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. If a, b, c are sides of a triangle and $a^2 + b^2 = c^2$, name the type of triangle: **[1]**

a) Obtuse angled triangle b) Equilateral triangle

c) Right angled triangle d) Acute angled triangle

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

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

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

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) $\sqrt{3}$

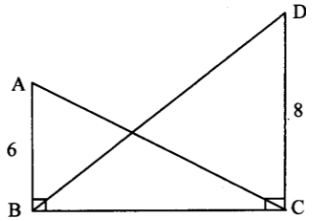
iv. $\angle PRQ$ is inscribed in the arc PRQ of a circle with centre O. If $\angle PRQ = 75^\circ$, then $m(\text{arc } PRQ) =$ _____. **[1]**

a) 285° b) 150°

c) 75° d) 210°

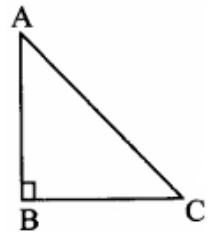
(b) **Solve the following sub-questions :**

i. In the following figure, $\angle ABC = \angle DCB = 90^\circ$, $AB = 6, DC = 8$, then $\frac{A(\triangle ABC)}{A(\Delta DCB)} = ?$ **[1]**



ii. $\square ABCD$ is cyclic. If $\angle B = 110^\circ$, then find measure of $\angle D$. **[1]**

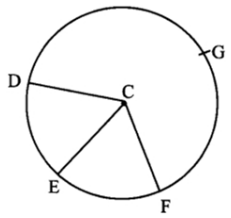
iii. In $\triangle ABC, \angle ABC = 90^\circ, \angle BAC = \angle BCA = 45^\circ$. If $AC = 9\sqrt{2}$, then find the value of AB. **[1]**



iv. Find the distance between the points $O(0,0)$ and $P(3,4)$. **[1]**

2. **[12]**

(a) **Complete any two activities and rewrite it :** **[2]**

i. 

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

Find:

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

ii. m(arc DEF).

ii. Show that, $\cot\theta + \tan\theta = \text{cosec}\,\theta \times \sec\theta$ **[2]**

Solution:

$\text{L.H.S} = \cot\theta + \tan\theta$

$= \frac{\cos\theta}{\sin\theta} + \frac{\sin\theta}{\cos\theta}$

$= \frac{\square+\square}{\sin\theta\times\cos\theta}$

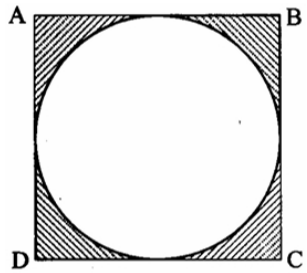
$= \frac{1}{\sin\theta\times\cos\theta}$ ...$\square$

$= \frac{1}{\sin\theta} \times \frac{1}{\square}$

$= \text{cosec}\,\theta \times \sec\theta$

$\text{L.H.S} = \text{R.H.S}$

$\therefore \cot\theta + \tan\theta = \text{cosec}\,\theta \times \sec\theta$

iii. 

[2]

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

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

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

$= 14^2$

$= \square\ cm^2$

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

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

$= 154\,cm^2$

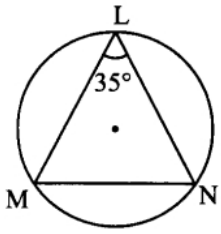
Area of shaded portion

$=$ Area of square $-$ Area of circle

$= 196 - 154$

$= \square\ cm^2$

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

i. 

[2]

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

i. m(arc MN)

ii. m(arc MLN)

Activity:

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

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

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

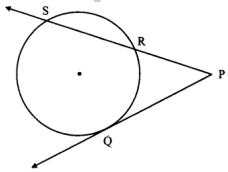
$\therefore (\text{arc MN}) = \square$

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

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

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

ii. Find the length of diagonal of rectangle having sides 11 cm and 60 cm. **[2]**

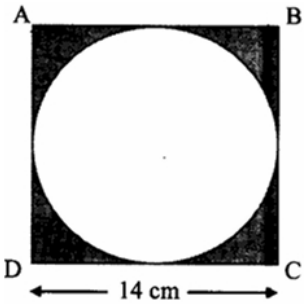
iii. 

[2]

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

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

ii. 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]**

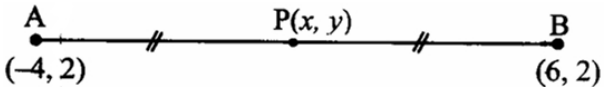
i. Draw the figure using given information.

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

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

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

i. Find the co-ordinates of point P where P is the midpoint of a line segment AB with $A(-4, 2)$ and $B(6, 2)$. **[3]**



Suppose, $(-4, 2) = (x_1, y_1)$ and $(6, 2) = (x_2, y_2)$ and co-ordinates of P are (x, y)

$\therefore$ According to midpoint theorem,

$x = \frac{x_1 + x_2}{2} = \frac{\square + 6}{2} = \frac{\square}{2} = \square$

$y = \frac{y_1 + y_2}{2} = \frac{2 + \square}{2} = \frac{4}{2} = \square$

$\therefore$ Co-ordinates of midpoint P are $\square$

ii. Draw a circle of radius 3.3 cm. Draw a chord PQ of length 6.6 cm. Draw tangents to the circle at points P and Q. **[3]**

iii. If a and b are natural numbers and $a > b$. If $\left(a^2 + b^2\right), \left(a^2 - b^2\right)$ and 2ab are the sides of the triangle, then prove that the triangle is right angled. Find out two Pythagorean triplets by taking suitable values of a and b. **[3]**

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

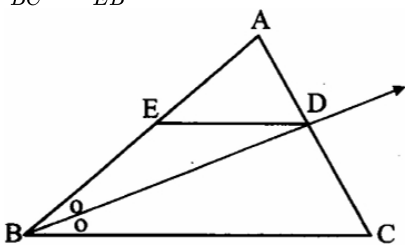
(a) A straight road leads to the foot of the tower of height 48 m. From the top of the tower the angles of depression of two cars standing on the road are 30° and 60° respectively. Find the distance between the two cars. $(\sqrt{3} = 1.73)$ **[4]**

(b) A bucket is in the form of a frustum of a cone. It holds 28.490 litres of water. The radii of the top and the bottom are 28 cm and 21 cm respectively. Find the height of the bucket. $\left(\pi = \frac{22}{7}\right)$ **[4]**

(c) Draw a circle of radius 2.7 cm and draw a chord PQ of length 4.5 cm. Draw tangents at points P and Q without using the centre. **[4]**

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

(a) 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: **[3]**



Proof:

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

$\therefore \frac{\square}{\text{BC}} = \frac{\text{AD}}{\text{DC}}$ ...(i) $(\square)$

In $\triangle ABC, DE \| BC$

$\frac{\square}{EB} = \frac{AD}{DC}$ ...(ii) $(\square)$

$\frac{AB}{\square} = \frac{\square}{EB}$ ...[From(i)and(ii)]

(b) Circles with centres A, B and C touch each other externally. If $AB = 3\,cm, BC = 3\,cm$, $CA = 4\,cm$, then find the radii of each circle. **[3]**