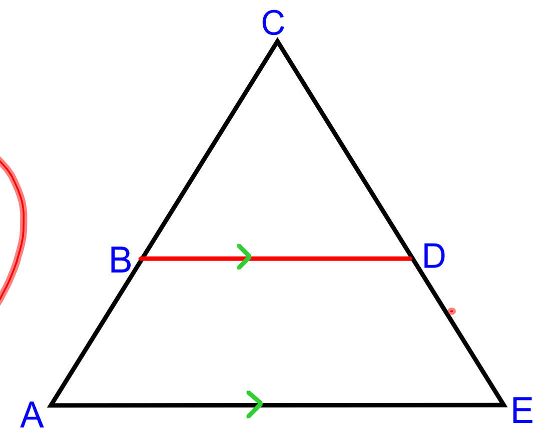
6-4 Parallel Lines and Proportional Parts

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.

If $\overline{BD} \parallel \overline{AE}$, then $\frac{BA}{BC} = \frac{DE}{DC}$



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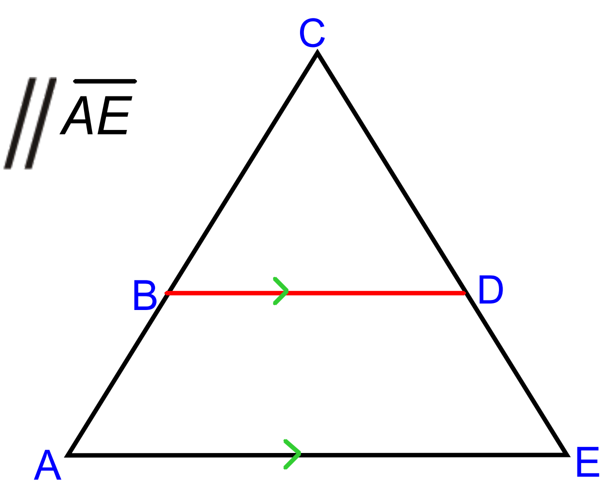
Converse of the Triangle Proportionality Theorem:

____*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.

If $\frac{BA}{BC} = \frac{DE}{DC}$, then $\overline{BD} \parallel \overline{AE}$



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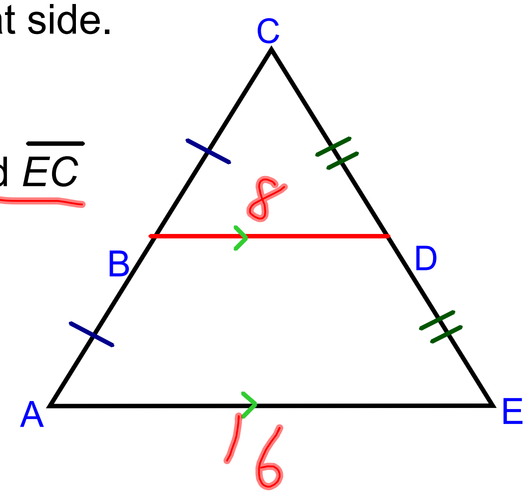
Triangle Midsegment Theorem:

____*The midsegment of a triangle is parallel to one side of the triabgle, and its length is one-half the length of the length of that side.



If B and D are midpoints of $\overline{AC}$ and $\overline{EC}$ respectively,

then, $\overline{BD} \parallel \overline{AE}$, and $BD = \frac{1}{2}AE$

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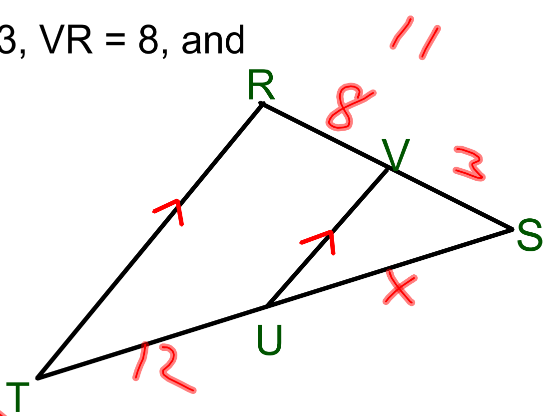
Example 1:

