Excel Coaching Classes

Date: 12-Jun-2026
Time: 60min

Similarity

Marks: 20

Q.1 Attempt the following

1. **ΔPQR ~ ΔSTU and A(ΔPQR) : A(ΔSTU) = 64 : 81, then what is the ratio of corresponding sides?** **(1)**

- [x] (A) 8 : 9
- [ ] (B) 64 : 81
- [ ] (C) 9 : 8
- [ ] (D) 16 : 27

Ans:

Explanation:

$\frac{A(\Delta PQR)}{A(\Delta STU)} = \frac{PQ^2}{ST^2}$ ...[Theorem of areas of similar triangles]

$\therefore \frac{PQ^2}{ST^2} = \frac{64}{81}$

$\therefore \frac{PQ^2}{ST^2} = \frac{8^2}{9^2}$

$\therefore$ PQ : ST = 8 : 9

2. **If ΔABC ~ ΔDEF and ∠A = 48°, then ∠D = ______.** **(1)**

- [x] (A) 48°
- [ ] (B) 83°
- [ ] (C) 49°
- [ ] (D) 132°

Ans:

Explanation:

ΔABC ~ ΔDEF ⇒ m∠A = m∠D

⇒ m∠D = 48°

3. **If Δ ABC ~ Δ PQR and 4A (Δ ABC) = 25 A(Δ PQR), then AB : PQ = ?** **(1)**

- [ ] (A) 4 : 25
- [ ] (B) 2 : 5
- [x] (C) 5 : 2
- [ ] (D) 25 : 4

Ans:

Explanation:

4A (Δ ABC) = 25 A(Δ PQR)

$\therefore \frac{A(\Delta ABC)}{A(\Delta PQR)} = \frac{25}{4}$

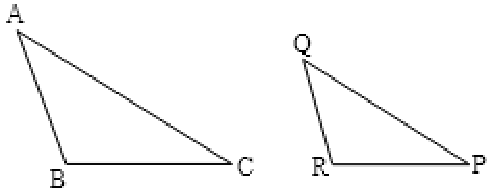
ΔABC ~ ΔPQR

$\therefore \frac{A(\Delta ABC)}{A(\Delta PQR)} = \frac{AB^2}{PQ^2}$ ...[Theorem of areas of similar triangles]

$\therefore \frac{25}{4} = \frac{AB^2}{PQ^2}$

$\therefore \frac{AB}{PQ} = \frac{5}{2}$ ...[Taking square root of both sides]

4. **In ΔABC and ΔPQR, in a one to one correspondence $\frac{AB}{QR} = \frac{BC}{PR} = \frac{CA}{PQ}$, then** **(1)**



- [ ] (A) ΔPQR ~ ΔABC
- [x] (B) ΔPQR ~ ΔCAB
- [ ] (C) ΔCBA ~ ΔPQR
- [ ] (D) ΔBCA ~ ΔPQR

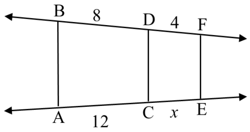
Ans:

Explanation:

The triangles are similar if their corresponding sides are proportional. This is the Side-Side-Side (SSS) Similarity Theorem. In this case, we have: $\frac{AB}{QR} = \frac{BC}{PR} = \frac{CA}{PQ}$ This means that the triangles are similar. Based on the order of the sides, the corresponding similarity is between ΔPQR and ΔCAB.

Q.2 Attempt the following (Any 3)

1. **In the given figure, if AB || CD || FE, then find *x* and AE.** **(2)**



line AB || line CD || line FE ...[Given]

$\therefore \frac{BD}{DF} = \frac{AC}{CE}$ ...$\left[\begin{array}{l}\text{Property of three parallel} \\ \text{lines and their transversals}\end{array}\right]$

$\frac{8}{4} = \frac{12}{x}$

$x = \frac{12 \times 4}{8}$

$x = 6$ units

Now, AE = AC + CE ...[A – C – E]

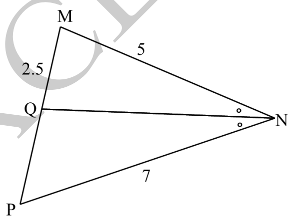
= 12 + x

= 12 + 6

= 18 units

$\therefore$ **x = 6 units and AE = 18 units**

2. **In ΔMNP, NQ is a bisector of ∠N. If MN = 5, PN = 7, MQ = 2.5, then find QP.** **(2)**



In ΔMNP, NQ is the bisector of ∠N. ...[Given]

