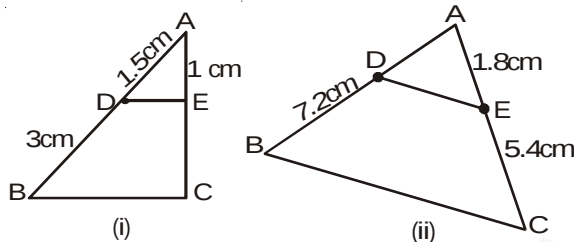


Ex - 6.2

Q1. In figure, (i) and (ii), $DE \parallel BC$. Find EC in (i) and AD in (ii).



Sol. (i) In figure, (i) $DE \parallel BC$ (Given)

$$\Rightarrow \frac{AD}{DB} = \frac{AE}{EC} \text{ (By Basic Proportionality Theorem)}$$

$$\Rightarrow \frac{1.5}{3} = \frac{1}{EC}$$

$$\{ \because AD = 1.5 \text{ cm, } DB = 3 \text{ cm and } AE = 1 \text{ cm} \}$$

$$\Rightarrow EC = \frac{3}{1.5} = 2 \text{ cm}$$

(ii) In fig. (ii) $DE \parallel BC$ (given)

$$\text{So, } \frac{AD}{BD} = \frac{AE}{CE} \Rightarrow \frac{AD}{7.2} = \frac{1.8}{5.4}$$

$$\{ \because BD = 7.2, AE = 1.8 \text{ cm and } CE = 5.4 \text{ cm} \}$$

$$AD = 2.4 \text{ cm}$$

Q2. E and F are points on the sides PQ and PR respectively of a ΔPQR . For each of the following cases, State whether $EF \parallel QR$:

(i) $PE = 3.9 \text{ cm, } EQ = 3 \text{ cm, } PF = 3.6 \text{ cm and } FR = 2.4 \text{ cm.}$

(ii) $PE = 4 \text{ cm, } QE = 4.5 \text{ cm, } PF = 8 \text{ cm and } RF = 9 \text{ cm.}$

(iii) $PQ = 1.28 \text{ cm, } PR = 2.56 \text{ cm, } PE = 0.18 \text{ cm and } PF = 0.36 \text{ cm.}$

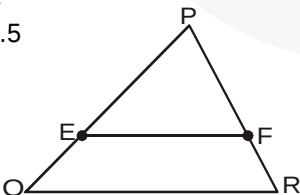
Sol. (i) In figure,

$$\frac{PE}{EQ} = \frac{3.9}{3} = 1.3,$$

$$\frac{PF}{FR} = \frac{3.6}{2.4} = \frac{3}{2} = 1.5$$

$$\Rightarrow \frac{PE}{EQ} \neq \frac{PF}{FR}$$

$\Rightarrow EF$ is not $\parallel QR$



(ii) In figure,

$$\frac{PE}{EQ} = \frac{4}{4.5} = \frac{8}{9} \text{ and } \frac{PF}{FR} = \frac{8}{9}$$

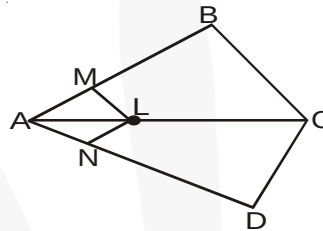
$$\Rightarrow \frac{PE}{EQ} = \frac{PF}{FR} \Rightarrow EF \parallel QR$$

(iii) In figure,

$$\begin{aligned}\frac{PE}{QE} &= \frac{0.18}{PQ - PE} = \frac{0.18}{1.28 - 0.18} = \frac{0.18}{1.10} \\ &= \frac{18}{110} = \frac{9}{55} = \frac{PF}{FR} = \frac{0.36}{PR - PF} \\ &= \frac{0.36}{2.56 - 0.36} = \frac{0.36}{2.20} = \frac{9}{55} = \frac{PE}{QE} = \frac{PF}{FR}\end{aligned}$$

∴ EF ∥ QR (By converse of Basic Proportionality Theorem)

Q3. In figure, if LM ∥ CB and LN ∥ CD, prove that $\frac{AM}{AB} = \frac{AN}{AD}$.



