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. Find the perimeter of a square if its diagonal is $10\sqrt{2}\ cm$. **[1]**

a) 20 cm
b) $40\sqrt{2}\ cm$
c) 40 cm
d) 10 cm

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

a) $\cot^2\theta$
b) $\sec^2\theta$
c) $\text{cosec}^2\,\theta$
d) $\sin^2\theta$

iii. A line makes an angle of 30° with positive direction of X -axis, then the slope of the line is ________. **[1]**

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

iv. If the points, A, B, C are non-collinear points, then how many circles can be drawn which passes through points A, B and C? **[1]**

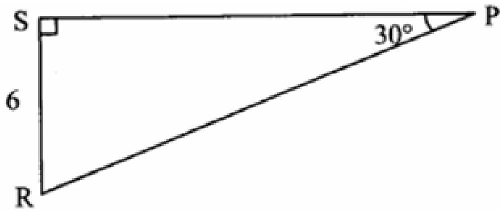
a) infinite
b) one
c) three
d) two

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

i. The ratio of corresponding sides of similar triangles is $3:5$, then find the ratio of their areas. **[1]**

ii. Two circles of radii 5 cm and 3 cm touch each other externally. Find the distance between their centres. **[1]**

iii. In the following figure, find the length of RP using the information given in $\triangle$ PSR. **[1]**



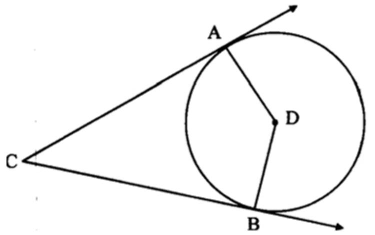
iv. Find the slope of the line passing through the points $A(2,3)$ and $B(4,7)$. **[1]**

2. **[12]**

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

[2]

i.



In the above figure, a circle with centre D touches the sides of $\angle ACB$ at A and B. If $\angle ACB = 52^\circ$, complete the activity to find the measure of $\angle ADB$.

In $\square ABCD$,

$\angle CAD = \angle CBD = \square^\circ \ldots$[Tangent theorem]

$\therefore \angle ACB + \angle CAD + \angle CBD + \angle ADB = \square^\circ$

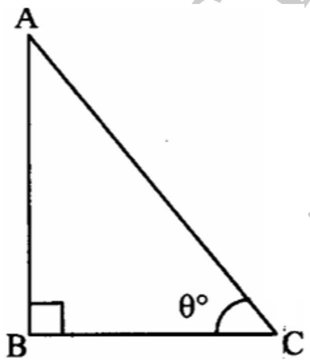
$\therefore 52^\circ + 90^\circ + 90^\circ + \angle ADB = 360^\circ$

$\therefore \angle ADB + \square^\circ = 360^\circ$

$\angle ADB = 360^\circ - 232^\circ$

$\therefore \angle ADB = \square^\circ$

ii. Find the value of $\sin^2\theta + \cos^2\theta$. **[2]**



Solution:

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

$AB^2 + BC^2 = \square$ ...[Pythagoras theorem]

Divide both sides by AC^2

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

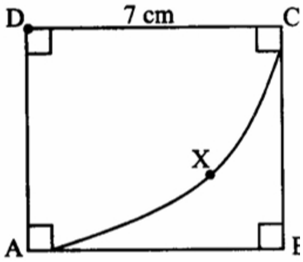
$\therefore \left(\frac{AB}{AC}\right)^2 + \left(\frac{BC}{AC}\right)^2 = 1$

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

$\therefore \sin^2\theta + \cos^2\theta = \square$

[2]

iii.



In the above figure, side of square $ABCD$ is 7 cm with centre D and radius DA sector D-AXC is drawn. Complete the following activity to find the area of square $ABCD$ and sector D-AXC.

Activity:

Area of square $= \square$ ...[Formula]

$= (7)^2$

$= 49\ cm^2$

Area of sector (D-AXC)

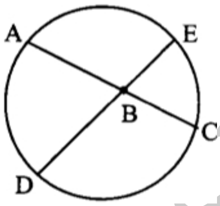
$= \square$ ...[Formula]

$= \frac{\square}{360} \times \frac{22}{7} \times \square$

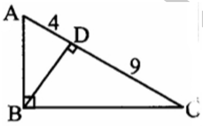
$= 38.5\ cm^2$

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

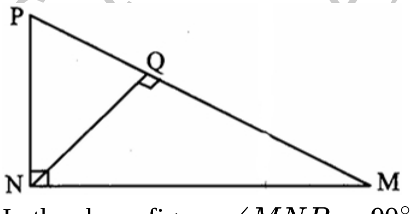
i. In the given figure, chord AC and chord DE intersect each other at point B. If $\angle ABE = 108^\circ$ and $m(\text{arc } AE) = 95^\circ$, Then find $m(\text{arc } DC)$. **[2]**



ii. In right-angled $\triangle ABC, BD \perp AC$. If $AD = 4$, $DC = 9$, then find BD. **[2]**



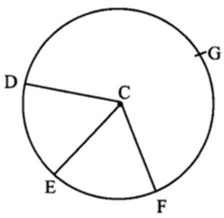
OR



In the above figure, $\angle MNP = 90^\circ$, seg $NQ \perp$ seg MP. $MQ = 9, QP = 4$. Find NQ.

