SOLUTION

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) [1]

(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 [1]

(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 [1]

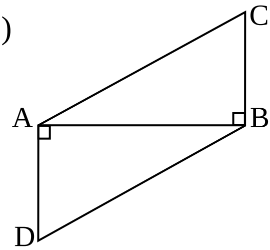
(4) If $\tan\theta = \sqrt{3}$, then the value of θ is ....

(a) 60° (b) 30° (c) 90° (d) 45° [1]

Ans. (1) - (d), (2) - (a), (3) - (b), (4) - (a). [4]

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

(1)



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

Solution:

$$\frac{A(\Delta ABC)}{A(\Delta ADB)} = \frac{\frac{1}{2} \times AB \times BC}{\frac{1}{2} \times AB \times AD}$$

$$\therefore \quad \frac{A(\Delta ABC)}{A(\Delta ADB)} = \frac{BC}{AD}$$ ...[½]

$$\left.\begin{array}{l} BC = 4 \\ AD = 8 \end{array}\right\} \text{ .... (given)}$$

$$\therefore \quad \frac{A(\Delta ABC)}{A(\Delta ADB)} = \frac{4}{8}$$

Ans. $\boxed{\mathbf{\frac{A(\Delta ABC)}{A(\Delta ADB)} = \frac{1}{2}}}$ ...[½] [1]

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

Solution:

Suppose $(x_1, y_1) \equiv (22, 20)$ and $(x_2, y_2) \equiv (0, 16)$ and the co-ordinates of the mid-point are (x, y).

∴ By the mid-point formula,

$$(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$ ...[½]

$$= \left(\frac{22 + 0}{2}, \frac{20 + 16}{2}\right)$$

$$\therefore \quad \boxed{(x, y) = (11, 18)}$$ ...[½] [1]

Ans. The co-ordinates of the mid-point are (11, 18).

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

Solution:

The two circles touch each other internally.

∴ The distance between their centres = 7 cm – 4 cm

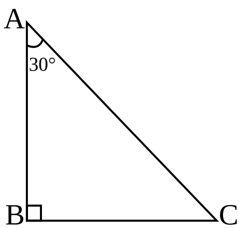
= 3 cm ...[½]

.... (By theorem of touching circles)

Ans. The distance between the centres of the given circle is 3 cm **.**

...[½] [1]

(4)



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

Solution:

$\angle B = 90°$, $\angle A = 30°$ .... (given)

∴ $\angle C = 60°$ .... (Remaining angle of ΔABC)

∴ ΔABC is a 30° – 60° – 90° triangle.

∴ By the 30° – 60° – 90° triangle theorem,

Side opposite the 30° angle $= \frac{1}{2} \times$ hypotenuse

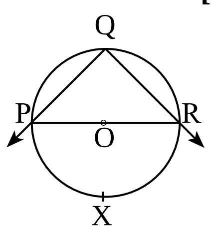
∴ $BC = \frac{1}{2} \times AC$ ...[½]

∴ $BC = \frac{1}{2} \times 14$

∴ **BC = 7** ...[½] [1]

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 measure of $\angle PQR$.



Activity:

$m(\text{arc PQR}) = 180°$ ...... (measure of semicircle)

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

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

$= \frac{1}{2} \times 180°$

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

Solution:

$m(\text{arc PQR}) = 180°$ ..... (measure of semicircle)

$\therefore\ m(\text{arc PXR}) = \boxed{180°}$

...[½]

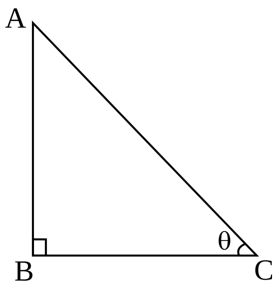
$\angle PQR = \frac{1}{2}\ m(\text{arc } \boxed{\text{PXR}})$ ... $\boxed{\text{Inscribed angle theorem}}$

...[½] + [½]

$= \frac{1}{2} \times 180°$

$\therefore\ \angle PQR = \boxed{\mathbf{90°}}$ ...[½] [2]

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



Activity:

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

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

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

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

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

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

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

Solution:

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

$\therefore\ AB^2 + BC^2 = \boxed{AC^2}$ .... (Pythagoras theorem) ...[½]

