER 1 2024-25 BASIC
Class 10 - Mathematics

Time Allowed: 3 hours   **Maximum Marks: 80**

General Instructions:

Read the following instructions carefully and follow them:

1. This question paper contains 38 questions.

2. This Question Paper is divided into 5 Sections A, B, C, D and E.

3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion-Reason based questions of 1 mark each.

4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.

5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.

6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.

7. In Section E, Questions no. 36-38 are case study-based questions carrying 4 marks each with sub-parts of the values of 1,1 and 2 marks each respectively.

8. All Questions are compulsory. However, an internal choice in 2 Questions of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.

9. Draw neat and clean figures wherever required.

10. Take $\pi = 22/7$ wherever required if not stated.

11. Use of calculators is not allowed.

Section A

1. The LCM of two numbers is 1200. Which of the following cannot be their HCF?   **[1]**

    a) 500   b) 200

    c) 600   d) 400

2. Which of the following is a pair of co-primes?   **[1]**

    a) (14, 35)   b) (18, 25)

    c) (32, 62)   d) (36, 96)

3. $\sqrt{2}x^2$ - 3x - 5 = 0 have   **[1]**

    a) Real and Distinct roots   b) No Real roots

    c) Real roots   d) Real and Equal roots

4. If the system 6x – 2y = 3, kx – y = 2 has a unique solution, then   **[1]**

a) k = 3　　　　　　　　　　　　　　　　b) $k \neq 4$

c) $k \neq 3$　　　　　　　　　　　　　　d) k = 4

5. $2x^2 - 3x + 2 = 0$ have　　　　　　　　　　　　　　　　　　　　　　　　**[1]**

    a) Real and Distinct roots　　　　　　　b) Real and Equal roots

    c) Real roots　　　　　　　　　　　　　d) No Real roots

6. The distance of a point from the y-axis is called　　　　　　　　　　　　　**[1]**

    a) origin　　　　　　　　　　　　　　　b) Scale

    c) abscissa　　　　　　　　　　　　　　d) ordinate

7. In two triangles $\triangle$PQR and $\triangle$ABC, it is given that $\frac{AB}{BC} = \frac{PQ}{PR}$. For these two triangles to be similar, which of the following should be true?　　　　**[1]**

    a) $\angle A = \angle P$　　　　　　　　　　b) CA = QR

    c) $\angle B = \angle Q$　　　　　　　　　　d) $\angle B = \angle P$

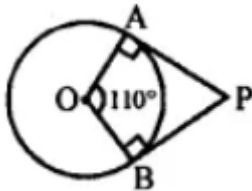8. In the figures find the measures of $\angle P$ and $\angle R$　　　　　　　　　　**[1]**

    a) 20º, 30º.　　　　　　　　　　　　　b) 50º, 40º.

    c) 30º, 20º.　　　　　　　　　　　　　d) 40º, 50º.
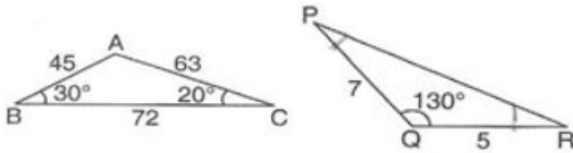
9. If PA and PB are two tangents to a circle with centre O such that $\angle AOB = 110°$, then $\angle APB = ?$　　**[1]**

    a) 90°　　　　　　　　　　　　　　　　b) 55°

    c) 70°　　　　　　　　　　　　　　　　d) 60°

10. $\cos^2 30° \cos^2 45° + 4\sec^2 60° + \frac{1}{2}\cos^2 90° - 2\tan^2 60° = ?$　　　　**[1]**

    a) $\frac{75}{8}$　　　　　　　　　　　　　　b) $\frac{73}{8}$

    c) $\frac{83}{8}$　　　　　　　　　　　　　　d) $\frac{81}{8}$

11. If the length of the shadow of a tower is $\sqrt{3}$ times that of its height, then the angle of elevation of the sun is　　**[1]**

    a) $75°$　　　　　　　　　　　　　　　b) $60°$

    c) $30°$　　　　　　　　　　　　　　　d) $45°$

12. $\frac{\csc^2 A - \cot^2 A}{1 - \sin^2 A}$ is equal to　　　　　　　　　　　　　　　**[1]**

    a) $\sin^2 A$　　　　　　　　　　　　　b) $\tan^2 A$

    c) $\sec^2 A$　　　　　　　　　　　　　d) $\cos^2 A$

13. The area of the sector of a circle with radius 6 cm which subtends an angle of 60º at the centre of the circle is:　　**[1]**
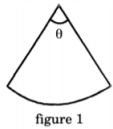
a) $\frac{152}{7}$ cm^2

