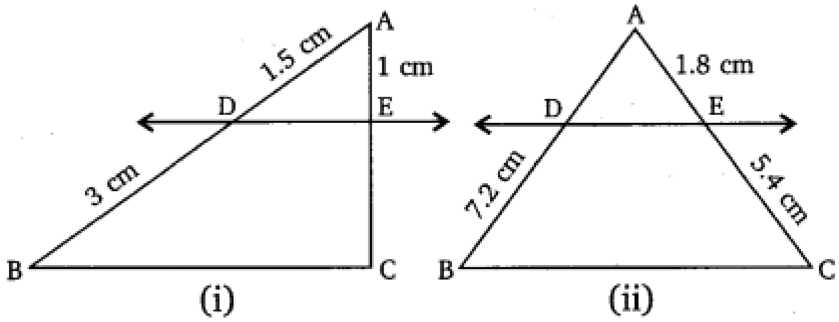
EXERCISE 6.2

Question 1:

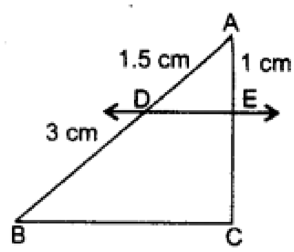
In the given figure (i) and (ii), DE || BC. Find EC in (i) and AD in (ii).



Solution:

(*i*) In Δ ABC, DE || BC

$\therefore \quad \dfrac{AD}{DB} = \dfrac{AE}{EC}$ [By basic proportionality theorem]

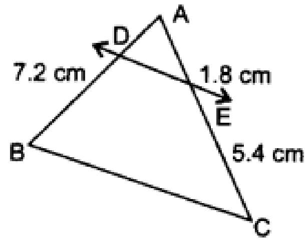


or $\quad \dfrac{1.5}{3} = \dfrac{1}{EC}$

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

(*ii*) In ΔABC, DE || BC

$\dfrac{AD}{DB} = \dfrac{AE}{EC}$ [By basic proportionality theorem]



or $\quad \dfrac{AD}{7.2} = \dfrac{1.8}{5.4}$

$\Rightarrow \quad AD = \dfrac{1.8 \times 7.2}{5.4} = 2.4 \text{ cm}$

Question 2:

E and F are points on the sides PQ and PR respectively of a ΔPQR. For each of the following cases, state whether EF || QR:

(i) PE = 3.9 cm, EQ = 3 cm, PF = 3.6 cm and FR = 2.4 cm

(ii) PE = 4 cm, QE = 4.5 cm, PF = 8 cm and RF = 9 cm

(iii) PQ = 1.28 cm, PR = 2.56 cm, PE = 0.18 cm and PF = 0.36 cm

Solution:

(i) $\frac{PE}{EQ} = \frac{3.9}{3} = \frac{1.3}{1}$

and $\frac{PF}{FR} = \frac{3.6}{2.4} = \frac{3}{2} = \frac{1.5}{1}$

Since $\frac{PE}{EQ} \neq \frac{PF}{FR}$, EF is **not parallel** to QR.

(ii) $\frac{PE}{EQ} = \frac{4}{4.5} = \frac{40}{45} = \frac{8}{9}$

and $\frac{PF}{FR} = \frac{8}{9}$

Since $\frac{PE}{EQ} = \frac{PF}{FR}$, **EF || QR.**

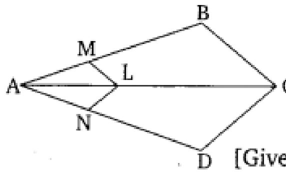
(iii) $\frac{PE}{EQ} = \frac{0.18}{1.28 - 0.18} = \frac{0.18}{1.10} = \frac{9}{55}$

and $\frac{PF}{FR} = \frac{0.36}{2.56 - 0.36} = \frac{0.36}{2.20} = \frac{9}{55}$

Since $\frac{PE}{EQ} = \frac{PF}{FR}$, **EF || QR.**

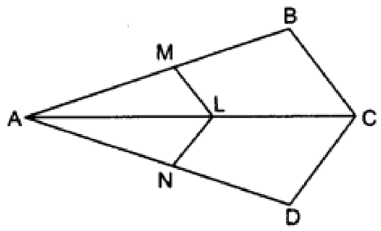
Question 3:

In the given figure, if LM || CB and LN || CD.
Prove that $AM/AB = AN/AD$.