$\therefore\ \dfrac{AB^2}{AB^2} + \dfrac{BC^2}{AB^2} = \dfrac{AC^2}{AB^2}$ .... (dividing by AB^2)

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

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

...[½] + [½]

$\therefore\ 1 + \boxed{\cot^2\theta} = \text{cosec}^2\theta$ ...[½] [2]

(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,

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

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

$\therefore\ \dfrac{PN}{NR} \neq \dfrac{PM}{MQ}$ ....[from (I) and (II)]

$\therefore$ By $\boxed{}$

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

Solution:

In ΔPQR,

$\dfrac{PN}{NR} = \dfrac{12}{\boxed{8}} = \dfrac{3}{2}$ ....(I) ...[½]

and $\dfrac{PM}{MQ} = \dfrac{15}{12} = \dfrac{\boxed{5}}{4}$ ....(II) ...[½]

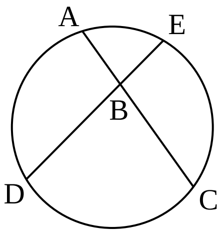
$\therefore\ \dfrac{PN}{NR} \neq \dfrac{PM}{MQ}$ ....[from (I) and (II)]

∴ By **converse of basic proportionality theorem** ...[½]

seg NM is **not parallel** to side RQ. ...[½] [2]

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 ∠ABE = 108° and *m*(arc AE) = 95°, then find *m*(arc DC).

Solution:

$\angle ABE = \frac{1}{2}[m(\text{arc AE}) + m(\text{arc DC})]$ ...[½]

∴ $108° = \frac{1}{2}[95° + m(\text{arc DC})]$ ...[½]

∴ $216° = 95° + m(\text{arc DC})$ ...[½]

∴ $m(\text{arc DC}) = 216° - 95° = 121°$ ...[½]

Ans. **m(arc DC) = 121°** [2]

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

Solution:

Let P (–1, 1) ≡ (x_1, y_1)

Q (5, –7) ≡ (x_2, y_2)

∴ $d(P, Q) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ ....(Distance formula)...[½]

$= \sqrt{[5-(-1)]^2 + (-7-1)^2}$ ...[½]

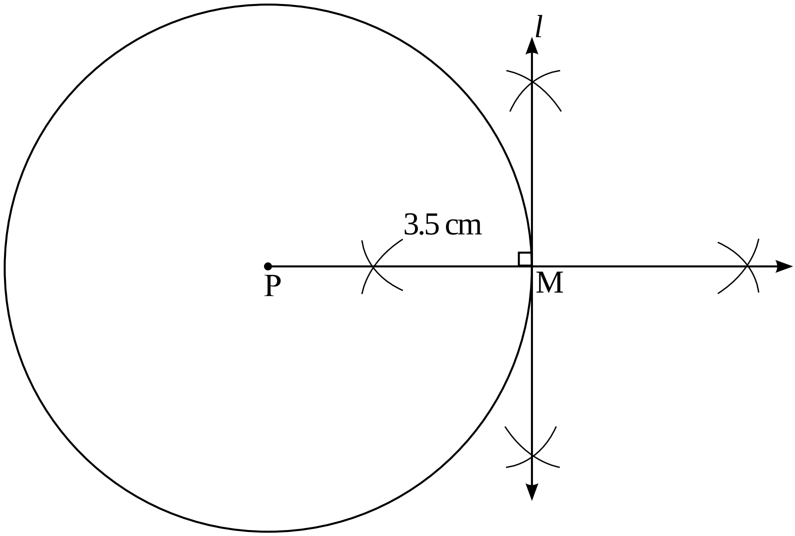
$= \sqrt{(6)^2 + (-8)^2}$ ...[½]

$= \sqrt{100}$

∴ **$d(P, Q) = 10$** ...[½] [2]

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

Construction:

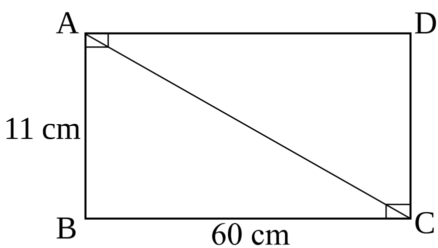


– To draw a circle with given radius and point M on it [1]

– To draw a tangent at point M [1] [2]

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

Solution:



The sides of the rectangle intersect each other at 90°.

