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. In right-angled triangle PQR, if hypotenuse $PR = 12$ and $PQ = 6$, then what is the measure of $\angle P$? **[1]**

a) 60° b) 30°

c) 90° d) 45°

ii. $1 + \tan^2\theta = ?$ **[1]**

a) $\cot^2\theta$ b) $\sec^2\theta$

c) $\text{cosec}^2\theta$ d) $\sin^2\theta$

iii. Seg AB is parallel to X -axis and co-ordinates of the point A are $(1, 3)$, then the co-ordinates of the point B can be ________. **[1]**

a) $(5, 1)$ b) $(3, 0)$

c) $(-3, 1)$ d) $(-5, 3)$

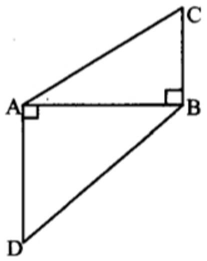
iv. AP is a tangent at A drawn to the circle with center O from an external point $P. OP = 12\ cm$ and $\angle OPA = 30^\circ$, then the radius of a circle is ________. **[1]**

a) 6 cm b) $12\sqrt{3}\ cm$

c) 12 cm d) $6\sqrt{3}\ cm$

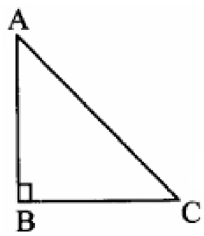
(b) **Solve the following sub-questions :**

i. In the given figure, seg $CB \perp$ seg AB, seg $AD \perp$ seg AB. If $BC = 4, AD = 8$, then find $\frac{A(\triangle ABC)}{A(\triangle ADB)}$. **[1]**



ii. In cyclic $\square ABCD, \angle B = 75^\circ$, then find $\angle D$. **[1]**

iii. In $\triangle ABC, \angle ABC = 90^\circ, \angle BAC = \angle BCA = 45^\circ$. If $AC = 9\sqrt{2}$, then find the value of AB. **[1]**

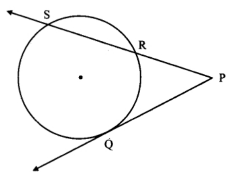


iv. Angle made by the line with the positive direction of X-axis is 45°. Find the slope of that line. **[1]**

2. **[12]**

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

i. **[2]**



In the above figure, ray PQ touches the circle at point Q. If $PQ = 12, PR = 8$, find the length of seg PS.

ii. A person is standing at a distance of 50 m from a temple looking at its top. The angle of elevation is of 45°. Find the height of the temple. **[2]**

iii. How many solid cylinders of radius 6 cm and height 12 cm can be made by melting a solid sphere of radius 18 cm? **[2]**

Activity:

Radius of the sphere, r = 18 cm

For cylinder, radius R = 6 cm, height H = 12cm

$\therefore$ Number of cylinders can be made

$= \frac{\text{Volume of the sphere}}{\square}$

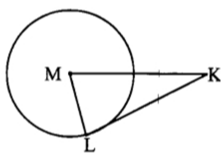
$= \frac{\frac{4}{3}\pi r^3}{\boxed{}}$

$= \frac{\frac{4}{3} \times 18 \times 18 \times 18}{\boxed{}}$

$= \square$

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

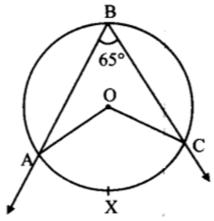
i. **[2]**



In the given figure, M is the centre of the circle and seg KL is a tangent segment. If $MK = 12, KL = 6\sqrt{3}$, then find Radius of the circle.

ii. In $\triangle ABC, AB = 9\ cm, BC = 40\ cm, AC = 41\ cm$. State whether $\triangle ABC$ is a right-angled triangle or not? Write reason. **[2]**

iii. In the following figure, O is the centre of the circle. **[2]**



$\angle ABC$ is inscribed in arc ABC and $\angle ABC = 65^\circ$.

Complete the following activity to find the measure of $\angle AOC$.

$\angle ABC = \frac{1}{2}\ m\square$ ...[Inscribed angle theorem]

$\square \times 2 = m(\text{arc}\ AXC)$

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

$\angle AOC = m(\text{arc}\ AXC) \ldots$[Definition of measure of an arc]

$\angle AOC = \square$

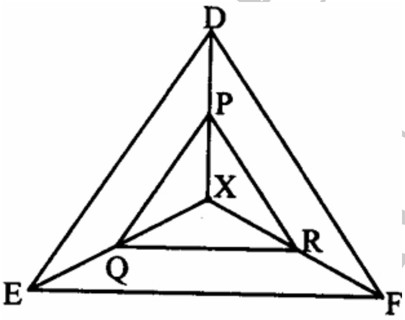
iv. Find the co-ordinates of the centroid of the $\triangle PQR$, whose vertices are $P(3, -5), Q(4, 3)$ and $R(11, -4)$. **[2]**

v. Find the surface area of a sphere of radius 7 cm. **[2]**

3. **[9]**

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

i. In the given figure, X is any point in the interior of the triangle. Point X is joined to the vertices of triangle. seg $PQ \|$ seg DE, seg QR $\|$ seg EF. Complete the activity and prove that seg PR $\|$ seg DF. **[3]**