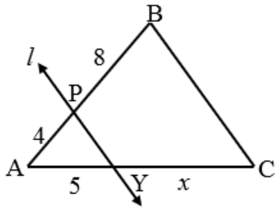
$\therefore \frac{PN}{MN} = \frac{QP}{MQ}$ ...[Property of angle bisector of a triangle]

$\therefore \frac{7}{5} = \frac{QP}{2.5}$

$\therefore$ QP = $\frac{7 \times 2.5}{5}$

$\therefore$ **QP = 3.5 units**

3. **In the given figure, line $l \|$ side BC, $AP = 4,\ PB = 8,\ AY = 5$ and $YC = x$. Find x.** **(2)**



In ΔABC, line $l \|$ side BC …[Given]

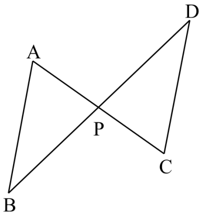
$\therefore \dfrac{AY}{YC} = \dfrac{AP}{PB}$ …[Basic proportionality theorem]

$\therefore \dfrac{5}{x} = \dfrac{4}{8}$

$\therefore x = \dfrac{8 \times 5}{4}$

$\therefore$ **The value of x is 10 units.**

4. **In the given figure, seg AC and seg BD intersect each other in point P and $\dfrac{AP}{CP} = \dfrac{BP}{DP}$. Prove that, ΔABP ~ ΔCDP.** **(2)**



Proof:

In ΔABP and ΔCDP,

$\dfrac{AP}{CP} = \dfrac{BP}{DP}$ …[Given]

∠APB ≅ ∠CPD …[Vertically opposite angles]

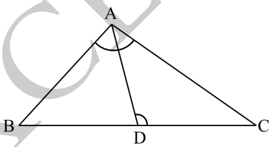
∴ **ΔABP ~ ΔCDP** …[SAS test of similarity]

Q.3 **Attempt the following (Any 2)**

Answer the following in detail.

1. **In the given figure, in ΔABC, point D is on side BC such that, ∠BAC = ∠ADC.** **(3)**

Prove that, CA^2 = CB × CD.



Proof:

In ΔBAC and ΔADC,

∠BAC ≅ ∠ADC …[Given]

∠BCA ≅ ∠ACD …[Common angle]

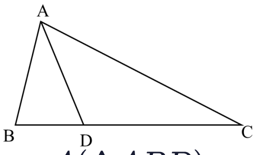
∴ ΔBAC ~ ΔADC …[AA test of similarity]

$\therefore \dfrac{CA}{CD} = \dfrac{CB}{CA}$ …$\left[\begin{array}{l}\text{Corresponding sides} \\ \text{of similar triangles}\end{array}\right]$

∴ CA × CA = CB × CD

∴ **CA^2 = CB × CD**

2. **In ΔABC, B–D–C and BD = 7, BC = 20, then find following ratios.** **(3)**



i. $\dfrac{A(\Delta ABD)}{A(\Delta ADC)}$

ii. $\dfrac{A(\Delta ABD)}{A(\Delta ABC)}$

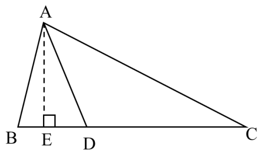
iii. $\dfrac{A(\Delta ADC)}{A(\Delta ABC)}$

Draw AE ⊥ BC, B – E – C.

BC = BD + DC …[B–D–C]

∴ 20 = 7 + DC

∴ DC = 20 – 7 = 13



i. ΔABD and ΔADC have same height AE.

$$\frac{A(\Delta ABD)}{A(\Delta ADC)} = \frac{BD}{DC}$$ …[Triangles having equal height]

∴ $$\mathbf{\frac{A(\Delta ABD)}{A(\Delta ADC)} = \frac{7}{13}}$$

ii. ΔABD and ΔABC have same height AE.

$$\frac{A(\Delta ABD)}{A(\Delta ABC)} = \frac{BD}{BC}$$ …[Triangles having equal height]

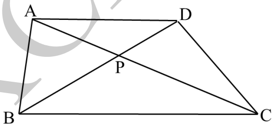
∴ $$\mathbf{\frac{A(\Delta ABD)}{A(\Delta ABC)} = \frac{7}{20}}$$

iii. ΔADC and ΔABC have same height AE.

$$\frac{A(\Delta ADC)}{A(\Delta ABC)} = \frac{DC}{BC}$$ …[Triangles having equal height]