$\therefore$ In ΔABC, $\angle ABC = 90°$

$\therefore$ By Pythagorus theorem,

$AC^2 = AB^2 + BC^2$ ...[½]

$= (11)^2 + (60)^2$ ...[½]

$= 121 + 3600$

$= 3721 = (61)^2$ ...[½]

$\therefore$ **AC = 61**

Ans. Diagonal's length is 61 cm. ...[½] [2]

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

Solution:

$\sin^2\theta + \cos^2\theta = 1$ ...[½]

$\therefore \left(\dfrac{7}{25}\right)^2 + \cos^2\theta = 1$

$\therefore \cos^2\theta = 1 - \dfrac{49}{625}$

$\therefore \cos^2\theta = \dfrac{576}{625}$

$\therefore$ $\mathbf{\cos\theta = \dfrac{24}{25}}$ ...[½]

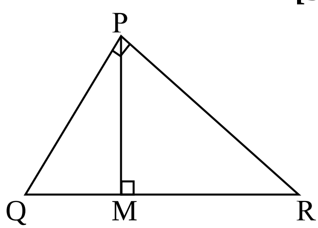
$\tan\theta = \dfrac{\sin\theta}{\cos\theta}$ ...[½]

$= \dfrac{7}{25} \times \dfrac{25}{24}$

$\therefore$ $\mathbf{\tan\theta = \dfrac{7}{24}}$ ...[½] [2]

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.

$\therefore PM^2 = \square \times MR$ .... $\square$

$\therefore (\square)^2 = 8 \times MR$

$\therefore \dfrac{100}{8} = MR$

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

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

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

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

Solution:

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

$\therefore \quad PM^2 = \boxed{QM} \times MR$ ....$\boxed{\text{Geometric mean theorem}}$

.........[½] + [½]

$\therefore \quad \boxed{(10)^2} = 8 \times MR$ ...[½]

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

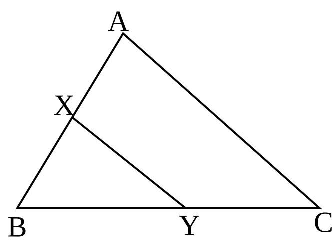
$\therefore \quad \boxed{12.5} = MR$ ...[½]

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

$\therefore \quad QR = 8 + \boxed{12.5}$ ...[½]

$\therefore \quad QR = \boxed{\mathbf{20.5}}$ ...[½] [3]

(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

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

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

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

Solution:

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

$\therefore \quad \frac{AX}{BX} = \frac{\boxed{3}}{\boxed{2}}$

$\therefore \quad \frac{AX + BX}{BX} = \frac{3 + 2}{2}$ ....componendo ...[½] + [½]

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

$\Delta BCA \sim \Delta BYX$ .... $\boxed{AA}$ test of similarity ...[½]

$\therefore \quad \frac{BA}{BX} = \frac{AC}{\boxed{XY}}$ ....c.s.s.t ...[½]

$\therefore \quad \frac{5}{2} = \frac{AC}{\boxed{9}}$ ....from (I) ...[½]

$\therefore \quad AC = \boxed{\mathbf{22.5}}$ ...[½] [3]

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

(1) Prove that:

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

Solution:

$$\text{RHS} = \frac{\cos\theta}{1 - \sin\theta}$$

$$= \frac{\cos\theta}{1 - \sin\theta} \times \frac{1 + \sin\theta}{1 + \sin\theta}$$ ...[½]

$$= \frac{\cos\theta\,(1 + \sin\theta)}{1 - \sin^2\theta}$$ ...[½]

$$= \frac{\cos\theta\,(1 + \sin\theta)}{\cos^2\theta}$$ .... ($\because \sin^2\theta + \cos^2\theta = 1$)

...[½]

$$= \frac{\cos\theta}{\cos\theta} \times \frac{1 + \sin\theta}{\cos\theta}$$

$$= \frac{1 + \sin\theta}{\cos\theta} \quad ...[½]$$

$$= \frac{1}{\cos\theta} + \frac{\sin\theta}{\cos\theta} \quad ...[½]$$

$$= \sec\theta + \tan\theta \quad ...[½]$$

$\therefore$ **RHS = LHS**

Hence proved

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

Solution:

