MODEL QUESTION PAPER SET- 1 : 2021 - 22

STD 10TH – MATHS - II (THEORY)

MM: 40 SOLUTIONS Time: 2 Hrs

ENTIRE SYLLABUS:

Q.1 A) Solve Multiple choice questions. **(4)**

1) $\triangle ABC \sim \triangle DEF$, $\frac{AC}{DF} = \frac{7}{4}$

then, $\frac{\angle BAC}{\angle EDF}$= ..... .

a. $\frac{7}{4}$ b. $\frac{3}{5}$ c. $\frac{1}{1}$ d. $\frac{4}{7}$

Ans. Option c.

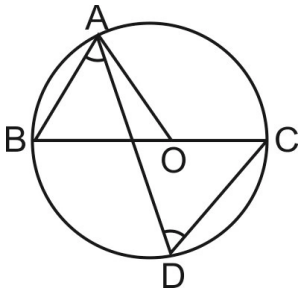
Hint : Corresponding angles of similar triangles are congruent equal.

2) Which of the following is not a pythagoras triplet?

a. (5, 12, 13) b. (8, 15, 17) c. (12, 15, 19) d. (3, 4, 5)

Ans. Option c.

3)

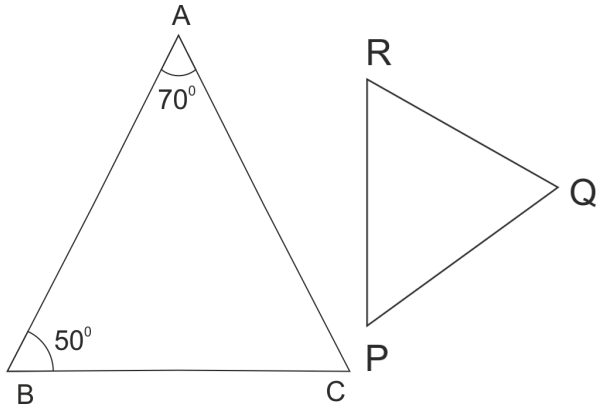


If AB||CD in the given figure, O is the centre of the circle. If $\angle BAD = 60°$, then $\angle ADC$ is equal to

a. 30^0 b. 45^0 c. 60^0 d. 120^0

Ans. Option c.

4)



In the given figure, $\triangle ABC \sim \triangle QPR$. Then $\angle R$ is

a. 60^0 b. 50^0 c. 70^0 d. 80^0

Ans. Option a.

Hint : $\angle C \cong \angle R$

B) Solve the following questions. **(4)**

1) Identify, with reason, if the following is Pythagorean triplet. 3, 5, 4

Ans. (3, 5, 4)

$5^2 = 25$

and $3^2 + 4^2 = 9 + 16$

$= 25$

$\therefore \quad 5^2 = 3^2 + 4^2$

$\therefore$ (3, 5, 4) is a Pythagorean triplets.

2) Find the distance between each of the following pairs of points.

R (0, – 3), S $\left(0, \frac{5}{2}\right)$

Ans. Let R (0, – 3) $\equiv (x_1, y_1)$ and

S (0, 2.5) $\equiv (x_2, y_2)$

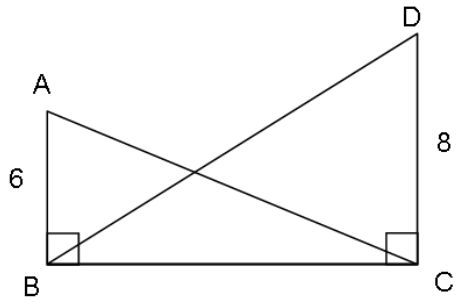
By distance formula,

$$RS = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(0-0)^2 + [2.5 - (-3)]^2}$$
$$= \sqrt{0^2 + (2.5 + 3)^2}$$
$$= \sqrt{0+5.5^2}$$
$$= \sqrt{5.5^2}$$

$\therefore$ RS = 5.5 units

$\therefore$ The distance between the points R and S is 5.5 units.

3)



In figure, $\angle ABC = \angle DCB = 90°$, AB = 6, DC = 8 then $\frac{A(\triangle ABC)}{A(\triangle DCB)}$ = ?

