Time: 2 hours | **August 2022** | **Total Marks: 40**

Note: (i) All questions are compulsory.
(ii) Use of a calculator is not allowed.
(iii) The numbers to the right of the questions indicate full marks.
(iv) In case of MCQs [Q. No. 1(A)], only the first attempt will be evaluated and will be given credit.
(v) For every MCQ, the correct alternative (A), (B), (C) or (D) with subquestion number is to be written as an answer.

Q.1. (A) Four alternative answers are given for every sub-question. Select the correct alternative and write the alphabet of that answer. **[4]**

(1) From the following points .... point lies to the right side of the origin on X-axis.
(a) $(-2, 0)$ (b) $(0, 2)$ (c) $(2, 3)$ (d) $(2, 0)$

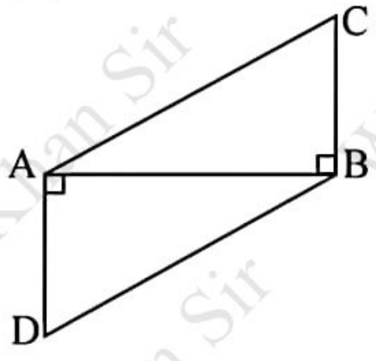
(2) $\Delta PQR \sim \Delta STU$ and $A(\Delta PQR) : A(\Delta STU) = 64:81$, then what is the ratio of corresponding sides?
(a) 8:9 (b) 64:81 (c) 9:8 (d) 16:27

(3) In a right-angled triangle, if the sum of the squares of the sides making right angle is 169, then what is the length of hypotenuse?
(a) 15 (b) 13 (c) 5 (d) 12

(4) If $\tan \theta = \sqrt{3}$, then the value of θ is ....
(a) 60° (b) 30° (c) 90° (d) 45°

Q.1. (B) Solve the following sub-questions. **[4]**

(1)

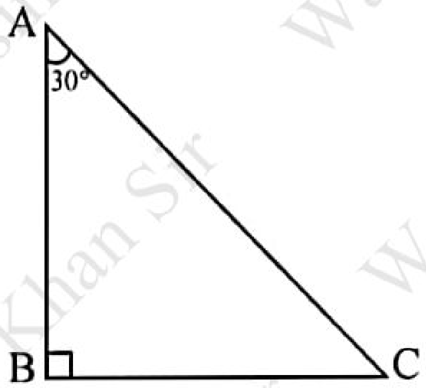


In the above figure, seg CB $\perp$ seg AB, seg AD $\perp$ seg AB. If BC = 4, AD = 8, then find $\dfrac{A(\Delta ABC)}{A(\Delta ADB)}$.

(2) Find the co-ordinates of the mid-point of the segment joining the points (22, 20) and (0, 16).

(3) Two circles having radii 7 cm and 4 cm touch each other internally. Find the distance between their centres.

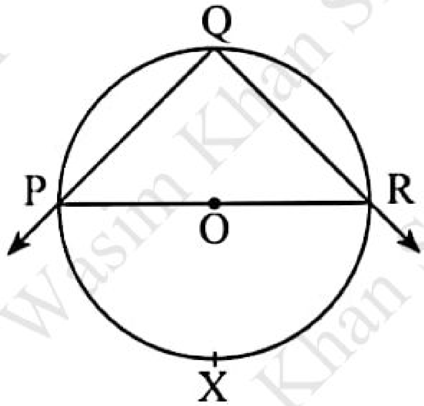
(4)



In ΔABC, $\angle B = 90°$, $\angle A = 30°$, AC = 14, then find BC.

Q.2. (A) Complete the following activities and rewrite them. (Any *two*) **[4]**

(1) In the given figure, $\angle PQR$ is inscribed in the semicircle PQR. Then complete the following activity to find the measure of $\angle PQR$.



Activity :

$m(\text{arc } PQR) = 180°$

...... (measure of semicircle)

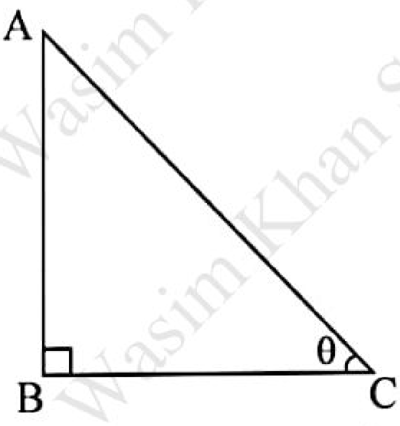
$\therefore \quad m(\text{arc } PXR) = \boxed{}$

$\therefore \angle PQR = \frac{1}{2}\ m(\text{arc } \boxed{})$ .... $\boxed{}$

$= \frac{1}{2} \times 180°$

$\therefore \angle PQR = \boxed{}$

(2) In ΔABC, $\angle B = 90°$, $\angle C = \theta°$, then complete the activity to derive the trigonometric identity.



