TRIANGLES
PPT-3

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 06
CHAPTER NAME :TRIANGLES

Website: www.odmegroup.org
Email: info@odmps.org
Toll Free: 1800 120 2316
Sishu Vihar, Infocity Road, Patia, Bhubaneswar- 751024

PREVIOUS KNOWLEDGE TEST

1.Two polygons of the same number of sides are similar, if (i) their corresponding angles are equal and (ii) their corresponding sides are in the same ratio (or proportion).

2.Two triangles are similiar, if (i) their corresponding angles are equal and (ii) their corresponding sides are in the same ratio (or proportion).

3. Theorem 6.1 : If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.

LEARNING OUTCOME

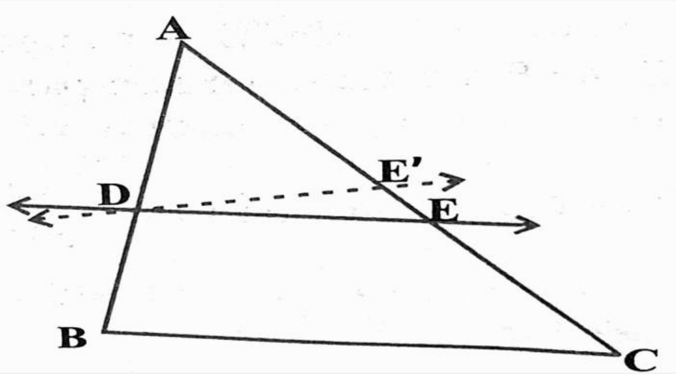
1.Students will be able to define similar triangles.

2.Students will be able to know the concept of similarity of triangles.

3. Students will be able to prove and apply Thales theorem (Basic Proportionality theorem) and its converse theorem.

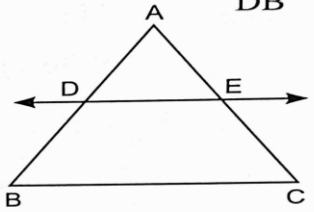
Theorem 6.2 (Converse of BPT): If a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side https://youtu.be/vr6yrovrd2Y (10.56).

- Theorem 6.2 : If a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side.
- This theorem can be proved by taking a line DE such that AD/ DB = AE/EC
- and assuming that DE is not parallel to BC (see Fig.).
- If DE is not parallel to BC, draw a line DE′ parallel to BC.
- So, AD /DB = AE'/ E' C (Why ?) Therefore, AE /EC = AE'/E'C (Adding 1 to both sides of above),
- (AE+EC)/EC= (AE' +E'C)/E'C
- AC/EC=AC/E'C
- E and E′ must coincide



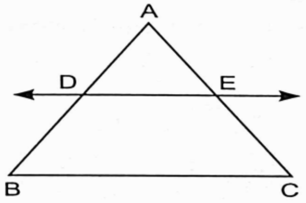
- **BASIC PROPORTIONALITY THEOREM.** In a triangle, a line drawn parallel to one side, to intersect the other sides in distinct points, divides the two sides in the same ratio.

  If DE || BC in ΔABC, then $\frac{AD}{DB} = \frac{AE}{EC}$



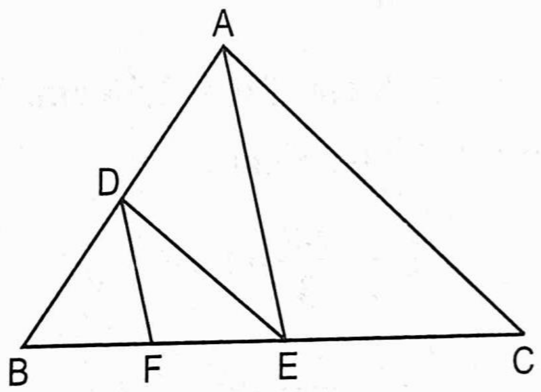
- **CONVERSE OF BASIC PROPORTIONALITY THEOREM.** If a line divides any two sides of a triangle in the same ratio, the line must be parallel to the third side.

  In ΔABC, if DE is a line such that $\frac{AD}{DB} = \frac{AE}{EC}$, then DE || BC



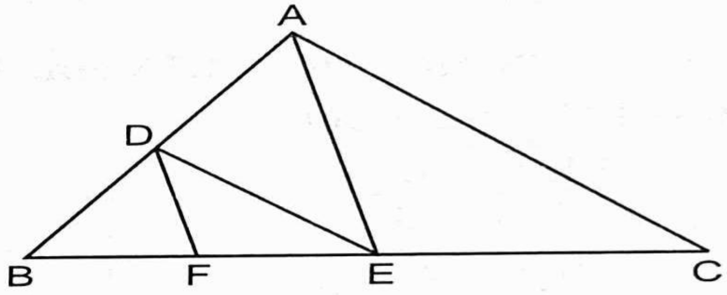
In the given figure, DE || AC and DF || AE,

Prove that $\frac{BF}{FE}=\frac{BE}{EC}$.



In the given figure, DE || AC and DF || AE,

Prove that $\frac{BF}{FE} = \frac{BE}{EC}$.