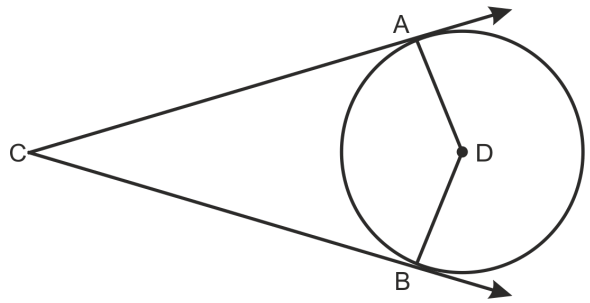
Ans. $\triangle$ ABC and $\triangle$ DCB have same base BC

$\therefore \quad \frac{A(\triangle ABC)}{A(\triangle DCB)} = \frac{AB}{DC}$ = {bases are same, hence areas proportional to height}

$\therefore \quad \frac{A(\triangle ABC)}{A(\triangle DCB)} = \frac{6}{8}$

$\therefore \quad \boxed{\frac{A(\triangle ABC)}{A(\triangle DCB)} = \frac{3}{4}}$

4) In the adjoining figure circle with D touches the side of $\angle$ ACB at A and B. If $\angle$ ACB = 52°, find measure of $\angle$ ADB.



Ans. The sum of all angles of a quadrilateral is 360°.

$\therefore \quad \angle ACB + \angle CAD + \angle CBD + \angle ADB = 360°$

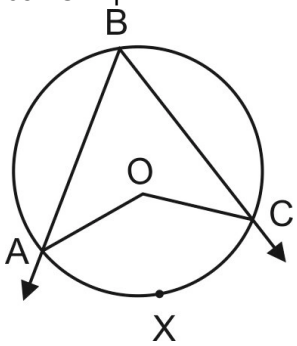
$\therefore \quad 52° + 90° + 90° + \angle ADB = 360°$ ..... Tangent theorem

$\therefore \quad \angle ADB + 232° = 360°$

$\therefore \quad \angle ADB = 360° - 232° = 128°$

Q.2 A) Complete the following Activities. (Any two) **(4)**

1) In the following figure,O is the centre of the circle. ∠ABC is inscribed in arc ABC and ∠ABC = 65°. Complete the following activity to find the measure of ∠ AOC.



Activity :

∠ ABC = $\frac{1}{2}$_____ ... [Inscribed angle theorem]

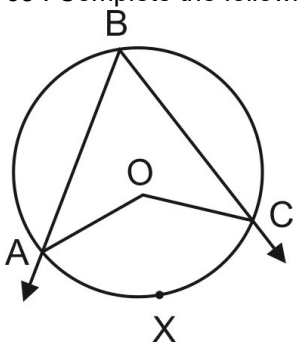
∴ _____×2 = m (arc AXC)

∴ m (arc AXC) = _____

∠ AOC = m (arc AXC) ... [Definition of measure of minor arc)

∴ ∠ AOC = _____

Ans. In the following figure,O is the centre of the circle. ∠ABC is inscribed in arc ABC and ∠ABC = 65°. Complete the following activity to find the measure of ∠ AOC.



Activity :

∠ ABC = $\frac{1}{2}$(arc AXC) ... [Inscribed angle theorem]

∴ 65°×2 = m (arc AXC)

∴ m (arc AXC) = 130°

∠ AOC = m (arc AXC)... [Definition of measure of minor arc)

∴ ∠ AOC = 130°

2) Identify, with reason, which of the following are Pythagorean triplets. (11, 60, 61)

61^2 = _____

and $11^2 + 60^2$= _____+ 3600

= _____

∴ 61^2 = $11^2 + 60^2$

∴ (11, 60, 61) is a _____ triplets.

Ans. Identify, with reason, which of the following are Pythagorean triplets. (11, 60, 61)

61^2 = 3721

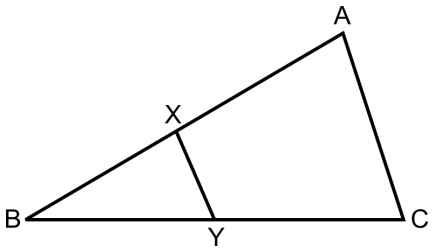
and $11^2 + 60^2$= 121 + 3600

= 3721

∴ 61^2 = $11^2 + 60^2$

∴ (11, 60, 61) is a Pythagorean triplets.

