

# MT

2018 \_\_\_\_ 1100

Seat No.

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## MT - GEOMETRY - SEMI PRELIM - I : PAPER - 5

Time : 2 Hours

(Pages 6)

Max. Marks : 40

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

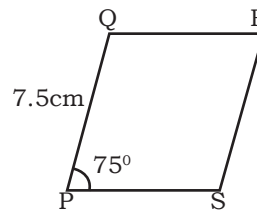
4

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.

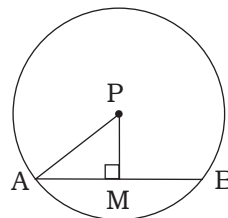
**Q.1. (B) Solve the following : (Any 2)**

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1. In a rhombus PQRS, if  $PQ = 7.5$ , then find QR. If  $\angle QPS = 75^\circ$ , then find the measure of  $\angle PQR$  and  $\angle SRQ$ .



2. Radius of the circle is 34 cm and the distance of a chord from the centre is 30 cm. Find the length of the chord.



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 :**

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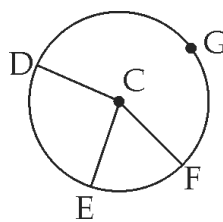
- Out of the dates given below which date constitutes a Pythagorean triplet?  
 (A) 15/08/17 (B) 16/08/16  
 (C) 3/5/17 (D) 4/9/15
- If two circles are touching externally, then how many common tangents of them can be drawn?  
 (A) One (B) Two (C) Three (D) Four
- A line makes an angle of  $30^\circ$  with the positive direction of X-axis. So the slope of the line is \_\_\_\_\_  
 (A)  $\frac{1}{2}$  (B)  $\frac{\sqrt{3}}{2}$  (C)  $\frac{1}{\sqrt{3}}$  (D)  $\sqrt{3}$
- Height and base of a right angled triangle are 24 cm and 18 cm, find the length of its hypotenuse.  
 (A) 24 cm (B) 30 cm (C) 15 cm (D) 18 cm

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

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- In  $\triangle RST$ ,  $\angle S = 90^\circ$ ,  $\angle T = 30^\circ$ ,  $RT = 12$  cm, then find RS and ST.

- In the adjoining figure, G, D, E, F are concyclic points of a circle with centre C.  $\angle ECF = 70^\circ$ ,  $m(\text{arc DGF}) = 200^\circ$  find  $m(\text{arc DE})$  and  $m(\text{arc DEF})$ .

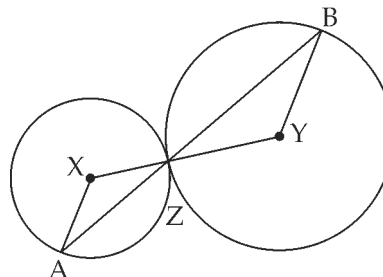


- Find the distance between the points  $P(-5, 7)$  and  $Q(-1, 3)$ .

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

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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  $\parallel$  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

$$\angle XZA \cong \text{} \quad \dots(\text{Vertically Opposite angles})$$

$$\text{Let } \angle XZA = \angle BZY = a \quad \dots(\text{i})$$

$$\text{seg } XA \cong \text{seg } XZ \quad \text{$$

$$\therefore \angle XAZ = \text{} = a \quad \dots(\text{ii}) \text{ (Isosceles triangle theorem)}$$

$$\text{seg } YB \cong \text{} \quad \text{$$

$$\therefore \angle BZY = \text{} = a \quad \dots(\text{iii}) \text{ (Isosceles triangle theorem)}$$

$$m\angle XAZ = m\angle YBZ = a \quad \dots[\text{From (i), (ii) and (iii)}]$$

$$\therefore \text{Radius } XA \parallel \text{radius } YB \quad \text{$$

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  $\triangle ABC$ ,  $\angle ABC = 90^\circ$

(2)  $\text{seg } BD \perp \text{hypotenuse } AC$ , A - D - C

To Prove :

$$\triangle ABC \sim \triangle ADB \sim \triangle BDC$$

Proof :

In  $\triangle ABC$  and  $\triangle ADB$ ,

$$\angle ABC \cong \angle ADB \quad \text{$$

$$\angle A \cong \angle A \quad \text{$$

$$\therefore \text{} \sim \text{} \quad \dots(\text{i}) \text{ (By AA Test of similarity)}$$

In  $\triangle ABC$  and  $\triangle BDC$ ,

$\cong$

...(Each is a right angle)

$\cong$

...(Common angle)

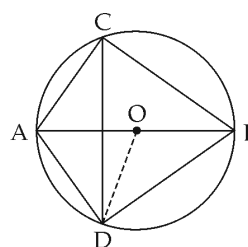
$\therefore \triangle ABC \sim \triangle BDC$

...(ii)

$\therefore \triangle ABC \sim$    $\sim$

...[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  $\cong$  seg OB

... (ii)

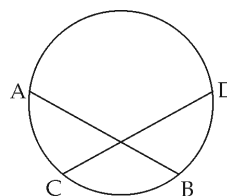
seg OD is  of seg AB [From (i) and (ii)]

$\therefore$  seg AD  $\cong$  seg BD

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

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- Find  $k$  if the line passing through points P(-12, -3) and Q(4,  $k$ ) has slope  $\frac{1}{2}$
- Seg PM is a median of  $\triangle PQR$ . If PQ = 40, PR = 42, and PM = 29, find QR.
- In the adjoining figure, chord AB  $\cong$  chord CD. Prove that arc AC  $\cong$  arc BD

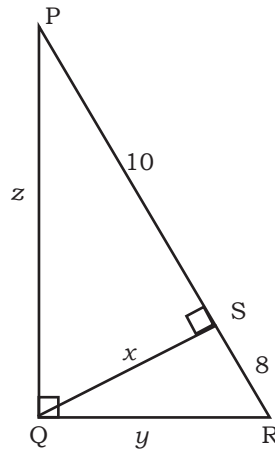


**Q.4. Solve the following : (Any 3)**

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- Determine whether  $P(-2, 3)$ ,  $Q(1, 2)$  and  $R(4, 1)$  are collinear
- Show that the points  $A(1, 2)$ ,  $B(1, 6)$ ,  $C(1 + 2\sqrt{3}, 4)$  are vertices of an equilateral triangle.

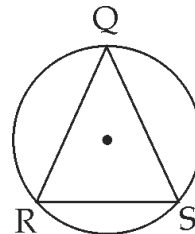
- In the adjoining figure,  
In  $\triangle PQR$ ,  $\angle PQR = 90^\circ$ ,  
seg  $QS \perp$  seg  $PR$ , then  
find  $x, y, z$ .



- In the adjoining figure,  
 $\triangle QRS$  is an equilateral triangle.

Prove that,

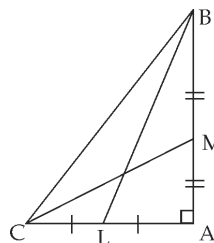
- $\text{arc } RS \cong \text{arc } QS \cong \text{arc } QR$
- $m(\text{arc } QRS) = 240^\circ$ .



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

4

- Prove that any three points on a circle cannot be collinear.
- In  $\triangle ABC$ ,  $\angle BAC = 90^\circ$ ,  
seg  $BL$  and seg  $CM$  are  
medians of  $\triangle ABC$ ,  
prove that  
 $4(BL^2 + CM^2) = 5 BC^2$ .



**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** 