Let $(4, 7) \equiv (x_1, y_1)$

$(8, 4) \equiv (x_2, y_2)$

$(7, 11) \equiv (x_3, y_3)$

Let (x, y) be the co-ordinates of the centroid.

$$\therefore (x, y) = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right) \quad [1]$$

$$= \left(\frac{4 + 8 + 7}{3}, \frac{7 + 4 + 11}{3}\right) \quad [1]$$

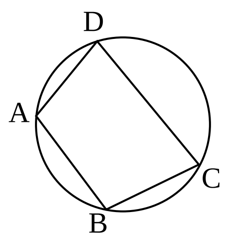
$$\therefore (x, y) = \left(\frac{19}{3}, \frac{22}{3}\right) \quad ...[½]$$

Ans. The co-ordinates of the centroid are $\left(\frac{19}{3}, \frac{22}{3}\right)$. ...[½] [3]

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

Solution:

Given: □ABCD is a cyclic quadrilaeral. ...[½]



To prove: $\angle B + \angle D = 180°$

$\angle A + \angle C = 180°$

Proof:

By the inscribed angle theorem,

$$m\angle ADC = \frac{1}{2}\, m(\text{arc ABC}) \text{ .... (1)} \quad ...[½]$$

and $m\angle ABC = \frac{1}{2}\ m(\text{arc ADC})$ .... (2)

$\therefore$ Adding equations (1) and (2),

$$m\angle ADC + m\angle ABC = \frac{1}{2}\ m(\text{arc ABC}) + \frac{1}{2}\ m(\text{arc ADC}) \quad ...[½]$$

$$= \frac{1}{2}\ [m(\text{arc ABC}) + m(\text{arc ADC})]$$

$$\therefore \quad m\angle D + m\angle B = \frac{1}{2} \times 360° \text{ (Measure of a complete circle)} \quad ...[½]$$

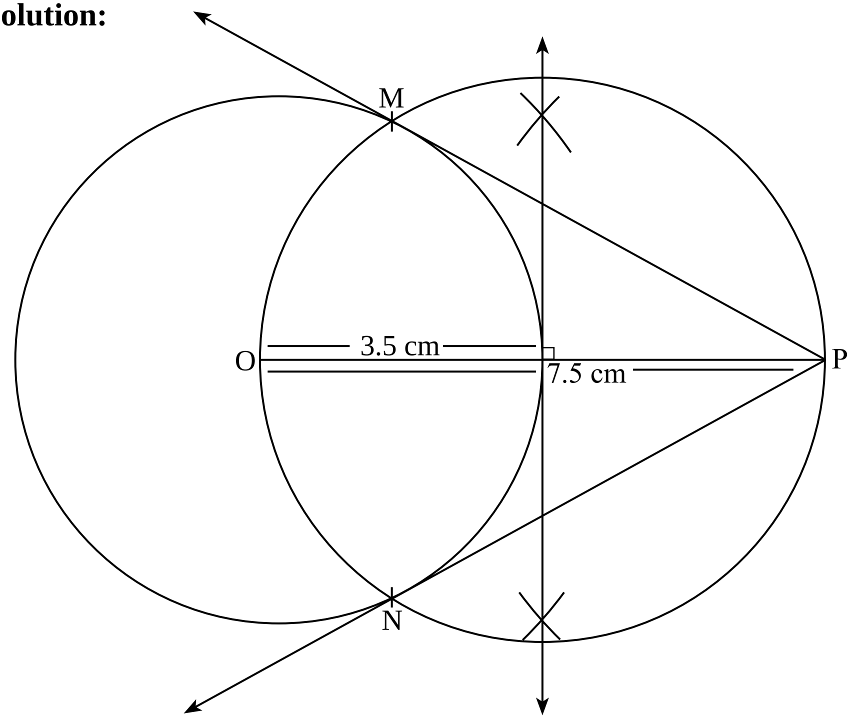
$$\therefore \quad \angle B + \angle D = 180° \quad ...[½]$$

Similarly, $\angle A + \angle C = 180°$ ...[½] [3]

Ans. Hence proved 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.