b) $\frac{132}{7}$ cm^2

c) $\frac{142}{7}$ cm^2

d) $\frac{122}{7}$ cm^2

14. A piece of paper in the shape of a sector of a circle (see figure 1) is rolled up to form a right-circular cone (see figure 2). The value of angle θ is : **[1]**

figure 1   figure 2

a) $\frac{5\pi}{13}$

b) $\frac{10\pi}{13}$

c) $\frac{9\pi}{13}$

d) $\frac{6\pi}{13}$

15. A number x is chosen at random from the numbers -4, -3, -2, -1, 0, 1, 2, 3, 4, 5. The probability that |x| < 3 is **[1]**

a) 1

b) 0

c) $\frac{1}{2}$

d) $\frac{7}{10}$

16. The mean of 20 numbers is zero. Of them, at the most, how many may be greater than zero? **[1]**

a) 1

b) 0

c) 10

d) 19

17. A hollow cube of internal edge 22 cm is filled with spherical marbles of diameter 0.5 cm and $\frac{1}{8}$ space of the cube remains unfilled. Number of marbles required is **[1]**

a) 142296

b) 142596

c) 142496

d) 142396

18. If the difference of mode and median of a data is 24, then the difference of median and mean of the same data is: **[1]**

a) 8

b) 12

c) 34

d) 24

19. **Assertion (A):** If (0, 3), (1, 1), and (-1, 2) be the midpoints of the sides of a triangle, then the centroid of the original triangle is (0, 2) **[1]**

Reason (R): The centroids of the triangle and joins the midpoints of the sides of triangle are same.

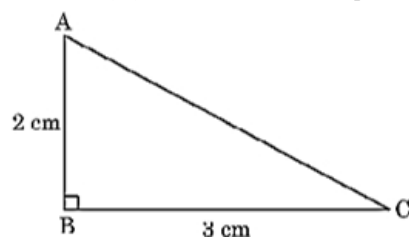a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

20. **Assertion (A):** The perimeter of $\triangle$ABC is a rational number. **[1]**

Reason (R): The sum of the squares of two rational numbers is always rational.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.
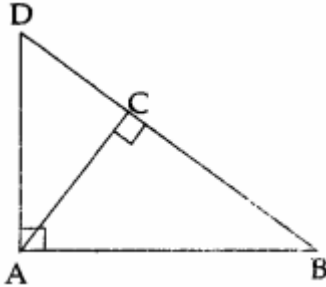
Section B

21. On comparing the ratios $\frac{a_1}{a_2}$, $\frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$, find out whether the pair of linear equations are consistent, or inconsistent: $\frac{4}{3}x + 2y = 8$; $2x + 3y = 12$. **[2]**

22. In $\triangle ABC$, AD $\perp$ BC, such that $AD^2 = BD \times CD$. Prove that $\triangle ABC$ is right angled at A. **[2]**

OR

In the adjoining figure, ΔABD is a right triangle, right angled at A and AC $\perp$ BD. Prove that $AB^2 = BC.\, BD$.

23. Draw a circle and two lines parallel to a given line such that one is a tangent and the other, a secant to the circle. **[2]**

24. Prove that: $\frac{\sin\theta}{\cot\theta + \csc\theta} = 2 + \frac{\sin\theta}{\cot\theta - \csc\theta}$ **[2]**

25. To warm ships for underwater rocks, a lighthouse spreads a red coloured light over a sector of angle 80° to a distance of 16.5 km. Find the area of the sea over which the ships are warned. (use $\pi = 3.14$) **[2]**

OR

Find the area of the sector of a circle of radius 5 cm, if the corresponding arc length is 3.5 cm.

Section C

26. Prove that $7\sqrt{5}$ is irrational. **[3]**

27. Find a quadratic polynomial, the sum and product of whose zeroes are $\sqrt{2}$ and $\frac{1}{3}$, respectively. **[3]**

28. Given the linear equation 2x + 3y - 8 = 0, write another linear equation in two variables such that the geometrical representation of the pair so formed is: **[3]**

    i. intersecting lines

    ii. parallel lines

    iii. coincident lines

OR

A two-digit number is such that the product of its digits is 18. When 63 is subtracted from the number, the digits interchange their places. Find the number.

29. In the given figure, tangents PQ and PR are drawn to a circle such that $\angle RPQ = 30^o$. A chord RS is drawn parallel to tangent PQ. Find the $\angle RQS$. **[3]**

Hint: Draw a line through Q and perpendicular to QP.]
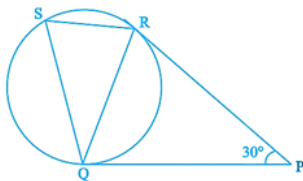
30. Evaluate: $\frac{\sin 30° + \tan 45° - cosec\, 60°}{\sec 30° + \cos 60° + \cot 45°}$ **[3]**

OR

Prove: $\sin^6 A + 3\sin^2 A \cos^2 A = 1 - \cos^6 A$

31. Cards bearing numbers 1,3,5,...,35 are kept in a bag. A card is drawn at random from the bag. Find the **[3]**

probability of getting a card bearing

   i. a prime number less than 15,

   ii. a number divisible by 3 and 5.