3)



In figure XY || seg AC. If 2AX = 3BX and XY = 9. Complete the activity to find the value of AC.

2 AX = 3 BX $\therefore$ $\frac{AX}{BX}$ = _____

$\frac{AX + BX}{BX}$ = _____ ... by componendo

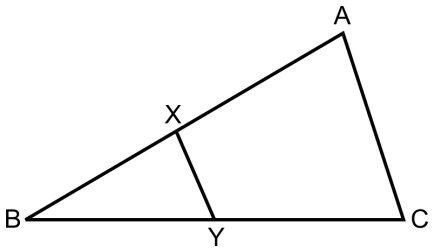
$\frac{AB}{BX}$ = _____ ... (I)

$\triangle BCA \sim \triangle BYX$ ... _____ test of similarity.

$\therefore$ $\frac{BA}{BX} = \frac{AC}{XY}$ ... corresponding sides of similar triangles.

$\therefore$ $\frac{5}{2} = \frac{AC}{9}$ $\therefore$ AC = _____ ... from (I)

Ans.



In figure XY || seg AC. If 2AX = 3BX and XY = 9. Complete the activity to find the value of AC.

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

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

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

$\triangle BCA \sim \triangle BYX$ ... AA test of similarity.

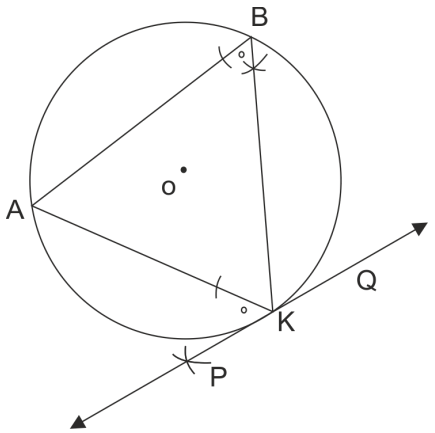
$\therefore$ $\frac{BA}{BX} = \frac{AC}{XY}$ ... corresponding sides of similar triangles.

$\therefore$ $\frac{5}{2} = \frac{AC}{9}$ $\therefore$ AC = 22.5 ... from (I)

B) Solve the following questions. (Any four) **(8)**

1) Draw a circle of radius 3.6. Draw a tangent to the circle at any point on it without using centre.

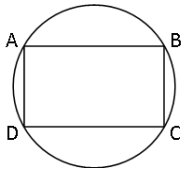
Ans.



Line BN is the required tangent.

2) Prove that, any rectangle is a cyclic quadrilateral.

Ans.



Let □ABCD be a given rectangle

In □ABCD,

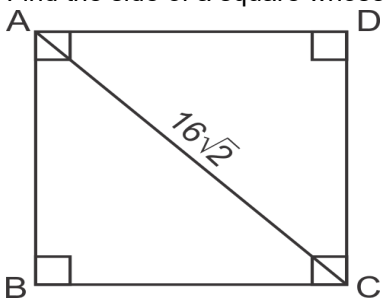
$\angle A = \angle B = \angle C = \angle D = 90^\circ$ ... [angles of a rectangle]

$\therefore$ $\angle A + \angle C = 180^\circ$

$\therefore$ $\angle B + \angle D = 180^\circ$ ... [opposite angle of a quadrilateral are supplementary, then the quadrilateral is a cyclic quadrilateral]

$\therefore$ □ABCD is a cyclic quadrilateral

3) Find the side of a square whose diagonal is $16\sqrt{2}$ cm.



Ans. Given : □ABCD is a square, AC = $16\sqrt{2}$ cm.

(1) □ABCD is a square ... (Given)

(2) $\therefore$ AB = BC = x ... (Sides of a square and assumption)

(3) $\angle D = 90^\circ$ ... (Angles of a square)

(4) In $\triangle ABC$, $\angle B = 90^\circ$ ... (From (3))

$\therefore$ $AC^2 = AB^2 + BC^2$ ... (Pythagoras Theorem)

$\therefore$ $(16\sqrt{2})^2 = x^2 + x^2$ ... (From (ii) and given)

$\therefore$ $256 \times 2 = 2x^2$

$\therefore$ $\frac{256 \times 2}{2} = x^2$

$\therefore$ $x^2 = 256$

$\therefore$ $x = \sqrt{256}$ ... (Taking sq. root)

$\therefore$ x = 16 cm

Side of the square is 16 cm

4) Ratio of corresponding sides of two similar triangles is 2:5, If the area of the small triangle is 64 sq.cm. then what is the area of the bigger triangle?

