

BOARD QUESTION PAPER: MARCH 2024

Mathematics Part - II

Time: 2 Hours

Max. Marks: 40

Note:

- All questions are compulsory.
- Use of a calculator is not allowed.
- The numbers to the right of the questions indicate full marks.
- In case of MCQs [Q. No. 1(A)] only the first attempt will be evaluated and will be given credit.
- Draw proper figures wherever necessary.
- The marks of construction should be clear. Do not erase them.
- Diagram is essential for writing the proof of the theorem.

Q.1. (A) Four alternative answers for each of the following sub-questions are given. Choose the alternative and write its alphabet: [4]

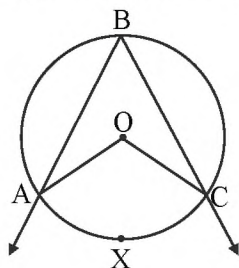
- Out of the dates given below which date constitutes a Pythagorean triplet?
(A) 15/8/17 (B) 16/8/16 (C) 3/5/17 (D) 4/9/15
- $\sin \theta \times \operatorname{cosec} \theta = ?$
(A) 1 (B) 0 (C) $\frac{1}{2}$ (D) $\sqrt{2}$
- Slope of X-axis is _____
(A) 1 (B) -1 (C) 0 (D) Cannot be determined
- A circle having radius 3 cm, then the length of its largest chord is _____.
(A) 1.5 cm (B) 3 cm (C) 6 cm (D) 9 cm

(B) Solve the following sub-questions: [4]

- If $\triangle ABC \sim \triangle PQR$ and $AB : PQ = 2 : 3$, then find the value of $\frac{A(\triangle ABC)}{A(\triangle PQR)}$.
- Two circles of radii 5 cm and 3 cm touch each other externally. Find the distance between their centres.
- Find the side of a square whose diagonal is $10\sqrt{2}$ cm.
- Angle made by the line with the positive direction of X-axis is 45° . Find the slope of that line.

Q.2. (A) Complete any two activities and rewrite it: [4]

1.



In the above figure, $\angle ABC$ is inscribed in arc AXC .

If $\angle ABC = 60^\circ$, find $m\angle AOC$.

Solution:

$$\angle ABC = \frac{1}{2} m(\text{arc } AXC) \quad \dots \boxed{}$$

$$60^\circ = \frac{1}{2} m(\text{arc } AXC)$$

$$\boxed{} = m(\text{arc } AXC)$$

But $m\angle AOC = \boxed{\text{m(arc.....)}}$... [Property of central angle]

$\therefore m\angle AOC = \boxed{}$

2. Find the value of $\sin^2\theta + \cos^2\theta$.

Solution:

In $\triangle ABC$, $\angle ABC = 90^\circ$, $\angle C = \theta^\circ$.

$AB^2 + BC^2 = \boxed{}$... [Pythagoras theorem]

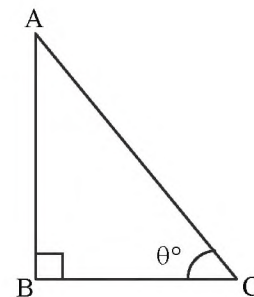
Divide both sides by AC^2

$$\frac{AB^2}{AC^2} + \frac{BC^2}{AC^2} = \frac{AC^2}{AC^2}$$

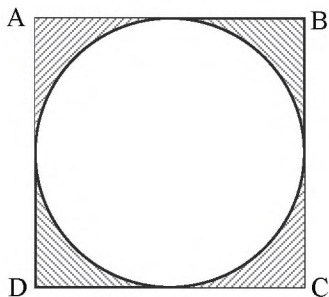
$\therefore \left(\frac{AB}{AC}\right)^2 + \left(\frac{BC}{AC}\right)^2 = 1$

But $\frac{AB}{AC} = \boxed{}$ and $\frac{BC}{AC} = \boxed{}$

$\therefore \sin^2\theta + \cos^2\theta = \boxed{}$



3.



In the figure given above, $\square ABCD$ is a square and a circle is inscribed in it. All sides of a square touch the circle.

If $AB = 14$ cm, find the area of shaded region.

Solution:

Area of square = $(\boxed{})^2$... [Formula]

$= 14^2$

$= \boxed{} \text{ cm}^2$

Area of circle = $\boxed{}$... [Formula]

$= \frac{22}{7} \times 7 \times 7$

$= 154 \text{ cm}^2$

Area of shaded portion = Area of square – Area of circle

$= 196 - 154$

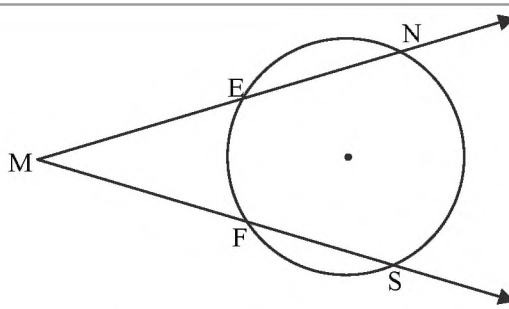
$= \boxed{} \text{ cm}^2$

(B) Solve any four of the following sub-questions:

[8]

1. Radius of a sector of a circle is 3.5 cm and length of its arc is 2.2 cm. Find the area of the sector.
2. Find the length of the hypotenuse of a right-angled triangle if remaining sides are 9 cm and 12 cm.

