

Q.P. SET CODE
D

MT - Z

Seat No.

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2018 ___ 1100 - **MT - Z** - MATHEMATICS (71) Geometry - SET - D (E)

Time : 2 Hours

(Pages 6)

Max. Marks : 40

Note :

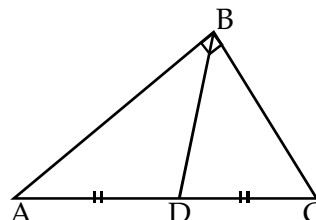
- (i) All questions are compulsory.
- (ii) Use of calculator is not allowed.
- (iii) Total marks are shown on the right side of the question.
- (iv) If necessary draw the figure to justify your answer.
- (v) Constructions marks should be distinct. Do not erase them.

Q.1.(A) Solve ANY FOUR of the following :

4

- (i) Write converse of the following statement:
The diagonals of a rectangle are congruent.
- (ii) If a transversal intersects two parallel lines then the sum of interior angles on the same side of the transversal is _____.

- (iii) In $\triangle ABC$, $\angle ABC = 90^\circ$
Seg BD is the median
on hypotenuse AC
BD = 7 cm
Find : AC



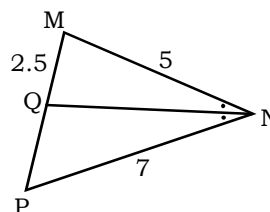
- (iv) Identify the correct statement:
A quadrilateral is a parallelogram if a pair of opposite sides is parallel.
A quadrilateral is a parallelogram if a pair of opposite sides is congruent.
A quadrilateral is a parallelogram if a pair of opposite angles is congruent.
A quadrilateral is a parallelogram if a pair of opposite sides is parallel and congruent.
- (v) What is the equation of the Y – axis?
- (vi) Find the value of $\frac{\tan 40^\circ}{\cot 50^\circ}$.

Q.1.(B) Solve ANY TWO of the following :**4**

- (i) Area of the base of a cone is 1386 sq. cm and its height is 28 cm. Find its volume.
- (ii) Length of a chord of a circle is 24 cm. If distance of the chord from the centre is 5 cm, then find radius of the circle.
- (iii) In $\triangle FAN$, $\angle F = 80^\circ$, $\angle A = 40^\circ$. Find out the greatest and the smallest side of the triangle.

Q.2.(A) Select the correct alternative answer and write it :**4**

- (i) In $\triangle MNP$, NQ is bisector of $\angle N$.
If $MN = 5$, $PN = 7$,
 $MQ = 2.5$ then find QP.



- (a) 7 (b) 3.5 (c) 4.5 (d) 1.5
- (ii) $\sqrt{1 + \tan^2 \theta}$ is equal to :
(a) $\cot \theta$ (b) $\cos \theta$ (c) $\operatorname{cosec} \theta$ (d) $\sec \theta$
- (iii) The curved surface area of a cylinder is 440cm^2 and its radius is 5 cm. Find its height.
(a) $\frac{44}{\pi}$ cm (b) 22π cm (c) 44π cm (d) $\frac{22}{\pi}$ cm
- (iv) Find the coordinates of the midpoint of the line segment joining $P(0, 6)$ and $Q(12, 20)$
(a) (6, 13) (b) (13, 6) (c) (-13, -6) (d) (-6, -13)

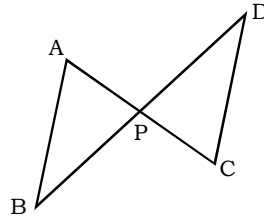
Q.2.(B) Solve ANY TWO of the following :**4**

- (i) Find k if the line passing through points $P(-12, -3)$ and $Q(4, k)$ has slope $\frac{1}{2}$.

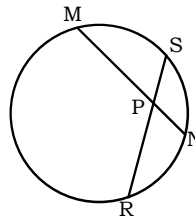
- (ii) In the figure seg AC and seg BD intersects each other

at point P and $\frac{AP}{CP} = \frac{BP}{DP}$.

