SATISH SCIENCE ACADEMY

DHANORI PUNE-411015

GEOMERTY

Class 10 - Mathematics - II

Time Allowed: 2 hours **Maximum Marks: 40**

General Instructions:

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

1. **[8]**

(a) **Four alternative answers for each of the following sub-questions are given. Choose the correct alternative and write its alphabet:**

i. Out of the following which is the Pythagorean triplet? **[1]**

a) $(5, 5, 2)$ b) $(2, 2, 2)$

c) $(3, 4, 5)$ d) $(1, 5, 10)$

ii. The value of $2\tan 45^\circ - 2\sin 30^\circ$ is _____. **[1]**

a) $\frac{1}{2}$ b) 2

c) 1 d) $\frac{3}{4}$

iii. A line makes an angle of 60° with the positive direction of X -axis, so the slope of a line is _____. **[1]**

a) $\frac{1}{2}$ b) $\frac{\sqrt{3}}{2}$

c) $\frac{1}{\sqrt{3}}$ d) $\sqrt{3}$

iv. Two circles of radii 5.5 cm and 3.3 cm respectively touch each other externally. What is the distance between their centres? **[1]**

a) 8.9 cm b) 2.2 cm

c) 4.4 cm d) 8.8 cm

(b) **Solve the following sub-questions :**

i. If $\triangle ABC \sim \triangle PQR$ and $AB : PQ = 2 : 3$, then find the value of $\frac{A(\triangle ABC)}{A(\triangle PQR)}$. **[1]**

ii. Chord AB and chord CD of a circle with centre O are congruent. If $m(\text{arc}\, AB) = 120^\circ$, then find the $m(\text{arc}\, CD)$. **[1]**

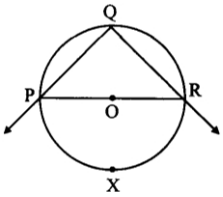
iii. Find the diagonal of a square whose side is 10 cm. **[1]**

iv. Find the Y-co-ordinate of the centroid of a triangle whose vertices are $(4,-3),(7,5)$ and $(-2,1)$. **[1]**

2. **[12]**

(a) **Complete any two activities and rewrite it :**

i. In the given figure, $\angle PQR$ is inscribed in the semicircle PQR. Complete the following activity to find measure of $\angle PQR$. **[2]**



Activity:

$m(\text{arc}\,PQR) = 180^\circ \ldots$ [measure of semicircle]

$\therefore m(\text{arc}\,PXR) = \square$

$\therefore \angle PQR = \frac{1}{2}\, m(\text{arc}\,\square)$ ...$\square$

$= \frac{1}{2} \times 180^\circ$

$\therefore \angle PQR = \square$

ii. If $\cos\theta = \frac{5}{13}$, then find $\sin\theta$. **[2]**

iii. If the length of an arc of sector of a circle is 20 cm and if radius 7 cm, find the area of the sector. **[2]**

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

i. In the given figure, chord AB and chord CD intersect each other at point E. If, $EB = 6, CE = 12$, then complete the activity to find ED. **[2]**

Activity:

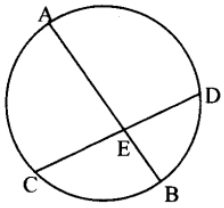
Chord AB and chord CD intersect each other at point E ...(given)

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

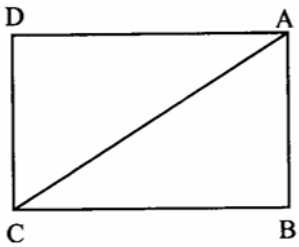
$\therefore \square \times ED = 15 \times 6$

$\therefore ED = \frac{\square}{12}$

$\therefore ED = \square$



ii. In the given figure, $\square ABCD$ is a rectangle. If $AB = 5, AC = 13$, then complete the following activity to find BC. **[2]**



Activity:

$\triangle ABC$ is $\square$ triangle.

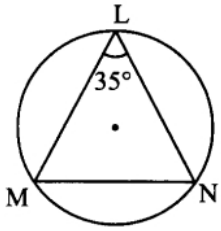
$\therefore$ By Pythagoras theorem,

$AB^2 + BC^2 = AC^2$

$\therefore 25 + BC^2 = \square$

$\therefore BC^2 = \square$

$\therefore BC = \square$

iii. 

[2]

In the above figure, $\angle L = 35^\circ$, find:

i. m(arc MN)

ii. m(arc MLN)

Activity:

i. $\angle L = \frac{1}{2}\, m(\text{arc MN})$ ... [By inscribed angle theorem]

$\therefore \square = \frac{1}{2}\, m(\text{arc MN})$

$\therefore 2 \times 35 = m(\text{arc}\, MN)$

$\therefore (\text{arc MN}) = \square$

ii. $m(\text{arc}\, MLN) = \square - m(\text{arc}\, MN)$ ... [Definition of measure of arc]

$= 360^\circ - 70^\circ$

$\therefore m(\text{arc}\, MLN) = \square$

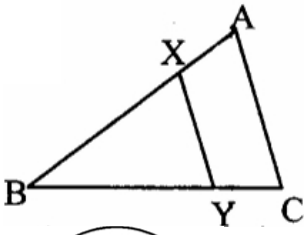
iv. Find the slope of a line passing through the points $A(2, 5)$ and $B(4, -1)$. **[2]**

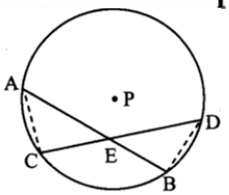
v. Radius of a sector of a circle is 3.5 cm and length of its arc is 2.2 cm. Find the area of the sector. **[2]**

3. **[9]**

(a) **Complete any one activity of the following and rewrite it :**

i. In $\triangle ABC$, seg $XY \parallel$ side AC. If $2AX = 3BX$ and $XY = 9$, then find the value of AC. **[3]**



ii. 