3.



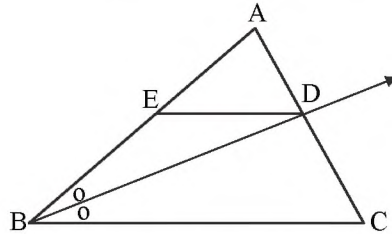
In the above figure, $m(\text{arc } NS) = 125^\circ$, $m(\text{arc } EF) = 37^\circ$.
Find the measure of $\angle NMS$.

4. Find the slope of the line passing through the points A(2, 3), B(4, 7).
5. Find the surface area of a sphere of radius 7 cm.

Q.3. (A) Complete any one activity of the following and rewrite it:

[3]

1.



In $\triangle ABC$, ray BD bisects $\angle ABC$, $A - D - C$, seg $DE \parallel$ side BC, $A - E - B$, then for showing $\frac{AB}{BC} = \frac{AE}{EB}$, complete the following activity:

Proof:

In $\triangle ABC$, ray BD bisects $\angle B$

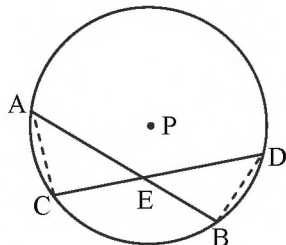
$\therefore \frac{\boxed{}}{BC} = \frac{AD}{DC} \quad \dots\text{(I)} \quad (\boxed{})$

In $\triangle ABC$, $DE \parallel BC$

$\therefore \frac{\boxed{}}{EB} = \frac{AD}{DC} \quad \dots\text{(II)} \quad (\boxed{})$

$\frac{AB}{\boxed{}} = \frac{\boxed{}}{EB} \quad \dots[\text{From (I) and (II)}]$

2.



Given: Chords AB and CD of a circle with centre P intersect at point E.

To prove: $AE \times EB = CE \times ED$

Construction: Draw seg AC and seg BD.

Fill in the blank and complete the proof.

Proof:

In $\triangle CAE$ and $\triangle BDE$.

$\angle AEC \cong \angle DEB \quad \dots \quad \boxed{}$

$\boxed{} \cong \angle BDE$ (angles inscribed in the same arc)

$$\therefore \triangle CAE \sim \triangle BDE \quad \dots \boxed{}$$

$$\therefore \frac{\boxed{}}{DE} = \frac{CE}{\boxed{}} \quad \dots \boxed{}$$

$$\therefore AE \times EB = CE \times ED.$$

(B) Solve any two of the following sub-questions:

[6]

- Determine whether the points are collinear.
A(1, -3), B(2, -5), C(-4, 7)
- $\triangle ABC \sim \triangle LMN$. In $\triangle ABC$, $AB = 5.5$ cm, $BC = 6$ cm, $CA = 4.5$ cm. Construct $\triangle ABC$ and $\triangle LMN$ such that $\frac{BC}{MN} = \frac{5}{4}$.
- Seg PM is a median of $\triangle PQR$, $PM = 9$ and $PQ^2 + PR^2 = 290$, then find QR.
- Prove that, 'If a line parallel to a side of a triangle intersects the remaining sides in two distinct points, then the line divides the side in the same proportion.'

Q.4. Solve any two of the following sub-questions:

[8]

- $\frac{1}{\sin^2 \theta} - \frac{1}{\cos^2 \theta} - \frac{1}{\tan^2 \theta} - \frac{1}{\cot^2 \theta} - \frac{1}{\sec^2 \theta} - \frac{1}{\operatorname{cosec}^2 \theta} = -3$, then find the value of θ .
- A cylinder of radius 12 cm contains water up to the height 20 cm. A spherical iron ball is dropped into the cylinder and thus water level raised by 6.75 cm. What is the radius of iron ball?
- Draw a circle with centre O having radius 3 cm. Draw tangent segments PA and PB through the point P outside the circle such that $\angle APB = 70^\circ$.

Q.5. Solve any one of the following sub-questions:

[3]

- $\square ABCD$ is trapezium, $AB \parallel CD$ diagonals of trapezium intersect in point P.
Write the answers of the following questions:
 - Draw the figure using given information.
 - Write any one pair of alternate angles and opposite angles.
 - Write the names of similar triangles with test of similarity.
- AB is a chord of a circle with centre O. AOC is diameter of circle, AT is a tangent at A.
Write answers of the following questions:
 - Draw the figure using given information.
 - Find the measures of $\angle CAT$ and $\angle ABC$ with reasons.
 - Whether $\angle CAT$ and $\angle ABC$ are congruent? Justify your answer.