[Given]

Solution:



In ΔABC, LM || CB

$$\Rightarrow \quad \frac{AM}{AB} = \frac{AL}{AC} \qquad \text{[By B.P.T.] ... }(i)$$

In ΔADC, LN || CD

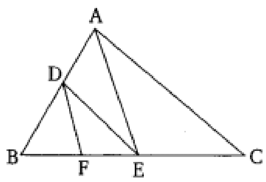
$$\Rightarrow \quad \frac{AN}{AD} = \frac{AL}{AC} \qquad \text{[By B.P.T.] ... }(ii)$$

From equation (*i*) and (*ii*)

$$\frac{AM}{AB} = \frac{AN}{AD}$$

Question 4:

In the given figure, DE || AC and DF || AE.
Prove that $BF/FE = BE/EC$.



Solution:

In ΔBAC, DE || AC [Given]

$$\therefore \frac{BE}{EC} = \frac{BD}{AD} \quad \text{...(i) [By Basic Proportionality Theorem]}$$

Similarly, in ΔBAE, DF || AE [Given]

$$\therefore \frac{BF}{FE} = \frac{BD}{DA} \quad \text{...(ii) [By Basic Proportionality Theorem]}$$

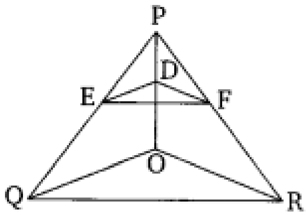
From equations (i) and (ii), we get:

$$\frac{BE}{EC} = \frac{BF}{FE}$$

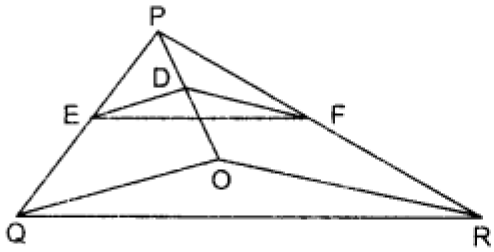
Hence, **proved**.

Question 5:

In the given figure, DE || OQ and DF || OR. Show that EF || QR.



Solution:



In ΔPOQ,

$$DE \parallel OQ$$

$$\frac{PE}{EQ} = \frac{PD}{DO}$$

In ΔPOR,

$$DF \parallel OR$$

$$\frac{PF}{FR} = \frac{PD}{DO}$$

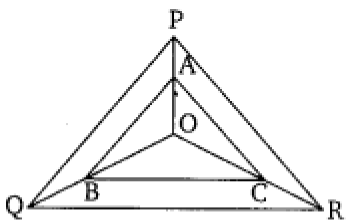
From equation (*i*) and (*ii*), we get

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

$\therefore \quad EF \parallel QR$

Question 6:

In the given figure, A, B and C are points on OP, OQ and OR respectively such that AB || PQ and AC || PR. Show that BC || QR.



Solution:

AB || PQ [Given]

$$\therefore \frac{OA}{AP} = \frac{OB}{BQ} \quad ...(i) \text{ [By Basic Proportionality Theorem]}$$

andAC || PR [Given]

$$\therefore \frac{OA}{AP} = \frac{OC}{CR} \quad ...(ii)$$

From equations (i) and (iii), we get:

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

$\therefore$ BC || QR

[By converse of Basic Proportionality Theorem]

Hence, **proved**.