Solution:



– To draw a circle with centre O and radius 3.5 cm ...[½]

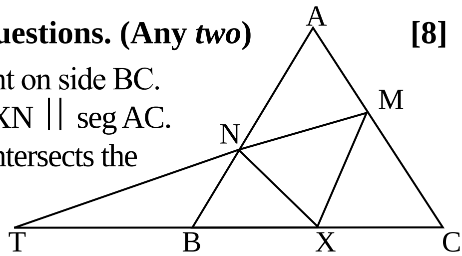
– To take point P at a distance of 7.5 cm from O ...[½]

– To draw the perpendicular bisector of seg OP ...[½]

– To locate points M and N ...[½]

– To draw the tangent segments PM and PN [1] [3]

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:

$TX^2 = TB \times TC$

Proof:

In ΔTMC, seg NX || seg MC ....(given)

$\therefore \quad \frac{TN}{NM} = \frac{TX}{XC}$ ....(1) (Basic proportionality theorem) ...[½]

ΔTMX, seg XM || seg NB ....(given)

$\therefore \quad \frac{TN}{NM} = \frac{TB}{BX}$ ....(2) (Basic proportionality theorem) ...[½]

$\therefore$ From (1) and (2),

$\frac{TX}{XC} = \frac{TB}{BX}$ ...[½]

$\therefore \quad \frac{XC}{TX} = \frac{BX}{TB}$ .... (By invertendo) ...[½]

$\therefore \quad \frac{XC + TX}{TX} = \frac{BX + TB}{TB}$ ...(By componendo) ...[½]

$\therefore \quad \frac{TC}{TX} = \frac{TX}{TB}$ ....($\because$ T-X-C and T-B-X) ...[½] + [½]

$\therefore \quad \boxed{TX^2 = TB \times TC}$ ...[½] [4]

Hence proved

(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 $\frac{7}{4}$ times the corresponding sides of ΔABC.

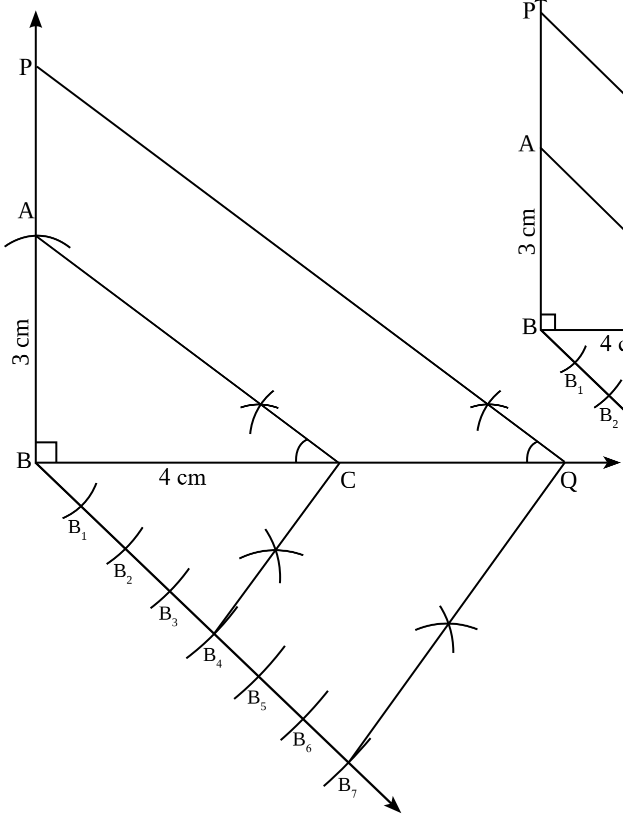
Solution:

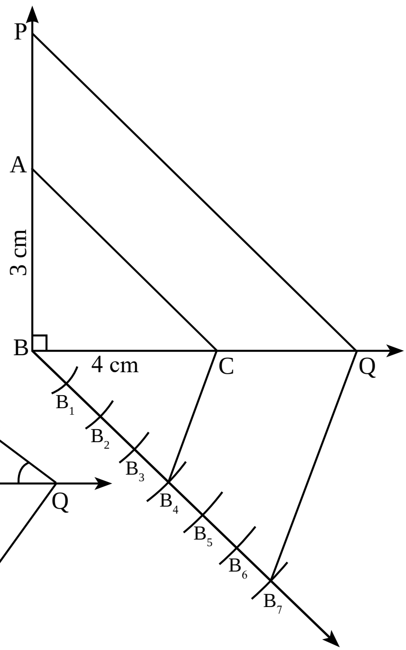
Given: In ΔABC,

$AB = 3$ cm, $\angle B = 90°$, $BC = 4$ cm

$\Delta ABC \sim \Delta PBQ$

$\therefore \quad PB = \frac{7}{4} AB,\ BQ = \frac{7}{4} BC,\ PQ = \frac{7}{4} AC$



