MT

2018 ___ ___ 1100 **Seat No.** | | | | | | | |

MT - GEOMETRY - SEMI PRELIM - I : PAPER - 1

Time : 2 Hours **(Pages 5)** **Max. Marks : 40**

Q.1. (A) Solve the following : (Any 4) **4**

1. If adjacent sides of a parallelogram are 3 cm and 4 cm, then find the perimeter of the parallelogram.

2. Radius of a circle is 8 cm. Find the length of the longest chord of the circle.

3. Side of a square is 5 cm. What is the length of its diagonal.

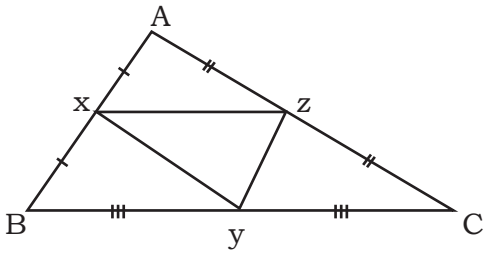
4. In a rhombus ABCD, if $\angle DAC = 35^\circ$, then $\angle ABC = ?$

5. Write the equation of x-axis.

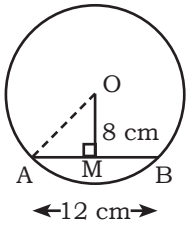
6. Write the equation of a line passing through 4 on the x-axis and parallel to y-axis.

Q.1. (B) Solve the following : (Any 2) **4**

1. In the figure, points X, Y, Z are the midpoints of side AB, side BC and side AC of ABC respectively. AB = 5 cm, AC = 9 cm and BC = 11 cm. find the length of XY and YZ.



2. Distance of chord AB from the centre of a circle is 8 cm. Length of the chord AB is 12 cm. Find the diameter of the circle.



3. The adjacent sides of a rectangle are 7 cm and 24 cm. Find the length of its diagonal.

Q.2. (A) Solve the following MCQs : **4**

1. AItitude on the hypotenuse of a right angled triangle divides it in two parts of lengths 4 cm and 9 cm. Find the length of the altitude.
   (A) 9 cm (B) 4 cm (C) 6 cm (D) $2\sqrt{6}$ cm

2. Two circles of radii 5.5 cm and 3.3 cm respectively touch each other. What is the distance between their centers?
   (A) 4.4 cm (B) 8.8 cm (C) 2.2 cm (D) 8.8 or 2.2 cm

3. Distance of point (-3, 4) from the origin is _____ .
   (A) 7 (B) 1 (C) 5 (D) -5

4. Out of the following which is a Pythagorean triplet?
   (A) (1, 5, 10) (B) (3, 4, 5) (C) (2, 2, 2) (D) (5, 5, 2)

Q.2. (B) Solve the following : (Any 2) **4**

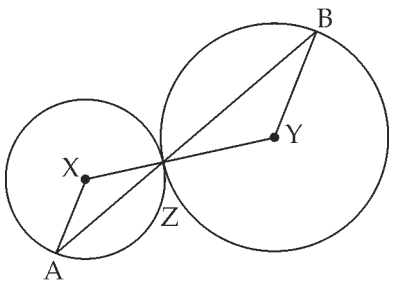
1. Find the diagonal of a rectangle whose length is 16 cm and area is 192 sq.cm.

2. □MRPN is cyclic, $\angle R = (5x - 13)^0$, $\angle N = (4x + 4)^0$. Find measures of $\angle R$ and $\angle N$

3. Find k, if B $(k, -5)$, C $(1, 2)$ and slope of the line is 7.

Q.3. (A) Solve the following activity : (Any 2) **4**

1. In the adjoining fig., circles with centres X, Y touch each other at Z. A secant passing through Z meets the circles at A and B respectively. Prove that, Radius XA || radius YB. Fill in the blanks and complete the proof.



Construction :
Draw segments XZ and ☐
Proof :
By theorem of touching circles, points X, Z, Y are ☐
$\angle XZA \cong$ ☐ ...(Vertically Opposite angles)
Let $\angle XZA = \angle BZY = a$ ...(i)
seg XA ≅ seg XZ ☐

$\therefore$ $\angle XAZ =$ [ ] $= a$ ...(ii) (Isosceles triangle theorem)

seg YB $\cong$ [ ] [ ]

$\therefore$ $\angle BZY =$ [ ] $= a$ ...(iii) (Isosceles triangle theorem)

$m\angle XAZ = m\angle YBZ = a$ ...[From (i), (ii) and (iii)]

$\therefore$ Radius XA || radius YB [ ]

2. Similarity in Right Angled Triangles :
'In a right angled triangle, if the altitude is drawn from the vertex of the right angle to the hypotenuse, then the two triangles formed are similar to the original triangle and to each other'.
Given :
(1) In ΔABC, $\angle ABC = 90^\circ$
(2) seg BD $\perp$ hypotenuse AC, A - D - C
To Prove :
$\Delta ABC \sim \Delta ADB \sim \Delta BDC$

Proof :

In ΔABC and ΔADB,

$\angle ABC \cong \angle ADB$ [ ]

