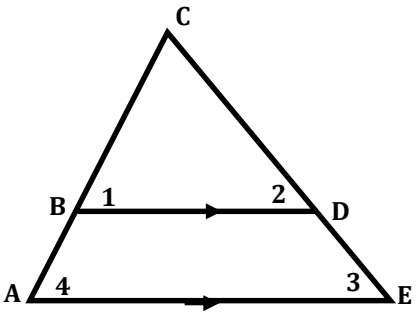
NOTES 8.4: PARALLEL LINES & PROPORTIONAL PARTS

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.



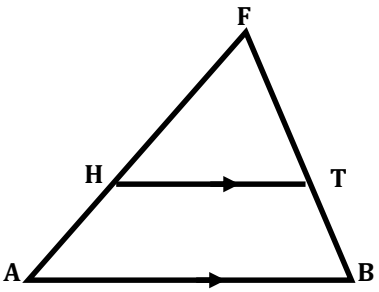
$\frac{CB}{CA} = \frac{CD}{\quad}$ $\frac{CB}{CD} = \frac{CA}{\quad}$ $\frac{BA}{CA} = \frac{DE}{\quad}$

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

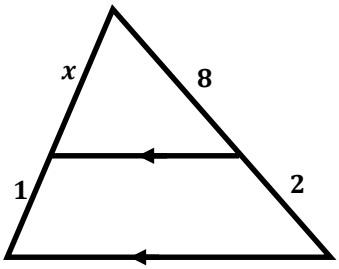
EXAMPLE 1: TRUE or FALSE?

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

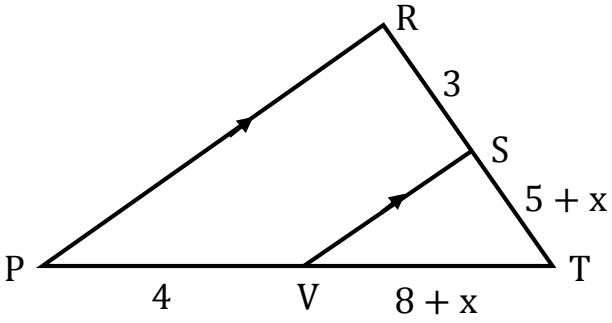
(c) $\frac{FH}{FT} = \frac{HA}{TB}$ (d) $\frac{FA}{FH} = \frac{FT}{TB}$



EXAMPLE 2: Find the value of 'x'.



EXAMPLE 3: Find the value of 'x'.



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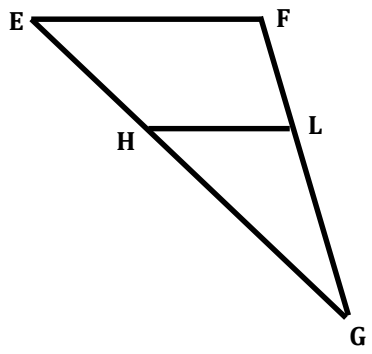
Likewise, proportional parts of a triangle can be used to prove the converse of this theorem.

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.

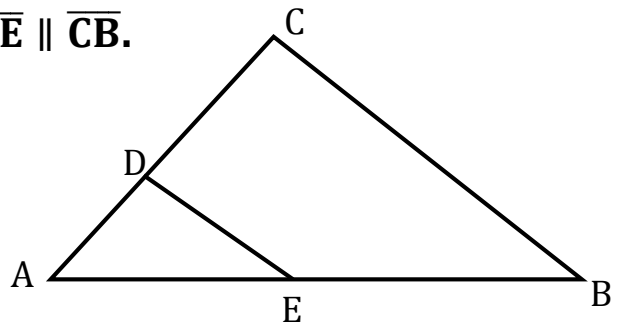
EXAMPLE 4: In ΔEFG, $EG = 15$, $EH = 5$, and LG is twice FL. Determine whether $\overline{HL} \parallel \overline{EF}$.