[2]

iii.



In the given figure points G, D, E, F are points of a circle with centre $C, \angle ECF = 70^\circ$, m (arc DGF) $= 200^\circ$. Find: i. m(arc DE) ii. m(arc DEF).

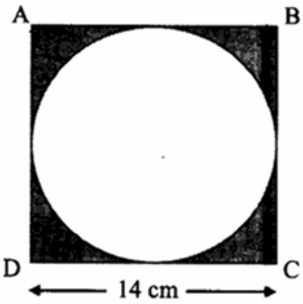
Find:

i. $m(\text{arc } DE)$

ii. m(arc DEF).

iv. Find the distance between the points $P(-1,1)$ and $Q(5,-7)$. **[2]**

v. A circle is inscribed in square $ABCD$ of side 14 cm. Complete the following activity to find the area of shaded portion. **[2]**



Activity:

Area of square $ABCD = \square$

$= 14^2$

$= 196\ cm^2$

Area of circle $= \pi r^2$

$= \frac{22}{7} \times 7^2$

$= \square cm^2$

Area of shaded portion

= Area of square ABCD - Area of circle

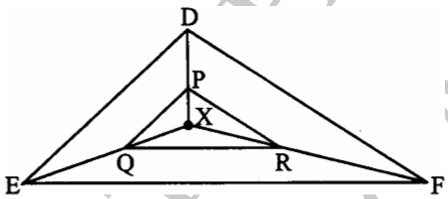
$= 196 - \square$

$= \square cm^2$

3. **[9]**

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

i. **[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)]

$\therefore$ seg $PR \| segDF$ ... [Converse of basic proportionality theorem]

ii. $\square ABCD$ is a cyclic quadrilateral where side $AB \cong$ side $BC, \angle ADC = 110^\circ, AC$ is the diagonal, then: **[3]**

i. Draw the figure using given information

ii. Find measure of $\angle ABC$

iii. Find measure of $\angle BAC$

iv. Find measure of (arc ABC).

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

i. Find the coondinates of centroid of the triangle whose vertices are $(4,7),(8,4),(7,11)$. **[3]**

ii. Draw a circle with centre **O** and radius 3 cm. Draw a tangent segment PA having length $\sqrt{40}cm$ from an exterior point P. **[3]**

iii. $\triangle ABC$ and $\triangle PQR$ are equilateral triangles with altitudes $2\sqrt{3}$ and $4\sqrt{3}$ respectively, then: **[3]**

i. Find the length of side AB and side PQ.

ii. Find $\frac{A(\Delta ABC)}{A(\Delta PQR)}$

iii. Find the ratio of perimeter of $\triangle ABC$ to the perimeter of $\triangle PQR$.

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]**

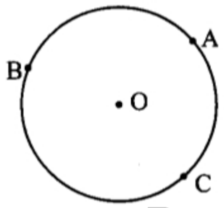
(b) An ice-cream pot has a right circular cylindrical shape. The radius of the base is 12 cm and height is 7 cm. This pot is completely filled with ice-cream. The entire ice-cream is given to the students in the form of right circular ice-cream cones, having diameter 4 cm and height is 3.5 cm. If each student is given one cone, how many students can be served? **[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) Prove that: The ratio of the intercepts made on a transversal by three parallel lines is equal to the ratio of the corresponding intercepts made on any other transversal by the same parallel lines. **[3]**

(b) A, B, C are any points on the circle with centre O. If $\boldsymbol{m}(\text{arc } BC)=110^\circ$ and m (arc AB) $=125^\circ$, complete the following activity to find $\boldsymbol{m}(\text{arc } ABC), \boldsymbol{m}(\text{arc } AC)$, m (arc ACB) and $\boldsymbol{m}(\text{arc } BAC)$. **[3]**



Activity :

$m(\text{arc } ABC)=m(\text{arc AB})+\square$

$=\square^\circ+110^\circ=235^\circ$

$m(\text{arc } AC)=360^\circ-m(\text{arc}\,\square)$

$=360^\circ-\square^\circ=125^\circ$

Similarly

$m(\text{arc } ACB)=360^\circ-\square=235^\circ$

and $m(\text{arc } BAC)=360^\circ-\square=250^\circ$