Then Prove that $\triangle ABP \sim \triangle CDP$.



- (iii) In figure, chord MN and chord RS intersect each other at point P.
If PR = 6, PS = 4, MN = 11
find PN



Q.3.(A) Carry out ANY TWO of the following activities :

4

- (i) Given : In $\triangle ABC$, $\angle ABC = 90^\circ$
To prove : $AC^2 = AB^2 + BC^2$

Construction : Draw seg $BD \perp$ hypotenuse AC. A – D – C

Proof : In $\triangle ABC$, $\angle ABC = 90^\circ$ (Given)

seg $BD \perp$ hypotenuse AC (Construction)

\therefore \sim \sim

(Similarity of right angled triangle)

$\triangle ABC \sim \triangle ADB$

$\frac{AB}{\text{input}} = \frac{\text{input}}{AB}$

$\therefore AB^2 = \text{input} \dots(i)$

$\triangle ABC \sim \triangle BDC$

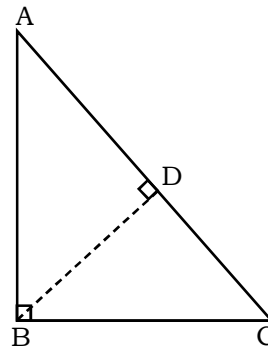
$\frac{BC}{\text{input}} = \frac{\text{input}}{BC} \dots(ii)$

$BC^2 = \text{input} \dots(ii)$

Adding (i) and (ii),

$AB^2 + BC^2 = \text{input}$

$AB^2 + BC^2 = AC^2$



(ii) Given : In ΔABC ,
Line $l \parallel$ side BC

To prove : $\frac{AP}{PB} = \frac{AQ}{QC}$

Construction : Draw seg PC and seg BQ

Proof :

$$\frac{A(\Delta APQ)}{A(\Delta PQB)} = \frac{\boxed{}}{\boxed{}} \dots(i) \boxed{}$$

$$\frac{A(\Delta APQ)}{A(\Delta PQC)} = \frac{\boxed{}}{\boxed{}} \dots(ii) \boxed{}$$

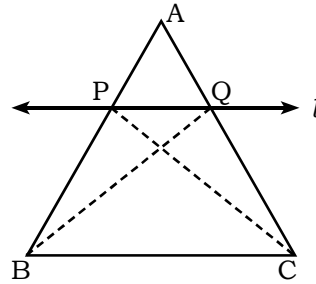
seg $PQ \parallel$ side BC (Given)

$\therefore \Delta PQB$ and ΔPQC have equal heights.

Also they have common base PQ

$\therefore A(\boxed{}) = A(\boxed{}) \dots(iii)$

$\therefore \frac{AP}{PB} = \frac{AQ}{QC}$



(iii) Given : PA and PB are tangent segments drawn from external point P to the circle

To Prove : seg $PA \cong$ seg PB

Construction : Draw seg OA , seg OB and seg OP .

Proof :