In ΔRST, $\overline{RT} \parallel \overline{VU}$, SV = 3, VR = 8, and UT = 12. Find SU



$\frac{8}{3} = \frac{12}{x}$

$8x = 3(12)$

$\frac{8x}{8} = \frac{36}{8}$

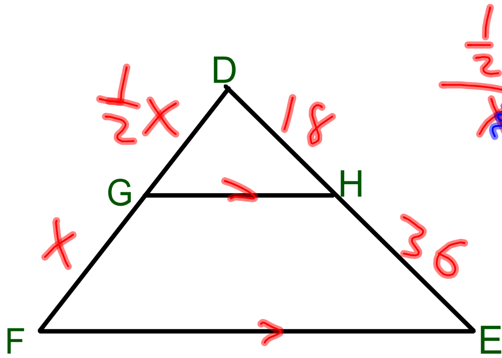
$x = 4.5$

$SU = 4.5$

Example 2:

In $\triangle$DEF, DH = 18, HE = 36, and DG = 0.5(GF).

Determine whether $\overline{GH} \parallel \overline{FE}$. Explain your answer.



$$\frac{\frac{1}{2}\cancel{x}}{\cancel{x}} = \frac{18}{36}$$

$$\frac{1}{2} = \frac{18}{36}$$

$$0.5 = 0.5$$

$\therefore GH \parallel FE$

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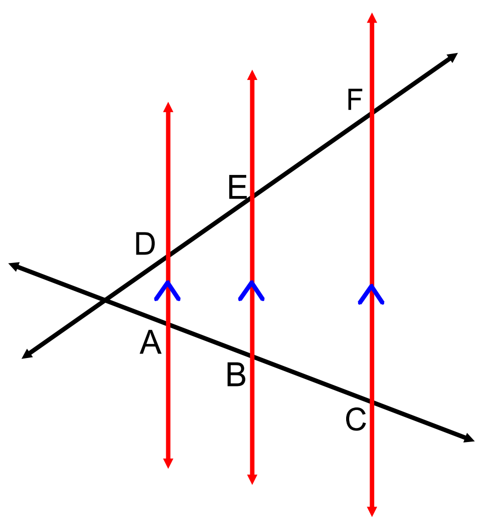
If 3 or more parallel lines intersect 2 transversal, *then* they cut off the transversals proportionally.

If $\overline{AD} \parallel \overline{EB} \parallel \overline{CF}$, *then*

$$\frac{AB}{BC} = \frac{DE}{EF} \qquad \frac{AC}{DF} = \frac{BC}{EF}$$

and $$\frac{AC}{BC} = \frac{DF}{EF}$$



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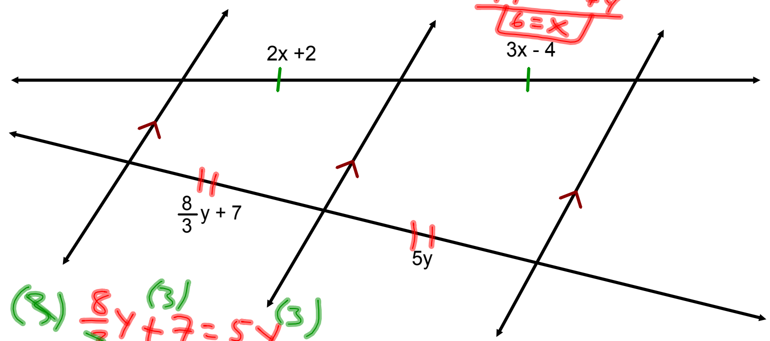
<u>Example 3:</u> Find *x* and *y*.

$$2x+2=3x-4$$
$$-2x \qquad -2x$$
$$2=x-4$$
$$+4 \qquad +4$$
$$\boxed{6=x}$$



$$(3)\ \frac{8}{3}y+7=5y\ (3)$$
$$8y+21=15y$$
$$-8y \qquad -8y$$
$$\frac{21}{7}=\frac{7y}{7}$$
$$\boxed{y=3}$$