Sol. In $\triangle ACB$ (see figure), LM ∥ CB (Given)

$$\Rightarrow \frac{AM}{MB} = \frac{AL}{LC} \quad \dots(1)$$

(Basic Proportionality Theorem)

In $\triangle ACD$ (see figure), LN ∥ CD (Given)

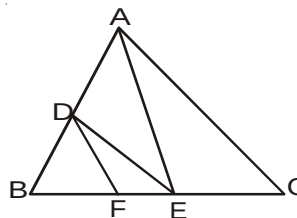
$$\Rightarrow \frac{AN}{ND} = \frac{AL}{LC} \quad \dots(2)$$

(Basic Proportionality Theorem)

From (1) and (2), we get

$$\begin{aligned}\frac{AM}{MB} &= \frac{AN}{ND} \\ \Rightarrow \frac{AM}{AM + MB} &= \frac{AN}{AN + ND} \Rightarrow \frac{AM}{AB} = \frac{AN}{AD}\end{aligned}$$

Q4. In figure, DE ∥ AC and DF ∥ AE. Prove that $\frac{BF}{FE} = \frac{BE}{EC}$.



Sol. In $\triangle ABE$,

$DF \parallel AE$ (Given)

$$\frac{BD}{DA} = \frac{BF}{FE} \dots(i) \quad (\text{Basic Proportionality Theorem})$$

In $\triangle ABC$,

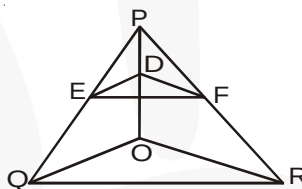
$DE \parallel AC$ (Given)

$$\frac{BD}{DA} = \frac{BE}{EC} \dots(ii) \quad (\text{Basic Proportionality Theorem})$$

From (i) and (ii), we get

$$\frac{BF}{FE} = \frac{BE}{EC} \quad \text{Hence proved.}$$

Q5. In figure, $DE \parallel OQ$ and $DF \parallel OR$. Show that $EF \parallel QR$.



Sol. In figure, $DE \parallel OQ$ and $DF \parallel OR$, then by Basic Proportionality Theorem,

We have
$$\frac{PE}{EQ} = \frac{PD}{DO} \dots(1)$$

and
$$\frac{PF}{FR} = \frac{PD}{DO} \dots(2)$$

From (1) and (2),
$$\frac{PE}{EQ} = \frac{PF}{FR}$$

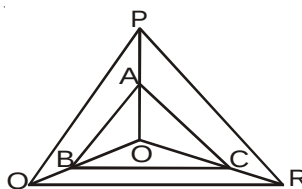
Now, in $\triangle PQR$, we have proved that

$$\Rightarrow \frac{PE}{EQ} = \frac{PF}{FR}$$

$$EF \parallel QR$$

(By converse of Basic Proportionality Theorem)

Q6. In figure, A, B and C are points on OP, OQ and OR respectively such that $AB \parallel PQ$ and $AC \parallel PR$. Show that $BC \parallel QR$.



Sol. In $\triangle POQ$,

$AB \parallel PQ$ (given)

$$\frac{OB}{BQ} = \frac{OA}{AP} \dots(i) \text{ (Basic Proportionality Theorem)}$$

In $\triangle POR$,

$AC \parallel PR$ (given)

$$\frac{OA}{AP} = \frac{OC}{CR} \dots(ii) \text{ (Basic Proportionality Theorem)}$$

From (i) and (ii), we get

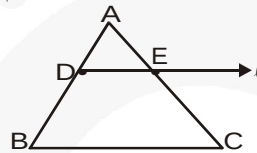
$$\frac{OB}{BQ} = \frac{OC}{CR}$$

$\therefore$ By converse of Basic Proportionality Theorem,

$BC \parallel QR$

Q7. Using Theorem 6.1, prove that a line drawn through the mid-point of one side of a triangle parallel to another side bisects the third side.

