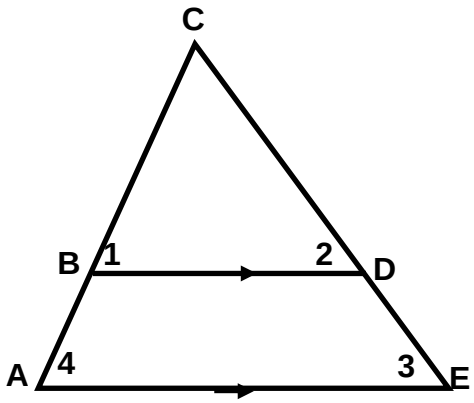
TOPIC 7-6: PARALLEL LINES & PROPORTIONAL PARTS IN TRIANGLES

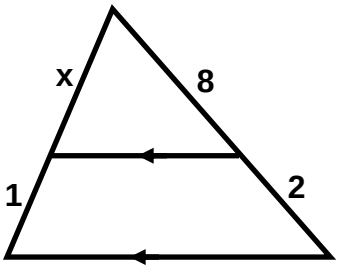
TRIANGLE PROPORTIONALITY THEOREM: If a line is parallel to one side of a triangle and intersects the other two sides in two distinct points, then it separates these sides into segments of proportional length.



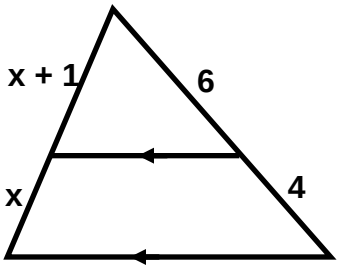
$$\frac{CB}{CA} = \frac{CD}{\quad} \qquad \frac{BA}{CA} = \frac{DE}{\quad}$$

$$\frac{CB}{BA} = \frac{CD}{\quad} \qquad \frac{BA}{DE} = \frac{CA}{\quad}$$

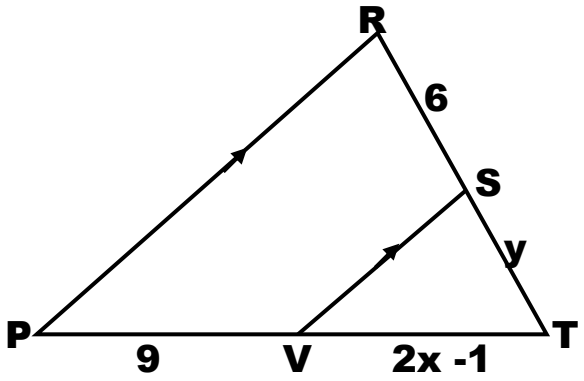
EXAMPLE 1 Find the value of 'x'.



EXAMPLE 2 Find the value of 'x'.



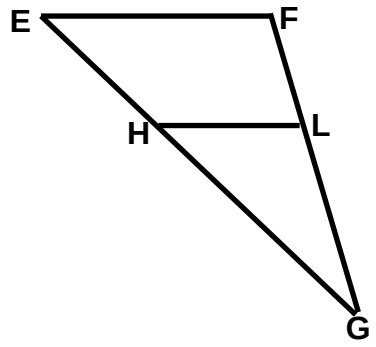
EXAMPLE 3 If RT = 10, find the values of 'x' and 'y'.



Likewise, proportional parts of a triangle can be used to prove the converse of this theorem.

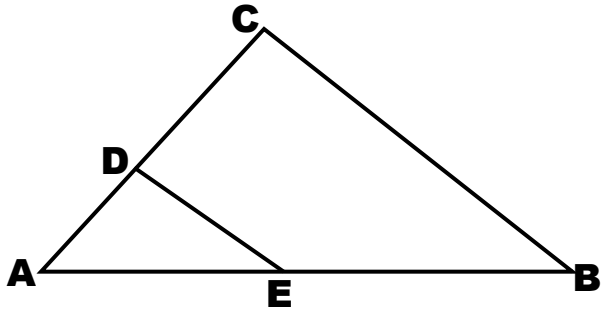
THEOREM: If a line intersects two sides of a triangle and separates the sides into corresponding segments of proportional lengths, then the line is parallel to the third side.

EXAMPLE 4 In ∆EFG, EG = 15, EH = 5, and LG = 12, FL = 6.
Determine whether $\overline{HL} \parallel \overline{EF}$.



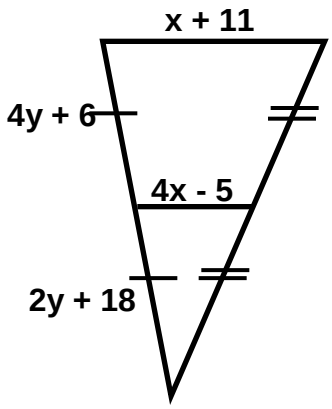
EXAMPLE 5 In ∆ABC, find 'x' so that $\overline{DE} \parallel \overline{CB}$.

AC = 30 **AD = 10**
AE = 22 **EB = x + 4**



THEOREM: A segment whose endpoints are the midpoints of two sides of a triangle is parallel to the third side of the triangle, and its length is half the length of the third side.

EXAMPLE 6 Find the values of 'x' and 'y'.



EXAMPLE 7 Find the values of 'x' and 'y'.