In ΔOAP and ΔOBP

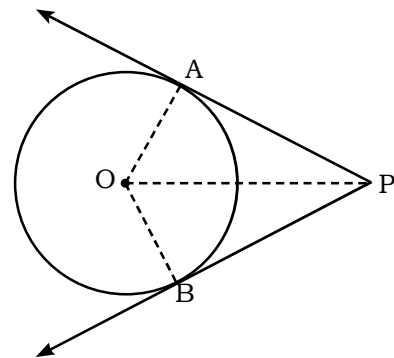
$\angle OAP = \angle OBP = 90^\circ$

hypot. $OP \cong$ hypot. OP

seg $OA \cong$ seg OB

$\therefore \Delta OAP \cong \Delta OBP$

\therefore seg $PA \cong$ seg PB

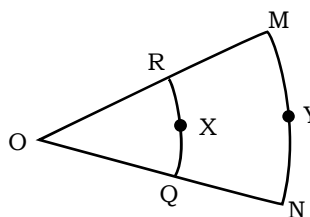


Q.3.(B) Solve ANY TWO of the following :**4**

- (i) Draw a circle with centre P. Draw an arc AB of 100° measure. Draw tangents to the circle at points A and point B.
- (ii) $A(h, -6)$, $B(2, 3)$ and $C(-6, k)$ are the co-ordinates of vertices of a triangle whose centroid is $G(1, 5)$. find h and k .
- (iii) If $\sin \theta + \sin^2 \theta = 1$, Prove that $\cos^2 \theta + \cos^4 \theta = 1$.

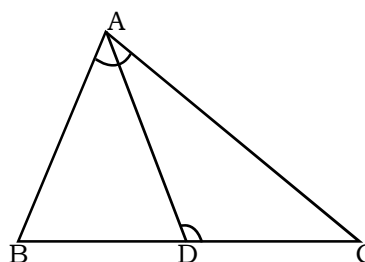
Q.4. Solve ANY THREE of the following :**9**

- (i) From the top of a lighthouse, an observer looks at a ship and finds the angle of depression to be 30° . If the height of the lighthouse is 100 m, then find how far is that ship from the lighthouse.
- (ii) O is the centre of the sector.
 $\angle ROQ = \angle MON = 60^\circ$,
 $OR = 7$ cm, $OM = 21$ cm.
 Find the lengths of arc RXQ
 and arc MYN. $(\pi = \frac{22}{7})$



- (iii) $\triangle ABC \sim \triangle LBN$. In $\triangle ABC$, $AB = 5.1$ cm, $\angle B = 40^\circ$, $BC = 4.8$ cm,
 $\frac{AC}{LN} = \frac{4}{7}$. Construct $\triangle ABC$ and $\triangle LBN$.

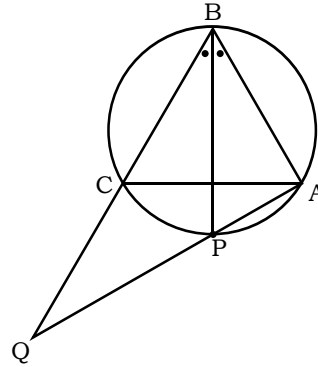
- (iv) In the figure,
 in $\triangle ABC$, point D on
 side BC is such that,
 $\angle BAC \cong \angle ADC$, then
 prove that : $CA^2 = CB \times CD$.



Q.5. Solve ANY ONE of the following :

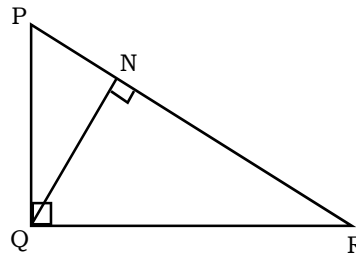
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- (i) ΔABC is an equilateral triangle.
 Bisector of $\angle B$ intersects circumcircle of ABC in point P .
 Prove that $CQ = CA$



- (ii) ΔPQR is a right angled triangle at Q such that $QR = b$ and $a = A$ (ΔPQR) then show that

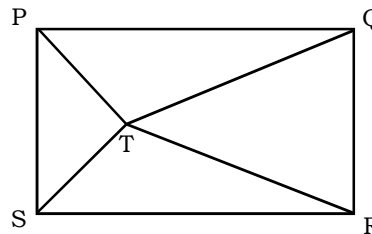
$$QN = \frac{2ab}{\sqrt{b^4 + 4a^2}}$$



Q.6. Solve ANY ONE of the following :

3

- (i) In adjoining figure, point T is in the interior of rectangle $PQRS$.
 Prove that,
 $TS^2 + TQ^2 = TP^2 + TR^2$



- (ii) The diameter and thickness of a hollow metallic sphere are 12 cm and 0.01 m respectively. Find the volume of hollow sphere.

Best Of Luck 🍀