



FIRST PRELIMINARY EXAMINATION 2021 – 2022

Paper: Mathematics

Grade: 10

Date: 14/02/2022

Marks: 40

Time : 1hr 30 mins.

Answer to this paper must be written on the paper provided separately.

You will **not** be allowed to write during the first 10 minutes.

This time is to be spent in reading the question paper.

The time given at the head of this paper is the time allowed for writing the answers.

All working, including rough work, must be clearly shown and must be done on the same sheet as the rest of the answer.

Omission of essential working will result in loss of marks.

The intended marks for questions or parts of a question are given in the brackets []

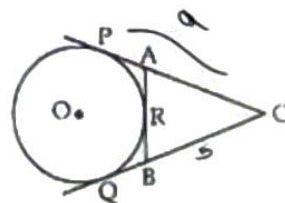
SECTION – A (10 Marks)

(Attempt all questions from this Section)

Question 1

Choose the correct answers to the questions from the given options. (Do not copy the question, Write the correct answer only.) [10]

- a) If P(a, -4) is the midpoint of the line segment joining the points A(6, -5) and B(-2, -3) then the value of a is
- i) -4 ii) 4
iii) -2 iv) 2
- b) What is the rule for a reflection over the y-axis?
- i) $(x, y) \Rightarrow (x, -y)$
ii) $(x, y) \Rightarrow (-x, y)$
iii) $(x, y) \Rightarrow (-y, x)$
iv) $(x, y) \Rightarrow (y, -x)$
- c) In given figure, CP and CQ are tangents to a circle with centre O. ARB is another tangent touching the circle at R. If CP = 9 cm and BC = 5 cm then the length of BR is
- i) 6 cm ii) 5 cm
iii) 3 cm iv) 4 cm
-
- The diagram shows a circle with center O. From an external point C, two secant lines are drawn. One secant passes through points P and A on the circle, while the other passes through points Q and B. The segments CP and CQ represent the tangent lengths from point C to the circle. A third line segment, labeled ARB, is tangent to the circle at point R and connects the two secant lines.



This paper consists of 6 printed pages.

d) What is the probability of getting the sum as a prime number if two dice are thrown?

- i) $\frac{5}{24}$
- ii) $\frac{5}{12}$
- iii) $\frac{5}{30}$
- iv) $\frac{1}{4}$

e) The curved surface area of a right circular cone of height 24 cm and base diameter 14 cm is:

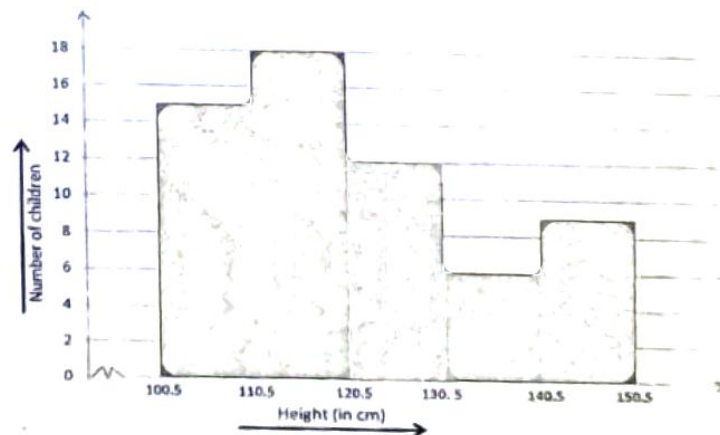
- i) $175\pi \text{ cm}^2$
- ii) $68\pi \text{ cm}^2$
- iii) $120\pi \text{ cm}^2$
- iv) $136\pi \text{ cm}^2$

f) The equation of straight line passing through the point (1, -2) and parallel to the line $y = 3x + 1$ is

- i) $3x - y - 1 = 0$
- ii) $3x + y - 5 = 0$
- iii) $3x - y - 5 = 0$
- iv) $3x - y + 1 = 0$

g) From the given graph, what is lower limit of the modal class?

- i) 120.5 cm
- ii) 110.5 cm
- iii) 100.5 cm
- iv) 130.5 cm



h) If the radius of the base of a right circular cylinder is halved keeping the same height, then the ratio of the volume of the cylinder thus obtained to the volume of original cylinder is

- i) 1 : 2
- ii) 1 : 4
- iii) 4 : 1
- iv) 2 : 1

- i) Consider the following frequency distribution:

| Class | -0.5 – 5.5 | 5.5 – 11.5 | 11.5 – 17.5 | 17.5 – 23.5 | 23.5 – 29.5 |
|-----------|------------|------------|-------------|-------------|-------------|
| Frequency | 13 | 10 | 15 | 8 | 11 |

The upper limit of the median class is

- i) 5.5
 - ii) 18.5
 - iii) 11.5
 - iv) 17.5
- j) $(\sec A + \tan A)(1 - \sin A) =$
- i) $\sec A$
 - ii) $\sin A$
 - iii) $\operatorname{cosec} A$
 - iv) $\cos A$

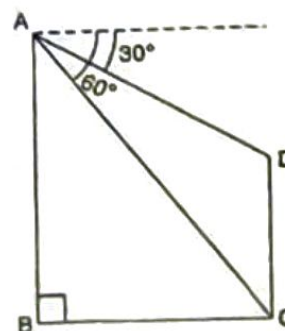
SECTION B

(Attempt any three questions from this section.)