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

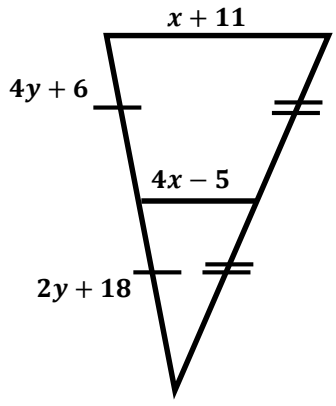
$AC = 30$ $AD = 10$

$AE = 22$ $EB = x + 4$



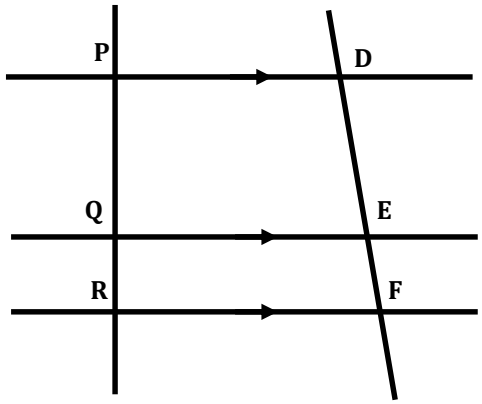
THEOREM: A segment whose endpoints are the midpoints of two sides of a triangle is parallel to the third side of the triangle, and its length is half the length of the third side.

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



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

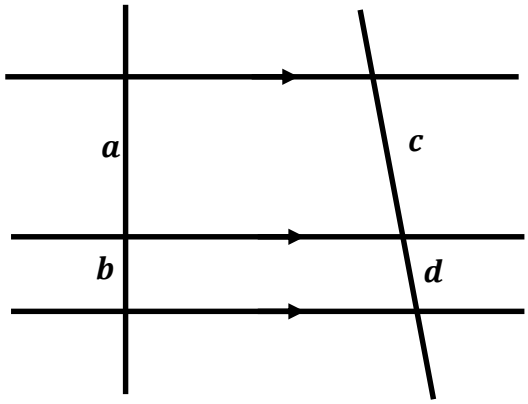
$\frac{\mathrm{PQ}}{\mathrm{QR}} = \frac{\mathrm{DE}}{\quad}$ OR $\frac{\mathrm{PQ}}{\mathrm{DE}} = \frac{\mathrm{QR}}{\quad}$



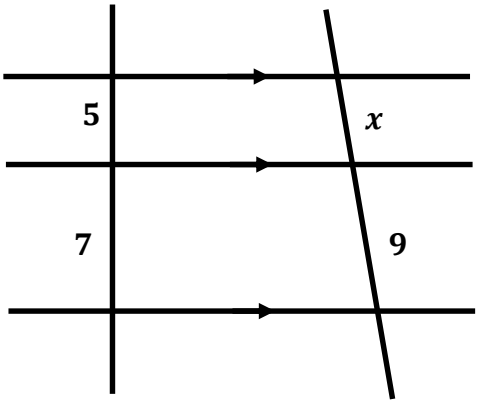
EXAMPLE 7: TRUE or FALSE?

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

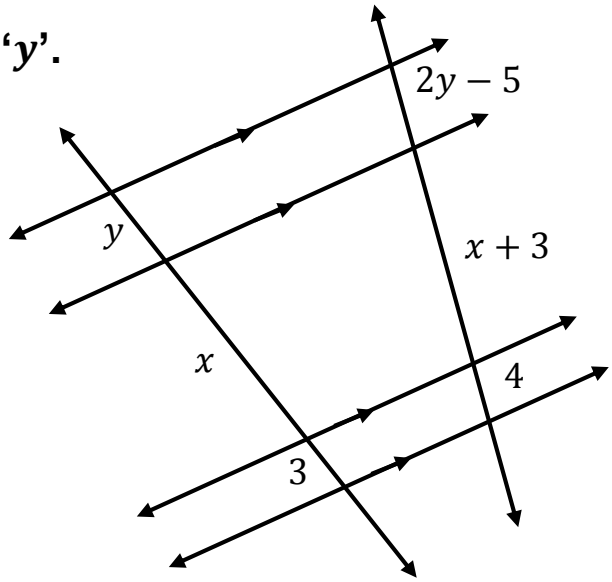
(c) $\frac{a}{d} = \frac{c}{b}$ (d) $\frac{b}{c} = \frac{a}{d}$



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 segments on every transversal.

EXAMPLE 10: Find the value of 'x'.