Activity:

In ΔABC, $\angle B = 90°$, $\angle C = \theta°$

$\therefore \quad AB^2 + BC^2 = \boxed{}$

........(Pythagoras theorem)

$\therefore \quad \frac{AB^2}{AB^2} + \frac{BC^2}{AB^2} = \frac{AC^2}{AB^2}$ ...dividing by AB^2

$\therefore \quad 1 + \frac{BC^2}{AB^2} = \frac{AC^2}{AB^2}$

But $\frac{\boxed{}}{AB^2} = \cot^2\theta$ and $\frac{AC^2}{\boxed{}} = \text{cosec}^2\theta$

$\therefore \quad 1 + \boxed{} = \text{cosec}^2\theta$

(3) In ΔPQR, if $PN = 12$, $NR = 8$, $PM = 15$, $MQ = 12$, then complete the following activity to justify whether seg NM is parallel to side RQ or not.

Activity :

In ΔPQR,

$\frac{PN}{NR} = \frac{12}{\boxed{}} = \frac{3}{2}$ ....(I)

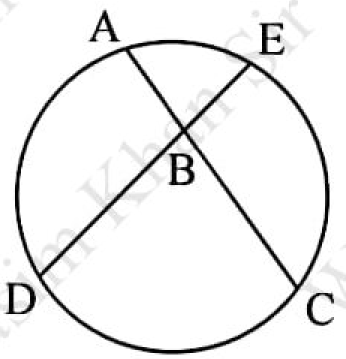
and $\frac{PM}{MQ} = \frac{15}{12} = \frac{\boxed{}}{4}$ ....(II)

$\therefore \quad \frac{PN}{NR} \neq \frac{PM}{MQ}$ ....from (I) and (II)

$\therefore$ By $\boxed{}$

seg NM is $\boxed{}$ to side RQ.

Q.2. (B) Solve the following sub-questions. (Any *four*) [8]

(1) 

In the given figure, chord AC and chord DE intersect each other at point B. If $\angle ABE = 108°$ and $m(\text{arc } AE) = 95°$, then find $m(\text{arc } DC)$.

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

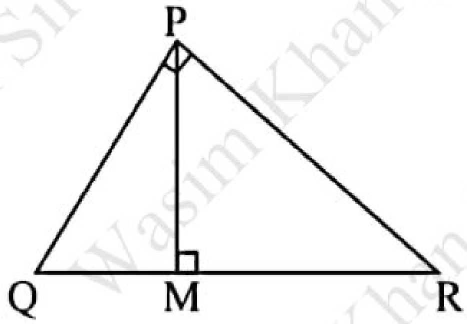
(3) Construct a tangent to a circle with centre P and radius 3.5 cm at any point M on it.

(4) Find the length of the diagonal of a rectangle having sides 11 cm and 60 cm.

(5) If $\sin\theta = \frac{7}{25}$, then find the value of $\cos\theta$ and $\tan\theta$.

Q.3. (A) Complete the following activities and rewrite them. (Any *one*) **[3]**

(1) In the given figure, $\angle QPR = 90°$, seg PM $\perp$ seg QR and Q-M-R. PM = 10, QM = 8, then complete the following activity to find the value of QR.



Activity :

In Δ PQR, $\angle QPR = 90°$ and seg PM $\perp$ seg QR.

$\therefore \quad PM^2 = \boxed{} \times MR$ .... $\boxed{}$

$\therefore \quad (\boxed{})^2 = 8 \times MR$

$\therefore \quad \frac{100}{8} = MR$

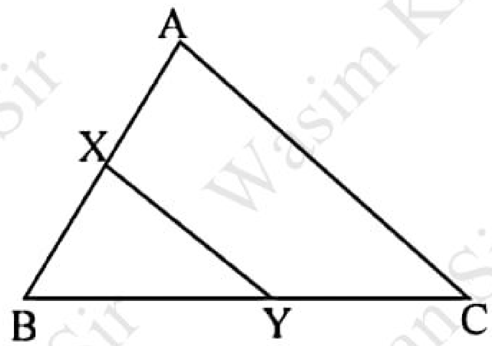
$\therefore \quad \boxed{} = MR$

Now $QR = QM + MR$ ....($\because$ Q-M-R)

$\therefore \quad QR = 8 + \boxed{}$

$\therefore \quad QR = \boxed{}$

(2) In the given figure, in ΔABC seg XY || side AC, A-X-B, B-Y-C. If 2AX = 3BX and XY= 9, then complete the following activity to find the value of AC.