Ans. Assume that $\triangle ABC \sim \triangle PQR$

$\triangle$ ABC is smaller and $\triangle$PQR is bigger triangle.

$\therefore$ $\frac{A(\triangle ABC)}{A(\triangle PQR)} = \frac{(2)^2}{(5)^2}$ ... ratios of areas of similar triangles

$\therefore$ $\frac{64}{A(\triangle PQR)} = \frac{4}{25}$

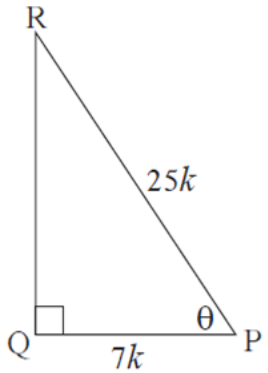
$\therefore$ $4 \times A(\triangle PQR) = 64 \times 25$

$A(\triangle PQR) = \frac{64 \times 25}{4} = 400$

$\therefore$ Area of bigger triangle = 400 sq.cm.

5) If $\sec\theta = \frac{25}{7}$, find the value of $\tan\theta$.

Ans.



$1 + \tan^2\theta = \sec^2\theta$

$\therefore \quad 1 + \tan^2\theta = \left(\frac{25}{7}\right)^2$

$\therefore \quad \tan^2\theta = \frac{625}{49} - 1$

$= \frac{625 - 49}{49}$

$= \frac{576}{49}$

$\therefore \quad \tan\theta = \frac{24}{7}$

Q.3 A) Complete the following activity. (Any one) (3)

1) If $\sin\theta = \frac{5}{13}$, where θ is an acute angle, find the value of other trigonometric ratios, using identities.

$\sin\theta = \frac{5}{13}$ ... (given)

$\sin^2\theta + \cos^2\theta = 1$ ... (Trigonometrically Identity)

$\therefore \quad \cos^2\theta = 1 - \sin^2\theta$

$= _____$ ... (given)

$\sin^2\theta + \cos^2\theta = 1$ ...(Trigonometrically Identity)

$\therefore \quad \cos^2\theta = 1 - \sin^2\theta$

$= 1 - \frac{25}{169}$

$= \frac{169 - 25}{169}$

$= _____$

$\therefore \quad \cos\theta = \pm\frac{12}{13}$ ... (Taking sq. root)

$\therefore \quad \cos\theta = \frac{12}{13}$ ... _____

$\tan\theta = \frac{\sin\theta}{\cos\theta}$

$= \frac{\frac{5}{13}}{\frac{12}{13}}$ ... [From (1) and (2)]

$\therefore \quad \tan\theta = \frac{5}{12}$

$\cot\theta = \frac{1}{\tan\theta}$

$= \frac{1}{\left(\frac{5}{12}\right)}$ ... [From (3)]

$\therefore \quad \cot\theta = _____$

$\sec\theta = \frac{1}{\cos\theta}$

$=$ ... [From (2)]

$$\frac{1}{\left(\frac{12}{13}\right)}$$

$\therefore$ sec θ = _____

cosec θ = $\frac{1}{\sin\theta}$

= $\frac{1}{\left(\frac{5}{13}\right)}$ ... [From (1)]

$\therefore$ cosec θ = _____

Ans. If sin θ = $\frac{5}{13}$, where θ is an acute angle, find the value of other trigonometric ratios, using identities.

sin θ = $\frac{5}{13}$ ... (given)

$\sin^2\theta + \cos^2\theta = 1$ ... (Trigonometrically Identity)

$\therefore$ $\cos^2\theta = 1 - \sin^2\theta$

= $1-\left(\frac{5}{13}\right)^2$ ... (given)

$\sin^2\theta + \cos^2\theta = 1$ ... (Trigonometrically Identity)

$\therefore$ $\cos^2\theta = 1 - \sin^2\theta$

= $1 - \frac{25}{169}$

= $\frac{169 - 25}{169}$

= $\frac{144}{169}$

$\therefore$ cos θ = $\pm\frac{12}{13}$ ... (Taking sq. root)