Section D

32.   A person on tour has ₹ 4200 for his expenses. If he extends his tour for 3 days, he has to cut down his daily **[5]** expenses by ₹ 70. Find the original duration of the tour.

<div align="center">OR</div>

Solve: $\frac{x-1}{2x+1} + \frac{2x+1}{x-1} = 2, x \neq -\frac{1}{2}, 1$

33.   In $\triangle ABC$, if $AD \perp BC$ and $AD^2 = BD \times DC$, then prove that $\angle BAC = 90°$. **[5]**

34.   A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in the **[5]** figure. If the height of the cylinder is 5.8 cm and its base is of radius 2.1 cm, find the total surface area of the article.
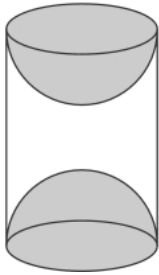
<div align="center">OR</div>

A solid is in the shape of a cone surmounted on a hemisphere with both their diameters being equal to 7 cm and the height of the cone is equal to its radius. Find the volume of the solid.

35.   In a retail market, fruit vendors were selling mangoes kept in packing boxes. These boxes contained varying **[5]** number of mangoes. The following was the distribution of mangoes according to the number of boxes.

Number of mangoes	50-52	53-55	56-58	59-61	62-64
Number of boxes	15	110	135	115	25

Find the mean number of mangoes kept in a packing box. Which method of finding the mean did you choose?

Section E

36.   **Read the following text carefully and answer the questions that follow:** **[4]**

India is competitive manufacturing location due to the low cost of manpower and strong technical and engineering capabilities contributing to higher quality production runs. The production of TV sets in a factory increases uniformly by a fixed number every year. It produced 16000 sets in 6th year and 22600 in 9th year.

   i. Find the production during first year. (1)

   ii. Find the production during 8th year. (1)

   iii. Find the production during first 3 years. (2)

     OR

    In which year, the production is ₹ 29,200. (2)

37.   **Read the following text carefully and answer the questions that follow:** **[4]**

Using Cartesian Coordinates we mark a point on a graph by how far along and how far up it is.

The left-right (horizontal) direction is commonly called X-axis.

The up-down (vertical) direction is commonly called Y-axis.

When we include negative values, the x and y axes divide the space up into 4 pieces.

Read the information given above and below:

Two friends Veena and Arun work in the same office in Delhi. In the Christmas vacations, both decided to go their hometowns represented by Town A and Town B respectively in the figure given below. Town A and Town B are connected by trains from the same station C (in the given figure) in Delhi.
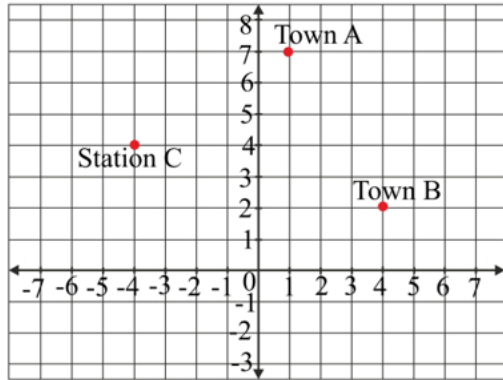
   i. Who will travel more distance to reach their home? (1)

  ii. Find the location of the station. (1)

 iii. Find in which ratio Y-axis divide Town B and Station. (2)

   OR

   Find the distance between Town A and Town B. (2)

38. **Read the following text carefully and answer the questions that follow:**   **[4]**

   A man is watching a boat speeding away from the top of a tower. The boat makes an angle of depression of 60° with the man's eye when at a distance of 200 m from the tower. After 10 seconds, the angle of depression becomes 45°.
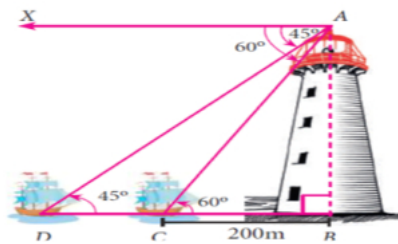
   i. What is the approximate speed of the boat (in km/hr), assuming that it is sailing in still water? (1)

  ii. How far is the boat when the angle is 45°? (1)

 iii. What is the height of tower? (2)

   OR

   As the boat moves away from the tower, angle of depression will decrease/increase? (2)