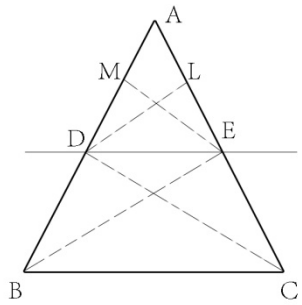
CHAPTER-6 (TRIANGLES)

DAY 1

BASIC PROPORTIONALITY THEOREM (THALES THEOREM)

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

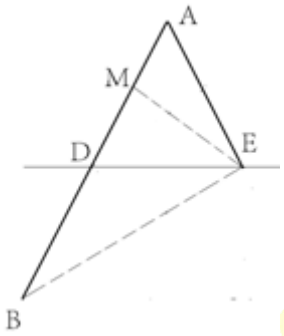


Given :- ΔABC in which DE || BC and DE intersects AB at D & AC at E.

To prove :- $\frac{AD}{DB} = \frac{AE}{EC}$

Construction:- join BE, CD and draw DL ⊥ AC and EM ⊥ AB

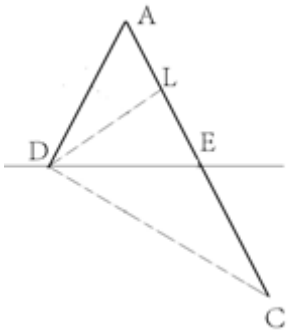
Proof :- In Δ ADE & ΔBDE, EM⊥AB



EM is the height for both of triangles ΔADE & ΔBDE

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

Similarly $\frac{ar(\Delta ADE)}{ar(\Delta CDE)} = \frac{\frac{1}{2}\times AE\times DL}{\frac{1}{2}\times EC\times DL} = \frac{AE}{EC}$ …….. ii)



Since ΔBDE and ΔCDE are on the same base and between the same parallel lines DE and BC.

$\therefore ar(\Delta BDE) = ar(\Delta CDE)$…….. iii)

From i), ii) & iii), we get

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

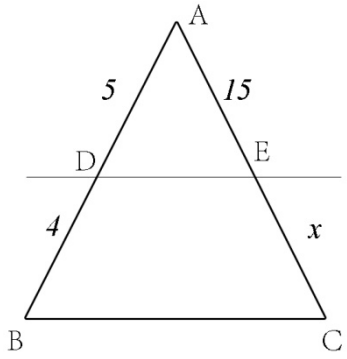
Note:- In ΔABC, if DE || BC then

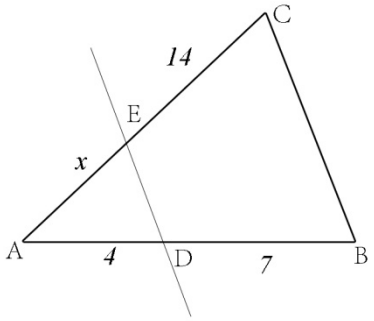
i) $\frac{\mathbf{AD}}{\mathbf{DB}} = \frac{\mathbf{AE}}{\mathbf{EC}}$ ii) $\frac{\mathbf{DB}}{\mathbf{AD}} = \frac{\mathbf{EC}}{\mathbf{AE}}$ iii) $\frac{\mathbf{AD}}{\mathbf{AB}} = \frac{\mathbf{AE}}{\mathbf{AC}}$

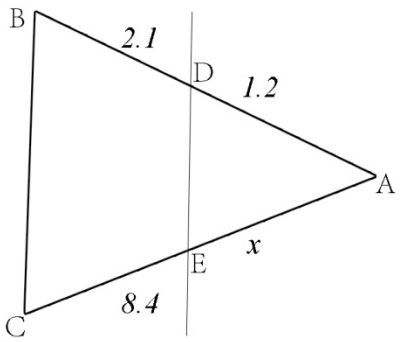
Now lets discuss some examples on it.

1. In ΔABC, if $DE \| BC$ then find x.

i) ii) iii)







Sol:-

i) In ΔABC, if $DE \| BC$

$\therefore$ By Thales Theorem $\frac{AD}{DB} = \frac{AE}{EC}$

$$\Rightarrow \frac{5}{4} = \frac{15}{x} \quad \Rightarrow x = 15 \times \frac{4}{5} = 12$$

ii) In ΔABC, if $DE \| BC$

$\therefore$ By Thales Theorem $\frac{AD}{DB} = \frac{AE}{EC}$

$$\Rightarrow \frac{4}{7} = \frac{x}{14} \quad \Rightarrow x = 14 \times \frac{4}{7} = 8$$

iii) In ΔABC, if $DE \| BC$

$\therefore$ By Thales Theorem $\frac{AD}{DB} = \frac{AE}{EC}$

$$\Rightarrow \frac{1.2}{2.1} = \frac{x}{8.4} \quad \Rightarrow x = 8.4 \times \frac{1.2}{2.1} = 1.2 \times 4 = 4.8$$

EXERCISE

1. Ex 6.2, Q1