Question 2

- a) In an aquarium, there are 44 red and some black fish. When fish is removed, the probability of getting a black fish is $\frac{9}{20}$. Find the number of black fish. [2]
- b) If $O(3, -1)$ is the centroid of PQR where $P = (4, k)$, $Q = (m, 9)$ and $R = (1, -6)$. Find the values of k and m . [2]
- c) In the given figure, from the top of a building $AB = 75\text{m}$ high, the angles of depression of the top and bottom of a vertical lamp post CD are observed to be 30° and 60° respectively. Find: [3]

- i) The horizontal distance between AB and CD
- ii) The height of the lamp post



- d) The following table gives daily wages of some employees in a firm. Find the missing frequency 'p' if the mean is ₹ 78. [3]

| Daily wages (in ₹) | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 | 100-110 |
|--------------------|-------|-------|-------|-------|--------|---------|
| No. of employees | 1 | 8 | 10 | p | 4 | 2 |

Question 3

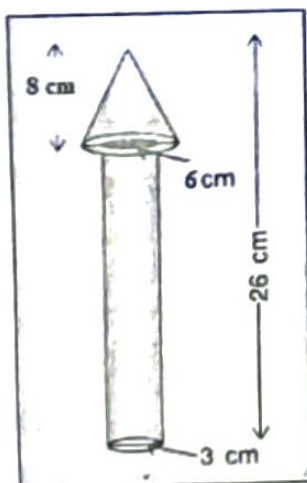
- a) If the line passing through A(a, 4) and B(5, -2) is perpendicular to the line $2x + 4y = 1$, find the value of a. [2]
- b) A study of the yield of 100 tomato plants resulted in the following record. [2]

| Tomatoes per plant | 0-5 | 5-10 | 10-15 | 15-20 | 20-25 |
|--------------------|-----|------|-------|-------|-------|
| Number of plants | 10 | 30 | 25 | 22 | 13 |

Calculate the mean of the number of tomatoes per plant.

- c) Attempt this question on graph paper. [3]
- Plot A(-3, 4), B(3, 4) and C(6, 0). Reflect point A, B and C in origin to get A', B' and C' respectively. Write their coordinates.
 - What is the figure formed by joining ABCA'B'C'?
 - Find its perimeter.

d)

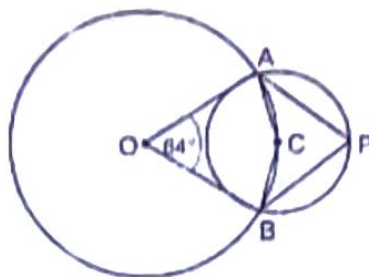


The adjoining figure shows a wooden toy rocket which is in the shape of a circular cone mounted on a circular cylinder. The total height of the rocket is 26 cm, while the height of the conical part is 8 cm. The base of the conical portion has a diameter of 6 cm, while the base diameter of cylindrical portion is 3 cm. Find the total surface area of the rocket. Use $\pi = 3.14$ and give answer correct to nearest cm^2 . [3]

d) Prove that: $\frac{1+\tan A}{\sin A} + \frac{1+\cot A}{\cos A} = 2(\sec A + \operatorname{cosec} A)$ [3]

Question 6

- a) In the adjoining figure, two circles with centres O and C intersect at points A and B such that OA and OB are the tangents to the circle with centre C. The centre C of the smaller circle lies on the circumference of the other circle. If $\angle AOB = 64^\circ$, find $\angle APB$. [2]



b) Prove that: $\frac{\cot^2 \theta}{(\operatorname{cosec} \theta + 1)^2} = \frac{1 - \sin \theta}{1 + \sin \theta}$ [2]

- c) The equation of a line is $2x + 3y = 9$. It intersects the y-axis at A. [3]

- Write the co-ordinates of A.
- Find the equation of line through A and perpendicular to the given line.

- d) 100 pupils in a school have weights as tabulated below:
Use graph paper for this question, take 2 cm = 5 kg along one axis and 2 cm = 10 pupils along the other axis. [3]

| Weights (in kg) | 40 - 45 | 45 - 50 | 50 - 55 | 55 - 60 | 60 - 65 | 65 - 70 | 70 - 75 |
|--------------------|---------|---------|---------|---------|---------|---------|---------|
| No. of pupils | 12 | 16 | 30 | 20 | 14 | 5 | 3 |

Draw the ogive for the above distribution and hence estimate the median weight.