$\therefore$ cos θ = $\frac{12}{13}$ ... (θ is acute)

tan θ = $\frac{\sin\theta}{\cos\theta}$

= $\frac{\frac{5}{13}}{\frac{12}{13}}$ ... [From (1) and (2)]

$\therefore$ tan θ = $\frac{5}{12}$

cot θ = $\frac{1}{\tan\theta}$

= $\frac{1}{\left(\frac{5}{12}\right)}$ ... [From (3)]

$\therefore$ cot θ = $\frac{12}{5}$

sec θ = $\frac{1}{\cos\theta}$

= $\frac{1}{\left(\frac{12}{13}\right)}$ ... [From (2)]

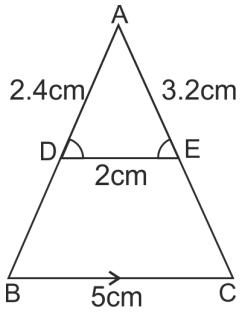
$\therefore$ sec θ = $\frac{13}{12}$

cosec θ = $\frac{1}{\sin\theta}$

= $\frac{1}{\left(\frac{5}{13}\right)}$ ... [From (1)]

$\therefore$ cosec θ = $\frac{13}{5}$

2) In a △ABC, D and E are points on the sides AB and AC respectively such that DE ∥ BC. If AD = 2.4 cm, AE = 3.2 cm, DE = 2 cm and BC = 5 cm, find the BD and CE.



In △ABC

∵ DE ∥ BC

∴ $\frac{AD}{AB}$ = _____

$\frac{2.4}{AB} = \frac{3.2}{AC} = \frac{2}{5}$

$\frac{2.4}{AB} = \frac{2}{5}$

AB = _____

= 6cm

$\frac{3.2}{AC} = \frac{2}{5}$

and AC = _____ = 8cm

∴ BD = _____

= 6 - 2.4

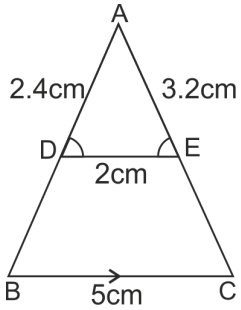
= _____

and CE = AC - AE

= 8 - 3.2

= _____

Ans. In a △ABC, D and E are points on the sides AB and AC respectively such that DE ∥ BC. If AD = 2.4 cm, AE = 3.2 cm, DE = 2 cm and BC = 5 cm, find the BD and CE.



In △ABC

∵ DE ∥ BC

∴ $\frac{AD}{AB} = \frac{AE}{AC} = \frac{DE}{BC}$

$\frac{2.4}{AB} = \frac{3.2}{AC} = \frac{2}{5}$

$\frac{2.4}{AB} = \frac{2}{5}$

AB = $\frac{2.4 \times 5}{2}$

= 6cm

$\frac{3.2}{AC} = \frac{2}{5}$

and AC = $\frac{3.2 \times 5}{2}$ = 8cm

∴ BD = AB - AD

= 6 - 2.4

= 3.6cm

and CE = AC - AE

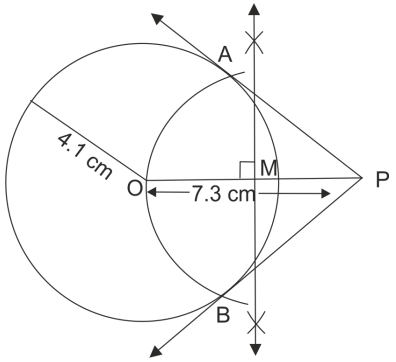
= 8 - 3.2

= 4. 8cm

B) Solve the following questions. (Any two) **(6)**

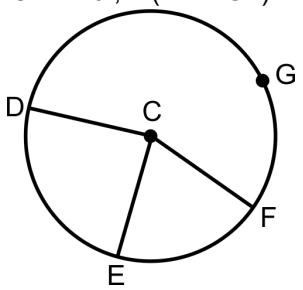
1) Draw a circle with radius 4.1 cm. Construct tangents to the circle from a point at a distance 7.3 cm from the centre.

Ans.



Line PA and line PB are required tangents.

2) In the figure, points G, D, E, F are concyclic points of circle with centre C.
$\angle ECF = 70°$, m(arc DGF) = 200° Find m(arc DE) and m(arc DEF).