$\angle A \cong \angle A$ [ ]

$\therefore$ [ ] ~ [ ] ...(i) (By AA Test of similarity)

In ΔABC and ΔBDC,

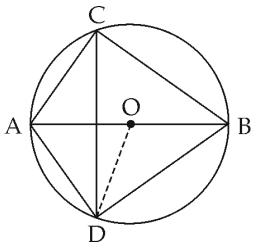
[ ] $\cong$ [ ] ...(Each is a right angle)

[ ] $\cong$ [ ] ...(Common angle)

$\therefore$ $\Delta ABC \sim \Delta BDC$ ...(ii) [ ]

$\therefore$ $\Delta ABC \sim$ [ ] ~ [ ] ...[From (i) and (ii)]

3. In the adjoining figure, seg AB is a diameter of a circle with centre O. Bisector of inscribed $\angle ACB$ intersects circle at point D. Prove that: seg AD $\cong$ seg BD
Proof : Draw seg OD.



$\angle ACB =$ [ ] ($\because$ Angle inscribed in a semicircle)

$\angle DCB =$ [ ] ($\because$ CD bisects $\angle ACB$)

m(arc DB) = [ ] ...(Inscribed angle theorem)

$\angle DOB =$ ☐ ...(i) (Definition of measure of an arc)

seg OA ≅ seg OB ... (ii) ☐

seg OD is ☐ of seg AB [From (i) and (ii)]

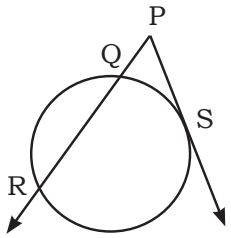
$\therefore$ seg AD ≅ seg BD ☐

Q.3. (B) Solve the following : (Any 2) **4**

1. Find x, if distance between points (x, 7) and M (1, 15) is 10.

2. In Δ ABC, seg AD ⊥ seg BC, $\angle C = 45^0$, BD = 5 and AC = $8\sqrt{2}$ then find AD and BC.

3. In seg PS is a tangent segment.
Line PR is a secant.
If PQ = 3.6, QR = 6.4, find PS.

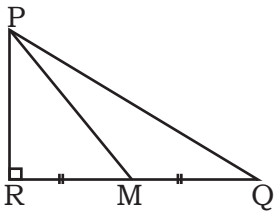


Q.4. Solve the following : (Any 3) **9**

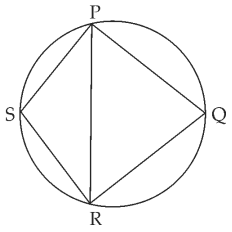
1. Show that A(-4, -7), B(-1, 2), C (8, 5) and D (5, -4) are the vertices of a parallelogram.

2. Determine whether P(1, 2), Q (2, $\frac{8}{5}$) and R (3, $\frac{6}{5}$) are collinear.

3. In the figure,
M is the midpoint of QR.
$\angle PRQ = 90^0$.
Prove that, $PQ^2 = 4PM^2 - 3PR^2$

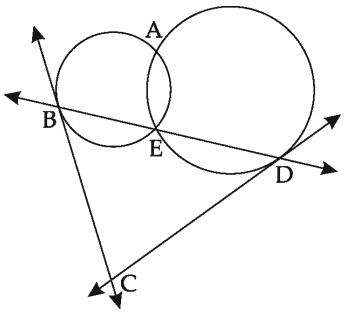


4. In the adjoining figure,
□PQRS is a cyclic.
side PQ ≅ side RQ. $\angle PSR = 110°$.
Find (i) Measure $\angle PQR$
(ii) m (arc PQR)
(iii) m (arc QR)
(iv) $\angle PRQ$



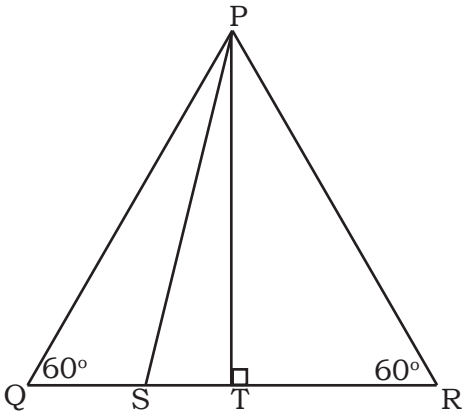
Q.5 Solve the following : (Any 1) **4**

1. In the adjoining figure, two circles intersect each other at points A and E. Their common secant through E intersects the circle at points B and D. The tangents of the circles at point B and D intersect each other at point C. Prove that □ABCD is cyclic.



2. In the adjoining figure, ΔPQR is an equilateral triangle. Point S is on seg QR such that QS = $\frac{1}{3}$ QR.

   Prove that 9 PS^2 = 7 PQ^2



Q.6 Solve the following : (Any 1) **3**

1. Find the co-ordinates of the points of trisection of the line segment AB with A(2, 7) and B(–4, –8).

2. Pranali and Prasad started walking to the East and to the North respectively, from the same point and at the same speed. After 2 hours distance between them was $15\sqrt{2}$ km. Find their speed per hour.

Best Of Luck