Question 7:

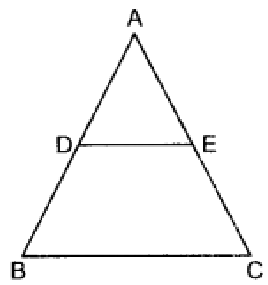
Using B.P.T., prove that a line drawn through the mid-point of one side of a triangle parallel to another side bisects the third side. (Recall that your have proved it in class IX)

Solution:

Given: A ΔABC in which D is the mid-point of AB and DE || BC

To Prove: AE = EC

Proof: In ΔABC, DE||BC



$$\therefore \quad \frac{AD}{DB} = \frac{AE}{EC}$$

But $\quad AD = DB$

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

$$\Rightarrow \quad 1 = \frac{AE}{EC} \Rightarrow AE = EC$$

Hence, DE bisects AC.

Question 8:

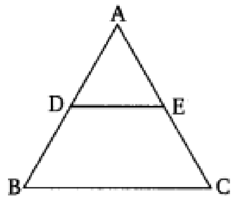
Using converse of B.P.T., prove that the line joining the mid-points of any two sides of a triangle is parallel to the third side. (Recall that your have done it in class IX)

Solution:

The given figure shows a ΔABC in which D and E are mid-points of sides AB and AC respectively.

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

and $\frac{AE}{EC} = 1$



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

[By converse of Basic Proportionality Theorem]

Hence, **proved**.

Question 9:

ABCD is a trapezium in which AB || DC and its diagonals intersect each other at the point O. Show that AO/BO=CO/DO.

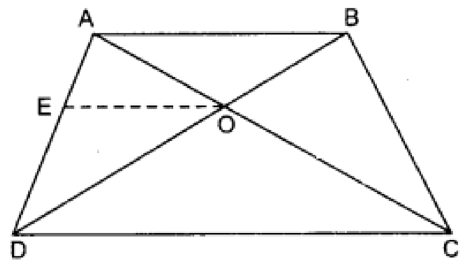
Solution:

Given: ABCD is a trapezium in which AB||DC

To Prove: $\frac{AO}{BO} = \frac{CO}{DO}$

Construction: Draw EO || DC

Proof: In ΔABD,



EO || DC [By const]

DC || AB [Given]

$\Rightarrow$ EO || AB

$\therefore \frac{AE}{ED} = \frac{BO}{DO}$ [By B.P.T.] ...(*i*)

In ΔADC, EO || DC $\Rightarrow \frac{AE}{ED} = \frac{AO}{CO}$ ...(*ii*)

From equation (*i*) and (*ii*)

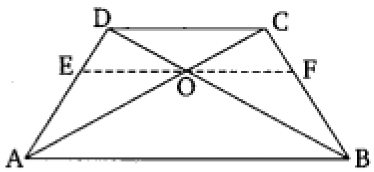
$\frac{BO}{DO} = \frac{AO}{CO}$ or $\frac{AO}{BO} = \frac{CO}{DO}$

Question 10:

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

Solution:

In the given figure is shown a quadrilateral ABCD. Draw EF ∥ AB.



$$\frac{AO}{BO} = \frac{CO}{OD} \quad \text{[Given]}$$

$$\therefore \quad \frac{AO}{OC} = \frac{BO}{OD} \quad \text{... (i)}$$

In ΔDAB, EO ∥ AB [By construction]

$$\therefore \quad \frac{DE}{EA} = \frac{DO}{OB} \quad \text{[By Basic Proportionality Theorem]}$$

$$\Rightarrow \quad \frac{AE}{ED} = \frac{BO}{OD} \quad \text{...(ii)}$$

From equations (i) and (ii), we get:

$$\frac{AO}{OC} = \frac{AE}{ED}$$

∴ OE ∥ CD

[By converse of Basic Proportionality Theorem]

But we have AB ∥ OE

∴ AB ∥ CD

Hence, quadrilateral ABCD is a trapezium. **Proved**.