∴ $$\mathbf{\frac{A(\Delta ADC)}{A(\Delta ABC)} = \frac{13}{20}}$$

3. **In ☐ABCD, seg AD || seg BC. Diagonal AC and diagonal BD intersect each other in point P. Then show that** $\dfrac{AP}{PD} = \dfrac{PC}{BP}$**.** **(3)**



Proof:

seg AD || seg BC and

BD is their transversal. …[Given]

∴ ∠DBC ≅ ∠BDA …[Alternate angles]

∴ ∠PBC ≅ ∠PDA …(i) [D–P–B]

In ΔPBC and ΔPDA,

∠PBC ≅ ∠PDA …[From (i)]

∠BPC ≅ ∠DPA …[Vertically opposite angles]

$\therefore$ $\Delta PBC \sim \Delta PDA$ …[AA test of similarity]

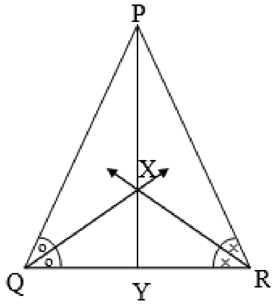
$\therefore$ $\frac{BP}{PD} = \frac{PC}{AP}$ …$\begin{bmatrix}\text{Corresponding sides}\\ \text{of similar triangles}\end{bmatrix}$

$\therefore$ $\mathbf{\frac{AP}{PD} = \frac{PC}{BP}}$ …[By alternendo]

Q.4 Attempt the following (Any 1)

1. **In ΔPQR, bisectors of ∠Q and ∠R intersect in point X. Line PX intersects side QR in point Y, then prove that: $\frac{PQ+PR}{QR} = \frac{PX}{XY}$.** **(4)**

Proof:



In ΔPQY, ray QX bisects ∠Q. …[Given]

$\therefore$ $\frac{PQ}{QY} = \frac{PX}{XY}$ …(i)[Property of angle bisector of a triangle]

Also, in ΔPRY, RX bisects ∠R. …[Given]

$\therefore$ $\frac{PR}{YR} = \frac{PX}{XY}$ …(ii)[Property of angle bisector of a triangle]

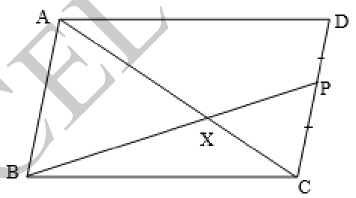
$\therefore$ $\frac{PQ}{QY} = \frac{PR}{YR}$ …[From (i) and (ii)]

$\therefore$ $\frac{PQ+PR}{QY+YR} = \frac{PR}{YR}$ …[Theorem of equal ratios]

$\therefore$ $\frac{PQ+PR}{QR} = \frac{PR}{YR}$ …(iii) [Q – Y – R]

$\therefore$ $\frac{PQ+PR}{QR} = \mathbf{\frac{PX}{XY}}$ …[From (ii) and (iii)]

2. **□ABCD is a parallelogram. Point P is the midpoint of side CD. Seg BP intersects diagonal AC at point X, then prove that: 3AX = 2AC** **(4)**



Proof:

□ABCD is a parallelogram …[Given]

$\therefore$ side AB || side CD …[Opposite sides of a parallelogram]

$\therefore$ side AB || side CP …[C – P – D]

and BP is their transversal.

$\therefore$ ∠CPB ≅ ∠ABP …[Alternate angles]

$\therefore$ ∠CPX ≅ ∠ABX …(i)[P – X – B]

In ΔPXC and ΔBXA,

∠PXC ≅ ∠BXA …[Vertically opposite angles]

$\angle CPX \cong \angle ABX$ …[From (i)]

$\therefore$ $\Delta PXC \sim \Delta BXA$ …[By AA test of similarity]

$\therefore$ $\frac{CX}{AX} = \frac{XP}{XB} = \frac{CP}{AB}$ …(ii)[corresponding sides of similar triangles]

Note that:

seg AB ≅ seg CD …(iii) [∵□ABCD is a parallelogram]

seg CP = $\frac{1}{2}$ seg CD …(iv) [Point P is the mid-point of side CD]

$\therefore$ seg CP = $\frac{1}{2}$ seg AB …(v) [From (iii) and (iv)]

$\therefore$ $\frac{CX}{AX} = \frac{XP}{XB} = \frac{CP}{AB} = \frac{1}{2}$ …[From (ii) and (v)]

$\therefore$ $\frac{CX}{AX} = \frac{1}{2}$

$\therefore$ $\frac{CX + AX}{AX} = \frac{1 + 2}{2}$ …[By componendo]

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

∴ 3AX = 2AC