Ans. Given: m(arc DGE) = 200^0

$\angle ECF = 70^0$

To Find: i) m(arc DE)

ii) m(arc DEF)

Solution: m(arc DGF) = 200^0 ... (given)

m(arc DEF) = 360^0 - m(arc DGF) ... (by formula of measure of major arc)

$\therefore$ m(arc DEF) = $360^0 - 200^0$

$\therefore$ $\boxed{\text{m(arc DEF)} = 160^0}$ ... I

$\angle ECF = 70^0$ ... (given)

$\therefore$ m(arc EF) = 70^0 ... (measure of arc is equal to corresponding central angle) ... II

We can see that,

m(arc DEF) = m(arc DE) + m(arc EF)

$\therefore$ 160^0 = m(arc DE) + 70^0 ... (from I and II)

$\therefore$ $\boxed{\text{m (arc DE)} = 90^0}$

3) If $\tan\theta = 1$ then, find the values of $\frac{\sin\theta + \cos\theta}{\sec\theta + \operatorname{cosec}\theta}$.

Ans. $\tan\theta = 1$

From the table of trigonometric ratios,

We know $\tan 45° = 1$

$\therefore$ $\theta = 45°$

$\sin\theta = \sin 45° = \frac{1}{\sqrt{2}}$

$\cos\theta = \cos 45^o = \frac{1}{\sqrt{2}}$

$\sec\theta = \sec 45^o = \sqrt{2}$

$\text{cosec}\,\theta = \text{cosec}\,45^o = \sqrt{2}$

$$\frac{\sin\theta + \cos\theta}{\sec\theta + \text{cosec}\,\theta} = \frac{\sin 45^o + \cos 45^o}{\sec 45^o + \text{cosec}\,45^o}$$

$$= \frac{\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}}{\sqrt{2} + \sqrt{2}}$$

$$= \frac{\frac{\sqrt{2} + \sqrt{2}}{2}}{2\sqrt{2}}$$

$$= \frac{2\sqrt{2}}{2} \div 2\sqrt{2}$$

$$= \frac{2\sqrt{2}}{2} \times \frac{1}{2\sqrt{2}}$$

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

Ans. $\frac{\sin\theta + \cos\theta}{\sec\theta + \text{cosec}\,\theta} = \mathbf{\frac{1}{2}}$

4) If point T divides the segment AB with A(- 7, 4) and B(- 6, - 5) in the ratio 7 : 2, find the co-ordinates of T.

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

$\therefore$ by the section formula,

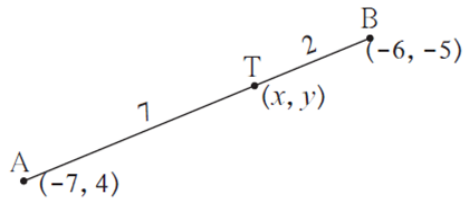
$$x = \frac{mx_2 + nx_2}{m + n} = \frac{7 \times (-6) + 2 \times (-7)}{7 + 2}$$

$$= \frac{-42 - 14}{9} = \frac{-56}{9}$$

$$y = \frac{my_2 + ny_1}{m + n} = \frac{7 \times (-5) + 2 \times (4)}{7 + 2}$$

$$= \frac{-35 + 8}{9} = \frac{-27}{9} = -3$$

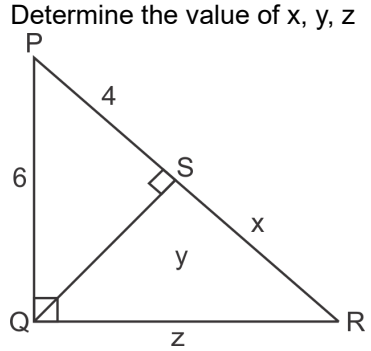
$\therefore$ Co-ordinates of point T are $\left(\frac{-56}{9}, -3\right)$.



Q.4 **Solve the following questions. (Any two)** **(8)**

1) In the given figure an altitude is drawn to the hypotenuse. The lengths of different segments are marked in the figure.