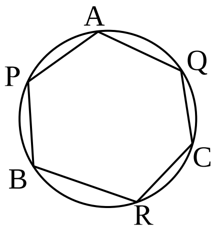


– Analytical figure [1]

– Construction of ΔABC [1]

– Construct $B_4C \parallel B_7Q$ and $AC \parallel PQ$ [1]

– Construct ΔPBQ [1] [4]

(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:

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

Proof:

By inscribed angle theorem,

$\angle APB = \frac{1}{2} \times m(\text{arc ACB})$

$= \frac{1}{2}$ [m(arc AQ) + m(arc QC) + m(arc CR) + m(arc RB)]

...[½] + [½]

.... (1)

and

$\angle BRC = \frac{1}{2} \times m(\text{arc BAC})$

$= \frac{1}{2}$ [m(arc BP) + m(arc PA) + m(arc AQ) + m(arc QC)]

...[½]

.... (2)

∴ Adding (1) and (2),

$\angle APB + \angle BRC$

$= \frac{1}{2} m(\text{arc AQ}) + \frac{1}{2} m(\text{arc QC}) + \frac{1}{2} m(\text{arc CR}) + \frac{1}{2} m(\text{arc RB})$

$+ \frac{1}{2} m(\text{arc BP}) + \frac{1}{2} m(\text{arc PA}) + \frac{1}{2} m(\text{arc AQ}) + \frac{1}{2} m(\text{arc QC})$

...[½]

$= m(\text{arc AQ}) + m(\text{arc QC}) + \frac{1}{2} [m(\text{arc CR}) + m(\text{arc RB})$

$+ m(\text{arc BP}) + m(\text{arc AP})]$

$= m(\text{arc AQ}) + m(\text{arc QC}) + \frac{1}{2} m(\text{arc ABC})$

.... (3) ...[½]

Now, $m(\text{arc AQ}) + m(\text{arc QC}) + m(\text{arc ABC}) = 360°$

.... (Measure of a complete circle)

∴ $m(\text{arc AQ}) + m(\text{arc QC}) = 360° - m(\text{arc ABC})$ ...[½]

.... (4)

$\therefore$ From (3) and (4),

$$\angle APB + \angle BRC = 360° - m(\text{arc ABC}) + \frac{1}{2}\, m(\text{arc ABC})$$

$$= 360° - \frac{1}{2}\, m(\text{arc ABC})$$

But $\angle AQC = \frac{1}{2}\, m(\text{arc ABC})$ (Inscribed angle theorem)

.... (5) ...[½]

$\therefore$ Using (5),

$$\boxed{\angle APB + \angle BRC = 360° - \angle AQC}$$ ...[½] [4]

Hence proved

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

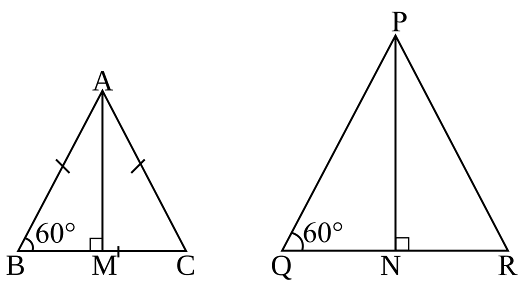
(a) Find the length of side AB and side PQ. [1]

(b) Find $\dfrac{A(\Delta ABC)}{A(\Delta PQR)}$. [1]

(c) Find the ratio of the perimeter of ΔABC to the perimeter of ΔPQR. [1]

Solution:

Let AM and PN be the altitudes of ΔABC and ΔPQR respectively.



$\therefore$ $AM = 2\sqrt{3}$ and

$\therefore$ $PN = 4\sqrt{3}$

(a) In ΔABM,

$\angle B = 60°$ ....($\because$ ΔABC is an equilateral Δ)

$AM \perp BC$

$\therefore$ $\angle M = 90°$

$\therefore$ $\angle A = 30°$ .... (Remaining angle of ΔABM)

$\therefore$ ΔABM is a $30° - 60° - 90°$ triangle.