[3]

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 $\triangle BDE$.

$\angle AEC \cong \angle DEB$ ...□

□ $\cong \angle BDE$ ...(angles inscribed in the same arc)

$\therefore \triangle CAE \sim \Delta BDE \cdots$□

$\therefore \frac{\square}{DE} = \frac{CE}{\square} \cdots$□

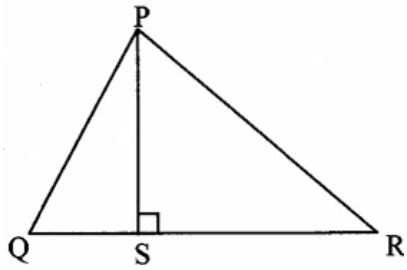
$\therefore AE \times EB = CE \times ED.$

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

i. Verify that the points $A(-2,2), B(2,2)$ and $C(2,7)$ are the vertices of right-angled triangle. **[3]**

ii. Construct two concentric circles with centre O with radii 3 cm and 5 cm. Construct tangent to a smaller circle from any point A on the larger circle. Measure and write the length of tangent segment. Calculate the length of tangent segment using Pythagoras theorem. **[3]**

iii. **[3]**



In $\triangle PQR$, seg $PS \perp$ side QR, then complete the activity to prove $P^2 + RS^2 = PR^2 + QS^2$.

Activity:

In $\triangle PSQ, \angle PSQ = 90^\circ$

$\therefore PS^2 + QS^2 = PQ^2$ ...[Pythagoras theorem]

$\therefore PS^2 = PQ^2 - \square$ ...(i)

Similarly,

In $\triangle PSR, \angle PSR = 90^\circ$

$\therefore PS^2 + \square = PR^2$ ...[Pythagoras theorem]

$\therefore PS^2 = PR^2 - \square \ldots$ (ii)

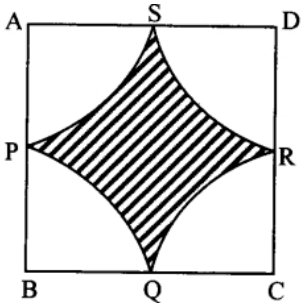
$\therefore PQ^2 - \square = \square - RS^2 \ldots$ [From (i) and (ii)]

$\therefore PQ^2 + \square = PR^2 + QS^2$

4. **Solve any two of the following sub-questions :** **[8]**

(a) A straight road leads to the foot of the tower of height 48 m. From the top of the tower the angles of depression of two cars standing on the road are 30° and 60° respectively. Find the distance between the two cars. $(\sqrt{3} = 1.73)$ **[4]**

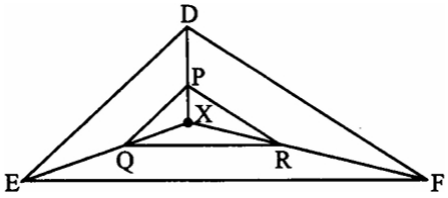
(b) In the given figure $\square ABCD$ is a square of side 50 m. Points P, Q, R, S are midpoints of side AB, side BC, side CD, side AD respectively. Find area of shaded region. **[4]**



(c) Draw triangle ABC, right angled at B such that $AB = 3\,cm, BC = 4\,cm$. Now construct $\triangle PBQ$ similar to $\triangle ABC$ each of whose sides are $\frac{7}{4}$ times the corresponding sides of $\triangle ABC$. **[4]**

5. **Solve any one of the following sub-questions :** **[3]**

(a) **[3]**



In the above figure, X is any point in the interior of triangle. Point X is joined to vertices of triangle seg $PQ \| \text{seg}\, DE$, seg QR || seg EF. Complete the following activity to prove seg PR || seg DF.

Activity:

In $\triangle XDE, PQ \| DE$ ...[Given]

$\therefore \frac{XP}{\square} = \frac{\square}{QE}$ ...(i) [Basic proportionality theorem]

In $\triangle XEF, QR \| EF$ ...[Given]

$\therefore \frac{XQ}{QE} = \frac{\square}{RF}$ ... (ii) $\square$

$\therefore \frac{XP}{PD} = \frac{\square}{\square}$ ... [From (i) and (ii)]

$\therefore \text{seg}\, PR \| segDF$ ... [Converse of basic proportionality theorem]

(b) 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: **[3]**

i. Draw the figure using given information.

ii. Find the measures of $\angle CAT$ and $\angle ABC$ with reasons.

iii. Whether $\angle CAT$ and $\angle ABC$ are congruent? Justify your answer.