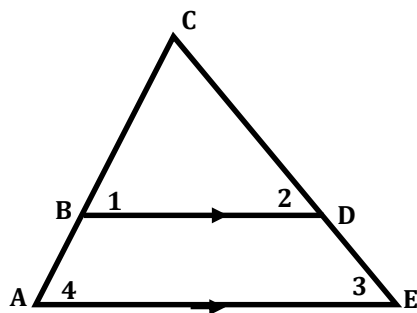


NOTES 8.4: PARALLEL LINES & PROPORTIONAL PARTS

Objective: _____

Proportions can be used to find the lengths of segments determined by parallel lines.

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.



$$\frac{CB}{CA} = \frac{CD}{CE}$$

$$\frac{CB}{CD} = \frac{CA}{CE}$$

$$\frac{BA}{CA} = \frac{DE}{CE}$$

$$\frac{CB}{BA} = \frac{CD}{DE}$$

$$\frac{CB}{CD} = \frac{BA}{DE}$$

$$\frac{BA}{DE} = \frac{CA}{CE}$$

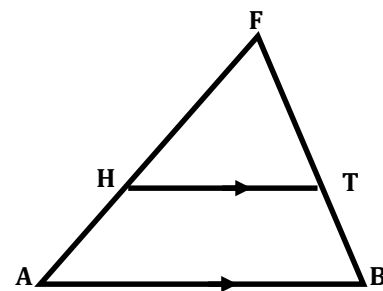
EXAMPLE 1: TRUE or FALSE?

(a) $\frac{FA}{HA} = \frac{FB}{TB}$

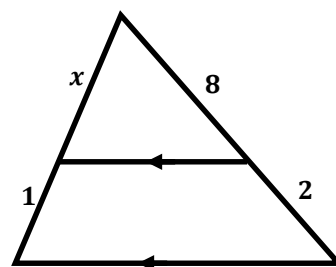
(b) $\frac{FT}{FH} = \frac{FB}{FA}$

(c) $\frac{FH}{FT} = \frac{HA}{TB}$

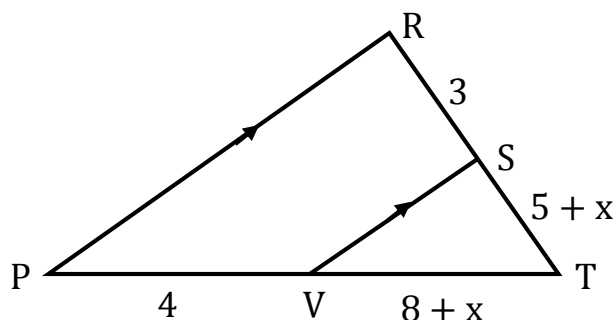
(d) $\frac{FA}{FH} = \frac{FT}{TB}$



EXAMPLE 2: Find the value of 'x'.



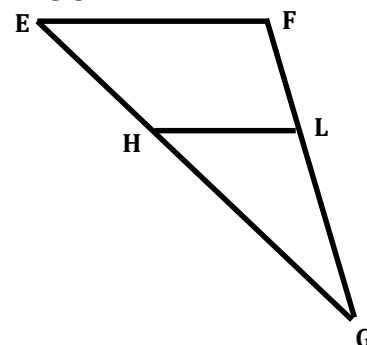
EXAMPLE 3: Find the value of 'x'.



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.

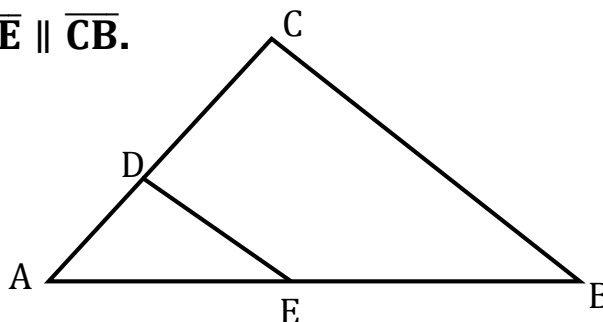
EXAMPLE 4: In $\triangle EFG$, $EG = 15$, $EH = 5$, and LG is twice FL . Determine whether $\overline{HL} \parallel \overline{EF}$.