Determine the value of x, y, z



Ans. (1)In $\triangle PSQ$, $\angle PSQ = 90°$ ... (given)

$\therefore$ $PQ^2 = PS^2 + QS^2$ ... (Pythagoras theorem)

(2)But,

PQ = 6, SR = x, PS = 4

QR = z, QS = y ... (given)

(3)$\therefore$ $6^2 = 4^2 + y^2$ ... [from (i) and (ii)]

$\therefore$ $36 = 16 + y^2$

$\therefore$ $y^2 = 36 - 16$

$\therefore$ $y^2 = 20$

$\therefore$ $y = \sqrt{20}$

$\therefore$ $y = \sqrt{4 \times 5}$

$\therefore$ $y = 2\sqrt{5}$ units

(4)$QS^2 = PS \times SR$ ... (Geometric mean property)

$\therefore$ $y^2 = 4 \times x$ ... [From (ii)]

$\therefore$ $(2\sqrt{5})^2 = 4 \times x$ ... [From (iii)]

$\therefore$ $4 \times 5 = 4 \times x$

$\therefore$ $\frac{4 \times 5}{4} = x$

$\therefore$ x = 5 units

(5)In $\triangle QSR$, $\angle QSR = 90°$ ... (given)

$QR^2 = QS^2 + SR^2$ ... (Pythagoras theorem)

$\therefore$ $z^2 = y^2 + x^2$ ... [From (2)]

$\therefore$ $z^2 = (2\sqrt{5})^2 + (5)^2$ ... [From (3) and (5)]

$\therefore$ $z^2 = (2\sqrt{5})^2 + (5)^2$

$\therefore$ $z^2 = (4 \times 5) + (5 \times 5)$

$\therefore$ $z^2 = 20 + 25$

$\therefore$ $z^2 = 45$

$\therefore$ $z = \sqrt{45}$ ... (Taking square root)

$\therefore$ $z = \sqrt{9 \times 5}$

$\therefore$ $z = 3\sqrt{5}$ units

x = 5 units, y = $2\sqrt{5}$ units, z = $3\sqrt{5}$ units

2) Prove that : $\frac{1}{\text{Cosec A} - \text{Cot A}} - \frac{1}{\text{Sin A}} = \frac{1}{\text{Sin A}} - \frac{1}{\text{Cosec A} + \text{Cot A}}$

Ans. L.H.S $\frac{1}{\text{cosecA} - \text{cotA}} - \frac{1}{\text{sinA}}$

$= \frac{1}{\frac{1}{\text{sinA}} - \frac{\text{cosA}}{\text{sinA}}} - \frac{1}{\text{sinA}}$

$= \frac{1}{\frac{1 - \text{cosA}}{\text{sinA}}} - \frac{1}{\text{sinA}}$

$= \frac{\text{sinA}}{1 - \text{cosA}} - \frac{1}{\text{SinA}}$

$= \frac{\sin^2 A - (1 - \text{cosA})}{\text{sinA}\,(1 - \text{cosA})}$

$= \frac{(1 - \cos^2 A) - (1 - \text{cosA})}{\text{sinA}\,(1 - \text{cosA})}$

$= \frac{(1 - \text{cosA})\,(1 + \text{cosA} - 1)}{\text{sinA}\,(1 - \text{cosA})}$

$= \frac{\text{cosA}}{\text{sinA}}$

= cotA

R.H.S $\frac{1}{\text{sinA}} - \frac{1}{\text{cosecA} + \text{cotA}}$

$= \frac{1}{\text{sinA}} - \frac{1}{\frac{1}{\text{sinA}} + \frac{\text{cosA}}{\text{sinA}}}$

$= \frac{1}{\text{sinA}} - \frac{1}{\frac{1 + \text{cosA}}{\text{sinA}}}$

$= \frac{1}{\sin A} - \frac{\sin A}{1 + \cos A}$

$= \frac{1 + \cos A - \sin^2 A}{\sin A(1 + \cos A)}$

R.H.S $\frac{(1 + \cos A) - (1 - \cos^2 A)}{\sin A(1 + \cos A)}$

$= \frac{(1 + \cos A) - (1 + \cos A)(1 - \cos A)}{\sin A(1 + \cos A)}$

$= \frac{(1 + \cos A)(1 - 1 + \cos A)}{\sin A(1 + \cos A)}$

$= \frac{\cos A}{\sin A} = \cot A$

$\therefore$ L.H.S = R.H.S

3) Determine whether the points are collinear.
P (– 2, 3), Q (1, 2), R (4, 1)