Sol. In $\triangle ABC$, D is mid point of AB (see figure)



$$\text{i.e., } \frac{AD}{DB} = 1 \dots(1)$$

Straight line $\ell \parallel BC$.

Line ℓ is drawn through D and it meets AC at E.

By Basic Proportionality Theorem

$$\frac{AD}{DB} = \frac{AE}{EC} \Rightarrow \frac{AE}{EC} = 1 \text{ [From (1)]}$$

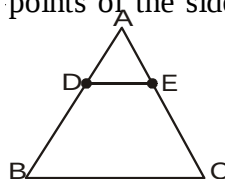
$$\Rightarrow AE = EC \Rightarrow E \text{ is mid point of AC.}$$

Q8. Using Theorem 6.2, prove that the line joining the mid-points of any two sides of a triangle is parallel to the third side.

Sol. In $\triangle ABC$, D and E are mid points of the sides AB and AC respectively.

$$\Rightarrow \frac{AD}{DB} = 1$$

$$\text{and } \frac{AE}{EC} = 1 \text{ (see figure)}$$



$$\Rightarrow \frac{AD}{DB} = \frac{AE}{EC} \Rightarrow DE \parallel BC$$

(By Converse of Basic Proportionality Theorem)

Q9. ABCD is a trapezium in which $AB \parallel DC$ and its diagonals intersect each other at the point O.

Show that $\frac{AO}{BO} = \frac{CO}{DO}$.

Sol. We draw $EOF \parallel AB$ (also $\parallel CD$) (see figure)

In $\triangle ACD$, $OE \parallel CD$

$$\Rightarrow \frac{AE}{ED} = \frac{AO}{OC} \dots (1)$$

In $\triangle ABD$, $OE \parallel BA$

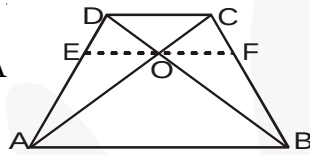
$$\Rightarrow \frac{DE}{EA} = \frac{DO}{OB}$$

$$\Rightarrow \frac{AE}{ED} = \frac{OB}{OD} \dots (2)$$

From (1) and (2)

$$\frac{AO}{OC} = \frac{OB}{OD},$$

$$\text{i.e., } \frac{AO}{BO} = \frac{CO}{DO}.$$



Q10. The diagonals of a quadrilateral ABCD intersect each other at the point O such that $\frac{AO}{BO} = \frac{CO}{DO}$. Show that ABCD is a trapezium.

Sol. In figure $\frac{AO}{BO} = \frac{CO}{DO}$

$$\Rightarrow \frac{AO}{OC} = \frac{BO}{OD} \dots (1) \text{ (given)}$$

Through O, we draw

$OE \parallel BA$

OE meets AD at E.

From $\triangle DAB$,

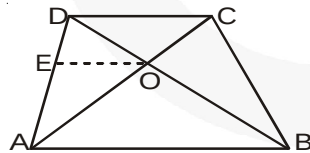
$EO \parallel AB$

$$\Rightarrow \frac{DE}{EA} = \frac{DO}{OB} \text{ (by Basic Proportionality Theorem)}$$

$$\Rightarrow \frac{AE}{ED} = \frac{BO}{OD} \dots (2)$$

From (1) and (2),

$$\frac{AO}{OC} = \frac{AE}{ED} \Rightarrow OE \parallel CD$$



(by converse of basic proportionality theorem)

Now, we have $BA \parallel OE$

and $OE \parallel CD$

$\Rightarrow AB \parallel CD$

$\Rightarrow$ Quadrilateral ABCD is a trapezium.

