Triangles Ex 4.6 Q19

Answer :

Given: In ΔABC, PQ is a line segment intersecting AB at P, and AC at Q. AP = 1cm, PB = 3cm, AQ = 1.5cm and QC = 4.5cm.

To find: $Ar(\Delta APQ) = \frac{1}{16}(\Delta ABC)$

In ΔABC,

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

$$\frac{1}{3} = \frac{1.5}{4.5}$$

$$\frac{1}{3} = \frac{1}{3}$$

According to converse of basic proportionality theorem if a line divides any two sides of a triangle in the same ratio, then the line must be parallel to the third side.

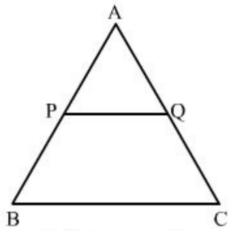
Hence, PQ || BC

In ΔAPQ and ΔABC,

$\angle APQ = \angle B$ (Corresponding angles)

$\angle PAQ = \angle BAC$ (Common)

So, $\Delta APQ \sim \Delta ABC$ (AA Similarity)



We know that the ratio of areas of two similar triangles is equal to the ratio of squares of their corresponding sides.

Hence

$$\frac{Ar(\Delta APQ)}{Ar(\Delta ABC)} = \frac{AP^2}{AB^2}$$

$$= \frac{AP^2}{(AP+BP)^2}$$

$$= \frac{1^2}{(1+3)^2} \text{(given)}$$

$$\frac{Ar(\Delta APQ)}{Ar(\Delta ABC)} = \frac{1}{16}$$

$$\boxed{Ar(\Delta APQ) = \frac{1}{16} Ar(\Delta ABC)}$$

Triangles Ex 4.6 Q20

Answer :

Given: In ΔABC, D is a point on side AB such that AD : DB= 3 : 2. E is a point on side BC such that DE || AC.

To find: $\frac{\Delta ABC}{\Delta BDE}$

In ΔABC,

$\frac{AD}{DB} = \frac{3}{2}$

Since DE||AC,

$\frac{EC}{EB} = \frac{3}{2}$

According to converse of basic proportionality theorem if a line divides any two sides of a triangle in the same ratio, then the line must be parallel to the third side.

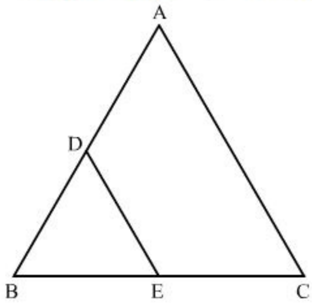
Hence DE || AC

In ΔBDE and ΔABC,

$\angle BDE = \angle A$ (Corresponding angles)

$\angle DBE = \angle ABC$ (Common)

So, $\Delta BDE \sim \Delta ABC$ (AA Similarity)



We know that the ratio of areas of two similar triangles is equal to the ratio of squares of their corresponding sides.

Let AD = $2x$ and BD = $3x$.

Hence

$$\frac{Ar(\Delta ABC)}{Ar(\Delta BDE)} = \frac{AB^2}{BD^2}$$

$$= \frac{(BD+DA)^2}{(BD)^2}$$

$$= \frac{(3x+2x)^2}{(2x)^2}$$

$$= \frac{(5x)^2}{(2x)^2}$$

$$\boxed{\frac{Ar(\Delta ABC)}{Ar(\Delta BDE)} = \frac{25}{4}}$$

*********** END **********