$\therefore$ By 30° – 60° – 90° triangle theorem,

$$\text{side opposite the } 60° \text{ angle} = \frac{\sqrt{3}}{2} \times \text{hypotenuse}$$

$$\therefore \quad AM = \frac{\sqrt{3}}{2} \times AB$$

$$\therefore \quad AB = \frac{2}{\sqrt{3}} \times 2\sqrt{3}$$

$$\therefore \quad \boxed{AB = 4}$$ ...[½]

Similarly, ΔPQN is also a 30° – 60° – 90° triangle.

$\therefore$ By 30° – 60° – 90° triangle theorem,

$PN = \frac{\sqrt{3}}{2} \times PQ$ .... (Side opposite the 60° angle)

$\therefore \quad 4\sqrt{3} = \frac{\sqrt{3}}{2} \times PQ$

$\therefore \quad \boxed{\mathbf{PQ = 8}}$ ...[½] [1]

(b) Equilateral triangles are similar.

$\therefore \quad \Delta ABC \sim \Delta PQR$

$\therefore$ By the theorem on areas of similar triangles,

$$\frac{A(\Delta ABC)}{A(\Delta PQR)} = \left(\frac{AB}{PQ}\right)^2$$ ...[½]

$$= \left(\frac{4}{8}\right)^2$$

$$= \left(\frac{1}{2}\right)^2$$

$$\therefore \quad \boxed{\frac{A(\Delta ABC)}{A(\Delta PQR)} = \frac{1}{4}}$$ ...[½] [1]

(c) $$\frac{\text{Perimeter of } \Delta ABC}{\text{Perimeter of } \Delta PQR} = \frac{AB + BC + AC}{PQ + QR + PR}$$

But ΔABC and ΔPQR are equilateral Δ.

$$\therefore \quad \frac{P(\Delta ABC)}{P(\Delta PQR)} = \frac{3AB}{3PQ} \qquad ...[½]$$

$$= \frac{4}{8} = \frac{1}{2}$$

$$\therefore \quad \boxed{\frac{P(\Delta ABC)}{P(\Delta PQR)} = \frac{1}{2}} \qquad ...[½] \ [3]$$

(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:

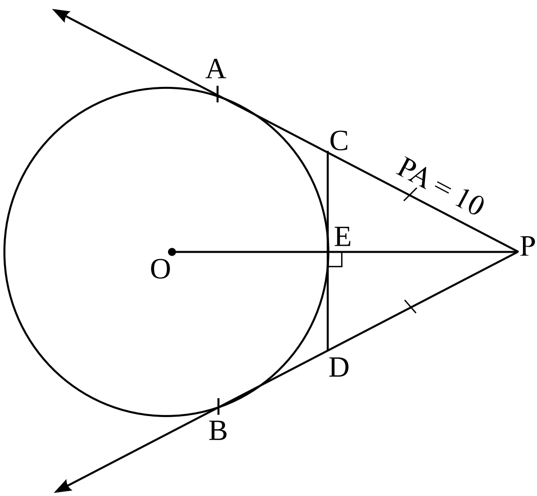
(a) Draw the suitable figure using given information. [½]

(b) Write the relation between seg PA and seg PB. [½]

(c) Find the perimeter of ΔPCD. [2]

Solution:

(a)



...[½]

(b) PA = PB .... (∵ The tangents drawn from an exterior point to a circle are equal.) ...[½]

(c) $\because$ Perimeter of $\Delta PCD = PC + CD + DP$ ....(1)...[½]

But $CD = CE + ED$ ....($\because$ $C - E - D$)

Also, $CE = CA$ and $ED = BD$

.......(Tangents drawn from an exterior point to the circle) ...[½]

$\therefore$ $CD = CA + BD$ ....(2)

$\therefore$ From (1) and (2),

$\therefore$ $P(\Delta PCD) = PC + CA + BD + DP$

$= PA + PB$ .... ($\because$ $P - C - A$ and $P - D - B$)

$= PA + PA$ .... [using (b)]

$= 10 + 10$ ($\because$ $PA = 10$) ...[½]

$\therefore$ $\boxed{P(\Delta PCD) = 20}$

Ans. Perimeter of ΔPCD is 20. ...[½] [3]

★★★