Ans. Let P (– 2, 3) $\equiv (x_1, y_1)$,
Q (1, 2) $\equiv (x_2, y_2)$ and
R (4, 1) $\equiv (x_3, y_3)$
By distance formula,

PQ $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$= \sqrt{[1 - (-2)]^2 + (2 - 3)^2}$

$= \sqrt{(1 + 2)^2 + (-1)^2}$

$= \sqrt{3^2 + (-1)^2}$

$= \sqrt{9 + 1}$

$\therefore$ PQ $= \sqrt{10}$ ... I

By distance formula,

QR $= \sqrt{(x_3 - x_2)^2 + (y_3 - y_2)^2}$

$= \sqrt{(4 - 1)^2 + (1 - 2)^2}$

$= \sqrt{(3)^2 + (-1)^2}$

$= \sqrt{9 + 1}$

$\therefore$ QR $= \sqrt{10}$ ... II

By distance formula,

PR $= \sqrt{(x_3 - x_1)^2 + (y_3 - y_1)^2}$

$= \sqrt{[4 - (-2)]^2 + (1 - 3)^2}$

$= \sqrt{(4 + 2)^2 + (-2)^2}$

$= \sqrt{(6)^2 + (-2)^2}$

$= \sqrt{36 + 4}$

$= \sqrt{40}$

$= \sqrt{4 \times 10}$

$\therefore$ PR $= 2\sqrt{10}$ ... III

PQ + QR $= \sqrt{10} + \sqrt{10}$ ... [From I, II]

$= 2\sqrt{10}$

PR $= 2\sqrt{10}$ ... [From III]

$\therefore$ PQ + QR = PR

$\therefore$ Points P (– 2, 3), Q (1, 2) and R (4, 1) are collinear.

Q.5 Solve the following questions. (Any one) **(3)**

1) Prove the following $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \frac{1}{\sec\theta - \tan\theta}$

Ans. LHS = $1 - \sin^2\theta = \cos^2\theta$

$\therefore$ $(1 + \sin\theta)(1 - \sin\theta) = \cos\theta \cdot \cos\theta$

... (I)

$\therefore \quad \dfrac{1 + \sin\theta}{\cos\theta} = \dfrac{\cos\theta}{1 - \sin\theta}$

By theorem on equal ratios

Each ratio of (I) = $\dfrac{1 + \sin\theta - \cos\theta}{\cos\theta - (1 - \sin\theta)}$

$= \dfrac{1 + \sin\theta - \cos\theta}{\cos\theta - 1 + \sin\theta}$

$= \dfrac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1}$

$\therefore \quad \dfrac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \dfrac{\cos\theta}{1 - \sin\theta}$

$= \dfrac{\dfrac{\cos\theta}{\cos\theta}}{\dfrac{1 - \sin\theta}{\cos\theta}}$ [Dividing both numerator and denominator by cos θ]

$= \dfrac{1}{\dfrac{1}{\cos\theta} - \dfrac{\sin\theta}{\cos\theta}}$

$= \dfrac{1}{\sec\theta - \tan\theta}$

$\therefore$ LHS = RHS

2) Find the point on x-axis which is equidistant from P (2, – 5) and Q (– 2,9).

Ans. Let the point A (x, 0) be equidistant from the points P and Q.

Let A (x, 0) ≡ (x_1, y_1), P (2, – 5) ≡ (x_2, y_2) and Q (– 2, 9) ≡ (x_3, y_3)

AP = AQ

$\therefore \quad AP^2 = AQ^2$

$\therefore \quad (x - 2)^2 + [0 - (-5)]^2 = [x - (-2)]^2 + (0 - 9)^2$

$\therefore \quad (x - 2)^2 + (0 + 5)^2 = (x + 2)^2 + (-9)^2$

$\therefore \quad x^2 - 4x + 4 + 25 = x^2 + 4x + 4 + 81$

$\therefore \quad -4x + 25 = 4x + 81$

$\therefore \quad -4x - 4x = 81 - 25$

$\therefore \quad -8x = 56$

$\therefore \quad x = \dfrac{56}{-8}$

$\therefore \quad x = -7$

$\therefore$ A (– 7, 0) is a point X axis which is equidistant from the points P and Q.