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

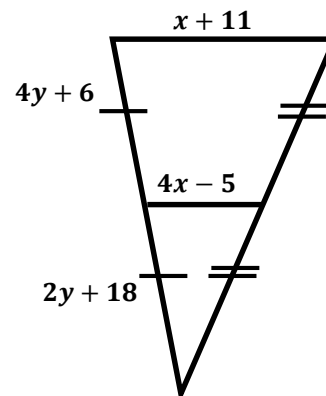
$AC = 30$
 $AE = 22$

$AD = 10$
 $EB = x + 4$



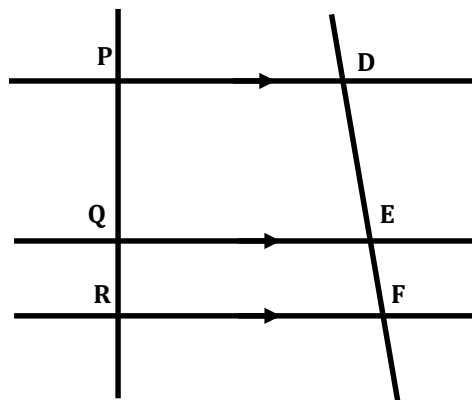
THEOREM: A segment whose endpoints are the midpoints of two sides of a triangle is parallel to the third side of the triangle, and its length is half the length of the third side.

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



THEOREM: If three or more parallel lines intersect two transversals, then they cut off the transversals proportionally.

$$\frac{PQ}{QR} = \frac{DE}{EF} \quad \text{OR} \quad \frac{PQ}{DE} = \frac{QR}{EF}$$



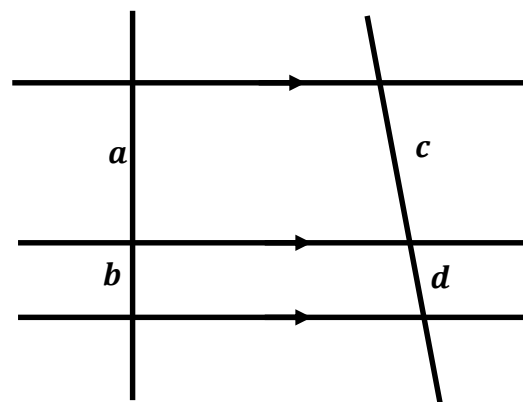
EXAMPLE 7: TRUE or FALSE?

(a) $\frac{a}{b} = \frac{c}{d}$

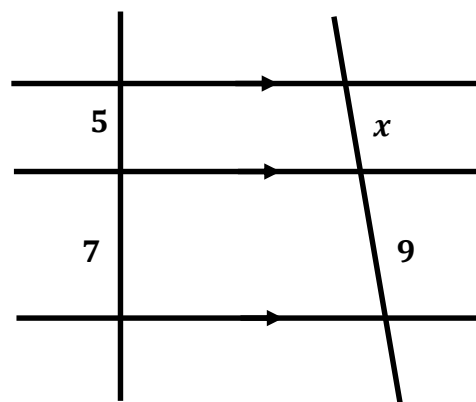
(b) $\frac{a}{c} = \frac{c}{d}$

(c) $\frac{a}{d} = \frac{c}{b}$

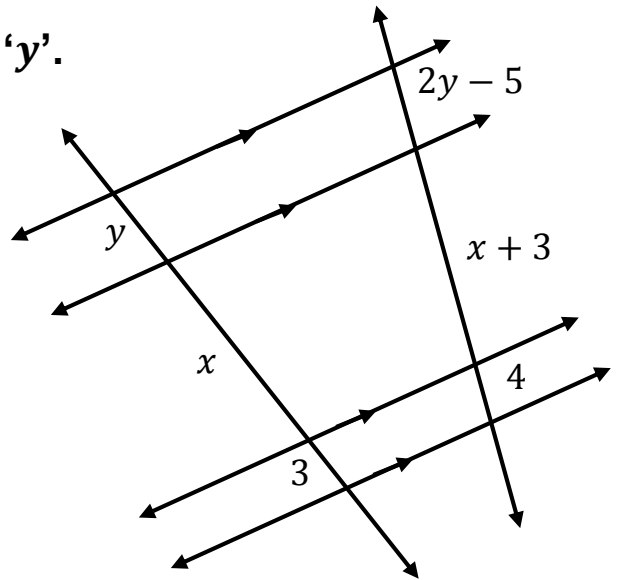
(d) $\frac{b}{c} = \frac{a}{d}$



EXAMPLE 8: Find the value of 'x'.



EXAMPLE 9: Find the values of 'x' and 'y'.



THEOREM: If three or more parallel lines cut off congruent segments on one transversal, then they cut off congruent segment on every transversal.

EXAMPLE 10: Find the value of 'x'.