Proof:

In $\triangle XDE$,

$PQ \| DE$ ...[Given]

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

In $\triangle XEF$,

$QR \| EF$ ...[Given]

$\frac{XQ}{\square} = \frac{XR}{\square}$ ...(ii) [$\square$]

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

$\therefore$ seg $PR \|$ seg DF ...[By converse of basic proportionality theorem]

ii. In a circle with centre O, PA and PB are tangents from an external point P. E is the point on the circle such that O -E-P. Tangent drawn at E intersects PA and PB in point C and D respectively. If $PA = 10$, then write the answers to the following questions: **[3]**

i. Draw the suitable figure using given information.

ii. Write the relation between seg PA and seg PB

iii. Find the perimeter of $\triangle PCD$.

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

i. If $A(6,1), B(8,2), C(9,4)$ and $D(7,3)$ are the vertices of $\square ABCD$, show that $\square ABCD$ is a parallelogram. **[3]**

Slope of line $= \frac{y_2-y_1}{x_2-x_1}$

$\therefore$ Slope of line $AB = \frac{2-1}{8-6} = \square$ ... (i)

$\therefore$ Slope of line $BC = \frac{4-2}{9-8} = \square$ ... (ii)

$\therefore$ Slope of line $CD = \frac{3-4}{7-9} = \square$ ... (iii)

$\therefore$ Slope of line $DA = \frac{3-1}{7-6} = \square$ ... (iv)

$\therefore$ Slope of line $AB = \square \ldots$ [From (i) and (iii)]

$\therefore$ line AB || line CD

$\therefore$ Slope of line $BC = \square \ldots$[From (ii) and (iv)]

$\therefore$ line BC ∥ line DA

Both the pairs of opposite sides of the quadrilateral are parallel.

$\therefore \square ABCD$ is a parallelogram.

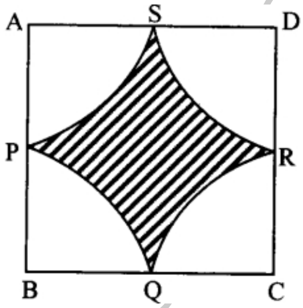
ii. Draw a circle with radius 4.2 cm. Construct tangents to the circle from a point at a distance of 7 cm from the centre. **[3]**

iii. In $\triangle PQR$, point S is the midpoint of side QR. If $PQ = 11, PR = 17, PS = 13$, find QR. **[3]**

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

(a) $\frac{1}{\sin^2\theta} - \frac{1}{\cos^2\theta} - \frac{1}{\tan^2\theta} - \frac{1}{\cot^2\theta} - \frac{1}{\sec^2\theta} - \frac{1}{\operatorname{cosec}^2\theta} = -3$, then find the value of θ. **[4]**

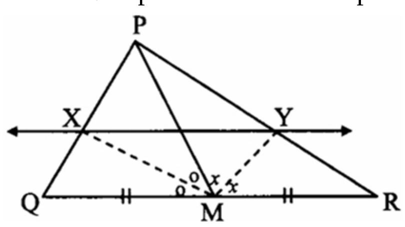
(b) In the given figure $\square ABCD$ is a square of side 50 m. Points P, Q, R, S are midpoints of side AB, side BC, side CD, side AD respectively. Find area of shaded region. **[4]**



(c) Draw a circle with centre P and radius 3 cm. Draw a chord MN of length 4 cm. Draw tangents to the circle through points M and N which intersect in point Q. Measure the length of segment PQ. **[4]**

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

(a) In $\triangle PQR$, seg PM is a median. Angle bisectors of $\angle PMQ$ and $\angle PMR$ intersect side PQ and side PR in points X and Y respectively. Prove that $XY || QR$. **[3]**



In $\triangle PMQ$

Ray MX is the bisector of $\angle PMQ$

$\therefore \frac{MP}{MQ} = \frac{\square}{\square}$ ....(i) [Theorem of angle bisector]

Similarly, in $\triangle PMR$, Ray MY is bisector o $\angle PMR$

$\therefore \frac{MP}{MR} = \frac{\square}{\square}$ ...(ii) [Theorem of angle bisector]

But $\frac{MP}{MQ} = \frac{MP}{MR}$ ... (iii) [As M is the midpoint of QR]

Hence MQ = MR

$\frac{PX}{\square} = \frac{\square}{YR}$ ... [From (i), (ii) and (iii)]

$\therefore XY \| QR$ ... [Converse of basic proportionality theorem]

(b) Prove that, tangent segments drawn from an external point to a circle are congruent. **[3]**