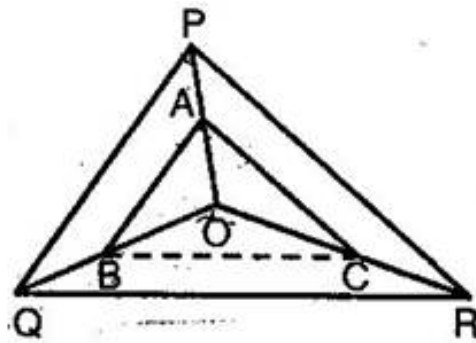




Exercise 6.2

6. 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 $BC \parallel QR$.



Ans. Given: O is any point in $\triangle PQR$, in which $AB \parallel PQ$ and $AC \parallel PR$.

To prove: $BC \parallel QR$

Construction: Join BC.

Proof: In $\triangle OPQ$, $AB \parallel PQ$

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

And in $\triangle OPR$, $AC \parallel PR$

$$\therefore \frac{OA}{AP} = \frac{OC}{CR} \text{ [Basic Proportionality theorem]} \\ \dots\dots\dots(ii)$$

From eq. (i) and (ii), we have

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

\therefore In $\triangle OQR$, B and C are points dividing the sides OQ and OR in the same ratio.

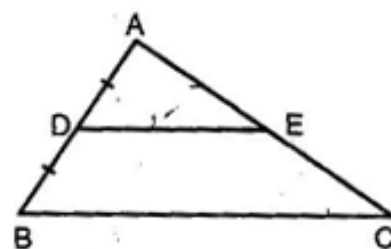
\therefore By the converse of Basic Proportionality theorem,

$$\Rightarrow BC \parallel QR$$

7. 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. (Recall that you have proved it in Class IX).

Ans. Given: A triangle ABC, in which D is the mid-point of side AB

and the line DE is drawn parallel to BC, meeting AC at E.



To prove: $AE = EC$

Proof: Since $DE \parallel BC$

$$\therefore \frac{AD}{DB} = \frac{AE}{EC} \text{ [Basic Proportionality theorem]} \dots\dots\dots \\ (i)$$

But $AD = DB$ [Given]

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

$$\Rightarrow \frac{AE}{EC} = 1 \text{ [From eq. (i)]}$$

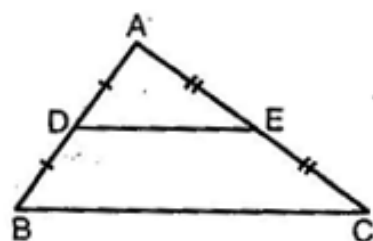
$$\Rightarrow AE = EC$$

Hence, E is the mid-point of the third side AC.

8. 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. (Recall that you have done it in Class IX).

Ans. Given: A triangle ABC, in which D and E are the mid-points of

sides AB and AC respectively.



To Prove: $DE \parallel BC$

Proof: Since D and E are the mid-points of AB and AC

respectively.

$$\therefore AD = DB \text{ and } AE = EC$$

Now, $AD = DB$

$$\Rightarrow \frac{AD}{DB} = 1 \text{ and } AE = EC$$

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

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

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

Thus, in triangle ABC, D and E are points dividing the sides AB and AC in the same ratio.

Therefore, by the converse of Basic Proportionality theorem, we have

$$DE \parallel BC$$

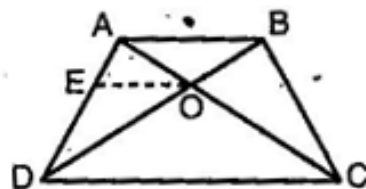
9. ABCD is a trapezium in which $AB \parallel DC$ and its diagonals intersect each other at the point O. Show

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

Ans. Given: A trapezium ABCD, in which $AB \parallel DC$ and its diagonals

AC and BD intersect each other at O.

AC and BD intersect each other at O.



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

To Prove:

Construction: Through O, draw OE || AB, i.e. OE || DC.

Proof: In $\triangle ADC$, we have OE || DC

$$\therefore \frac{AE}{ED} = \frac{AO}{CO} \quad [\text{By Basic Proportionality theorem}]$$

.....(i)

Again, in $\triangle ABD$, we have OE || AB[Construction]

$$\therefore \frac{ED}{AE} = \frac{DO}{BO} \quad [\text{By Basic Proportionality theorem}]$$

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

From eq. (i) and (ii), we get

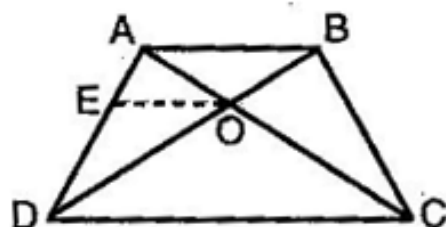
$$\frac{AO}{CO} = \frac{BO}{DO}$$

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

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

Ans. Given: A quadrilateral ABCD, in which its diagonals AC and

BD intersect each other at O such that $\frac{AO}{BO} = \frac{CO}{DO}$,
i.e.



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

To Prove: Quadrilateral ABCD is a trapezium.

Construction: Through O, draw OE \parallel AB meeting AD at E.

Proof: In $\triangle ADB$, we have OE \parallel AB [By construction]

$$\therefore \frac{DE}{EA} = \frac{OD}{BO} \text{ [By Basic Proportionality theorem]}$$

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

$$\Rightarrow \frac{EA}{DE} = \frac{BO}{DO} = \frac{AO}{CO}$$

$$\left[\because \frac{AO}{CO} = \frac{BO}{DO} \right]$$

$$\Rightarrow \frac{EA}{DE} = \frac{AO}{CO}$$

Thus in $\triangle ADC$, E and O are points dividing the sides AD and AC in the same ratio. Therefore by the converse of Basic Proportionality theorem, we have

$$EO \parallel DC$$

But EO \parallel AB [By construction]

$$\therefore AB \parallel DC$$

\therefore Quadrilateral ABCD is a trapezium.

***** END *****