1. In Δ ABC,

$$DE \parallel AC$$

$$\therefore \quad \frac{BD}{DA} = \frac{BE}{EC} \quad \text{[By B.P.T.] ... } (i)$$

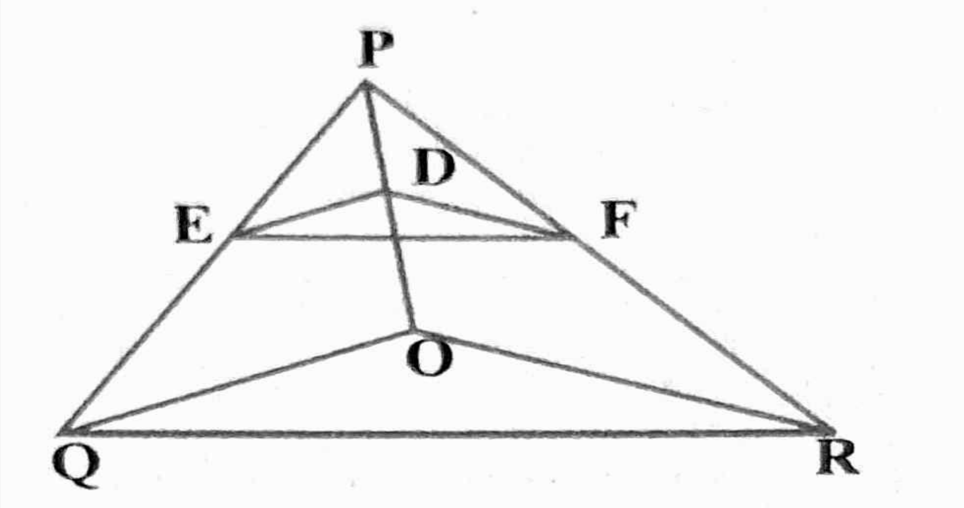
In ΔABE, DF || AE

$$\therefore \quad \frac{BD}{DA} = \frac{BF}{FE} \quad \text{[By B.P.T.] ... } (ii)$$

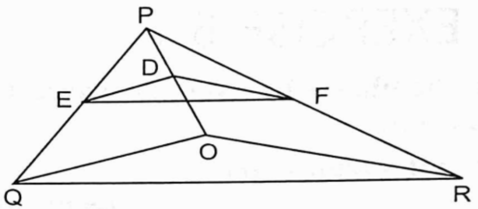
From equation (*i*) and (*ii*)

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

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



In Fig., DE || OQ and DF || OR. Show that EF || QR



Sol. In Δ POQ,

$$DE \parallel OQ$$

$$\frac{PE}{EQ} = \frac{PD}{DO} \qquad \text{[By B.P.T.] ...}(i)$$

In ΔPOR, $DF \parallel OR$

$$\frac{PF}{FR} = \frac{PD}{DO} \qquad \text{...}(ii)$$

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

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

$\therefore$ $EF \parallel QR$ [By converse of 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

.

prove that a line drawn through the mid-point of one side of a triangle parallel to another side bisects the third side

Sol. Given: In Δ ABC, D is the mid-point of AB and DE || BC

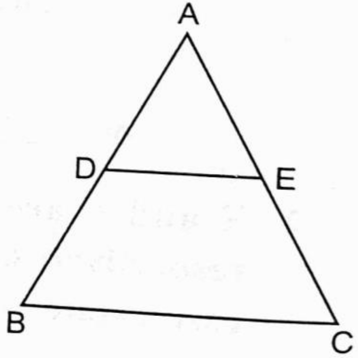
To Prove: AE = EC

Proof: In ΔABC,

$$DE \parallel BC$$

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

[By B.P.T.]



But $\quad AD = DB$

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

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

Hence, DE bisects AC.

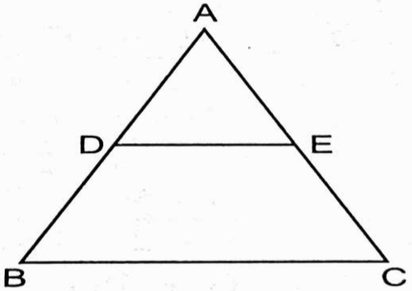
prove that the line joining the mid-points of any two sides of a triangle is parallel to the third side.

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

Sol. **Given:** A ΔABC, in which D and E are mid-points of sides AB and AC respectively.

To Prove: $DE \parallel BC$

Proof: In ΔABC, $AD = DB$ and $AE = EC$



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

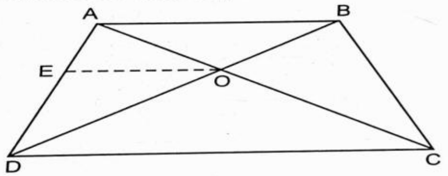
$$\frac{AD}{DB} = \frac{AE}{EC}$$

$\therefore \quad DE \parallel BC$ [By converse of B.P.T.]

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

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

Sol. 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 construction]

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

HOME ASSIGNMENT Ex. 6.2 Q. No 4 to Q10

AHA

1. If a line intersects sides AB and AC of a Δ ABC at D and E respectively and is parallel to BC, prove that AD/ AB = AE/ AC.

THANKING YOU

ODM EDUCATIONAL GROUP