ODM EDUCATIONAL GROUP
Changing your Tomorrow

TRIANGLES
PPT-2

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 06
CHAPTER NAME :TRIANGLES

PREVIOUS KNOWLEDGE TEST

1.Two figures having the same shape but not necessary the same size are called similar figures.

2.All congruent figures are similar, but all similar figures are not congruent.

3.All circles are always similar but they need not be congruent. They are congruent if their radii are equal.

4.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).

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

LEARNING OUTCOME

1. Students will be able to define similar triangles.

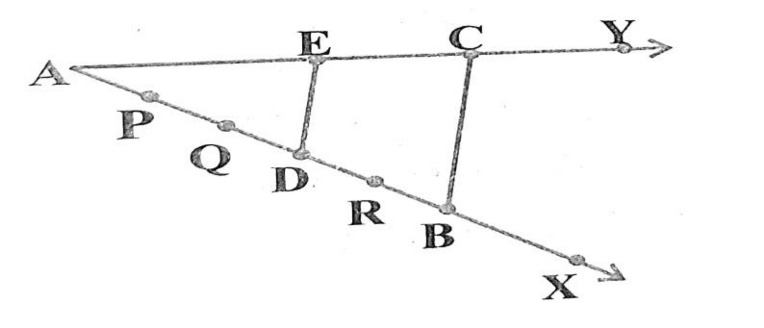
2. Students will be able to know the concept of similarity of triangles.

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

If corresponding angles of two triangles are equal, then they are known as equiangular triangles. A famous Greek mathematician Thales gave an important truth relating to two equiangular triangles which is as follows: The ratio of any two corresponding sides in two equiangular triangles is always the same.. To understand the Basic Proportionality Theorem, let us perform the following activity.

https://youtu.be/daE_2DZQ2Pw (4.02)

- If corresponding angles of two triangles are equal, then they are known as equiangular triangles. A famous Greek mathematician Thales gave an important truth relating to two equiangular triangles which is as follows: The ratio of any two corresponding sides in two equiangular triangles is always the same.. To understand the Basic Proportionality Theorem, let us perform the following activity.
- Activity : Draw any angle XAY and on its one arm AX, mark points (say five points) P, Q, D, R and B such that AP = PQ = QD = DR = RB. Now, through B, draw any line intersecting arm AY at C .
- Also, through the point D, draw a line parallel to BC to intersect AC at E. Do you observe from your constructions that AD /DB = 3/2?
- Measure AE and EC. What about AE /EC ? Observe that AE /EC is also equal to 3/ 2 . Thus, you can see that in Δ ABC, DE || BC and AD AE DB EC = . Is it a coincidence? No, it is due to the following theorem (known as the Basic Proportionality Theorem)::
- 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



Proof of Thales Theorem (known as the Basic Proportionality Theorem)

https://youtu.be/hfwabjyqd-s (11.03).

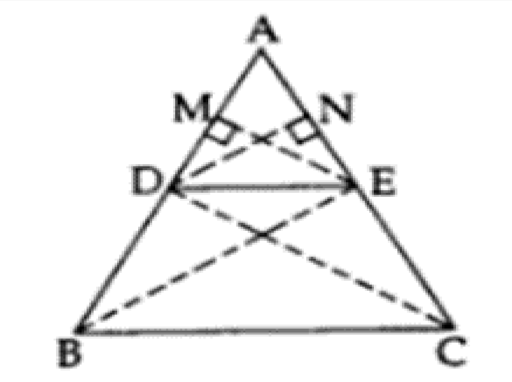
Theorem 6.1 (BPT or Thales theorem) : If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.

Given: In ΔABC, DE || BC.

To prove: AD/DB=AE/EC

Const.: Draw EM ⊥ AD and DN ⊥ AE. Join B to E and C to D.

Proof: In ΔADE and ΔBDE



,

$$ar(\Delta ADE)/ar(\Delta BDE)=\frac{1/2\times AD\times EM}{1/2\times DB\times EM} = AD/DB \text{ ....(i)}$$

[Area of Δ = 1/2 x base x corresponding altitude]

In ΔADE and ΔCDE,

$$ar(\Delta ADE)/ar(\Delta CDE)=\frac{1/2\times AE\ X DN}{1/2\times EC\times DN} = AE/EC \text{ ....(ii)}$$

∵ DE || BC ...[Given]

∴ ar(ΔBDE) = ar(ΔCDE)...........(iii)

[∵ As triangles on the same base and between the same parallel sides are equal in area

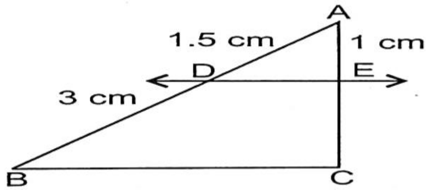
From (i), (ii) and (iii),]

AD/DB=AE/EC

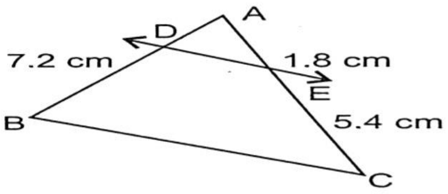
Converse of BPT : If a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side.

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

(*i*)



(*ii*)



Sol. (*i*) In Δ ABC, DE || BC

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

[By basic proportional theorem]

$$\text{or} \quad \frac{1.5}{3} = \frac{1}{EC} \Rightarrow EC = \frac{3}{1.5} = 2 \text{ cm}$$

(*ii*) In ΔABC, DE || BC

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

[By basic proportional theorem]

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

2. E and F are points on the sides PQ and PR respectively of a Δ PQR. 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

2. E and F are points on the sides PQ and PR respectively of a Δ PQR. 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

(*i*)

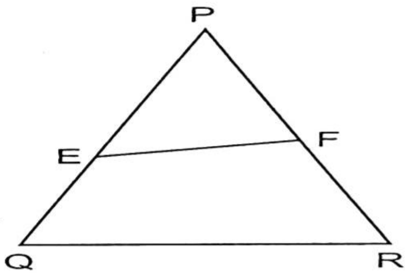
$$\frac{PE}{EQ} = \frac{3.9}{3} = 1.3$$

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

$$\because \quad \frac{PE}{EQ} \neq \frac{PF}{FR}$$

$\Rightarrow$ EF is not parallel to QR

[By converse of B.P.T.]



(*ii*)

$$\frac{PE}{EQ} = \frac{4}{4.5} = \frac{4 \times 10}{45} = \frac{8}{9}$$

$$\frac{PF}{RF} = \frac{8}{9}$$

$$\therefore \quad \frac{PE}{EQ} = \frac{PF}{RF}$$

$\Rightarrow$ EF || QR [By converse of B.P.T.]

HOME ASSIGNMENT Ex. 6.2 Q. No 1 to Q3

AHA

1. .ABCD is a trapezium with AB || DC. E and F are points on non-parallel sides AD and BC respectively such that EF is parallel to AB . Show that AE/ BF = ED/ FC .
2. 2. Prove that a line drawn through the mid-point of one side of a triangle parallel to another side bisects the third side.

THANKING YOU

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