Activity:

$2AX = 3BX$ .... given

$\therefore \quad \frac{AX}{BX} = \frac{\boxed{}}{\boxed{}}$

$\therefore \quad \frac{AX + BX}{BX} = \frac{3+2}{2}$ ....componendo

$\therefore \quad \frac{AB}{BX} = \frac{5}{2}$ ....(I)

$\Delta BCA \sim \Delta BYX$ .... $\boxed{}$ test of similarity

$\therefore \quad \dfrac{BA}{BX} = \dfrac{AC}{\boxed{}}$ .... c.s.s.t.

$\therefore \quad \dfrac{5}{2} = \dfrac{AC}{\boxed{}}$ .... from (I)

$\therefore \quad AC = \boxed{}$

Q.3. (B) Solve the following sub-questions. (Any *two*) **[6]**

(1) Prove that:

$$\sec\theta + \tan\theta = \frac{\cos\theta}{1 - \sin\theta}$$

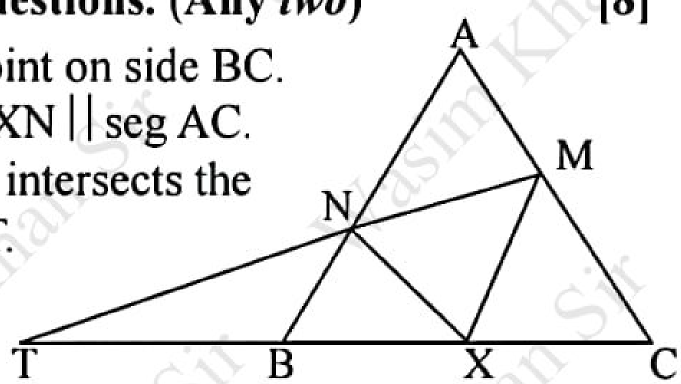
(2) Find the co-ordinates of the centroid of the triangle whose vertices are (4, 7), (8, 4), (7, 11).

(3) Prove that 'opposite angles of a cyclic quadrilateral are supplementary'.

(4) Draw a circle with centre 'O' and radius 3.5 cm. Take a point P at a distance of 7.5 cm from the centre. Draw tangents to the circle from point P.

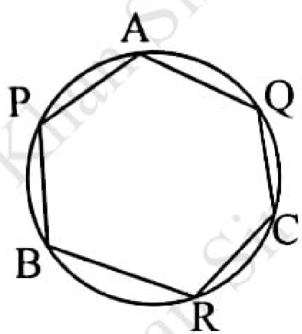
Q.4. Solve the following sub-questions. (Any *two*) **[8]**

(1) In ΔABC, point X is any point on side BC. Seg XM || seg AB and seg XN || seg AC. Extend seg MN such that it intersects the extended side BC in point T. Then prove that:
$TX^2 = TB \times TC$



(2) Draw a triangle ABC, right angle at B such that AB = 3 cm, BC = 4 cm. Now construct ΔPBQ similar to ΔABC, each of whose sides are $\dfrac{7}{4}$ times the corresponding sides of ΔABC.

(3)



In the given figure, points A, P, B, R, C, Q are on the circle. After joining the given points as shown in the figure, they form a hexagon. Then prove that:

$\angle APB + \angle BRC = 360° - \angle AQC$

Q.5. Solve the following sub-questions. (Any *one*) [3]

(1) ΔABC and ΔPQR are equilateral triangles with altitudes $2\sqrt{3}$ and $4\sqrt{3}$ respectively, then:

(a) Find the length of side AB and side PQ.

(b) Find $\dfrac{A(\Delta ABC)}{A(\Delta PQR)}$.

(c) Find the ratio of the perimeter of ΔABC to the perimeter of ΔPQR.

(2) In a circle with centre O, PA and PB are tangents from an external point P. E is the point on the circle such that O-E-P. The tangent drawn at E intersects PA and PB in points C and D respectively. If PA = 10, then write answers to the following questions:

(a) Draw the suitable figure using given information.

(b) Write the relation between seg PA and seg PB.

(c) Find the perimeter of ΔPCD.