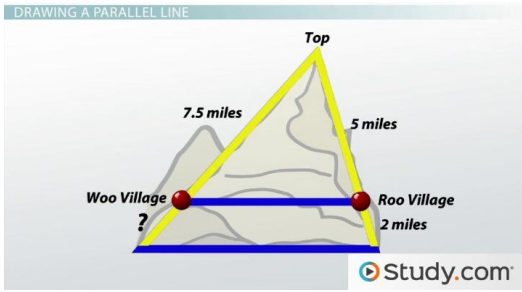
Name_____Period____



Unit 12 Day 2

Proportionality Theorems

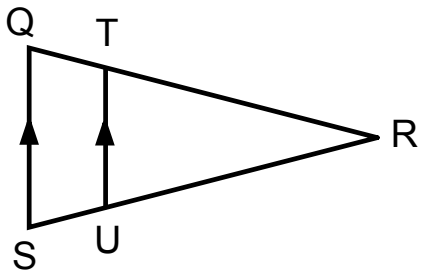
I can_____

Triangle Proportionality Theorem

If a line parallel to one side of a triangle intersects the other two side, then it divides the two sides proportionally.

If $\overline{TU} \parallel \overline{QS}$,

then $\dfrac{RT}{TQ} = \dfrac{RU}{US}$



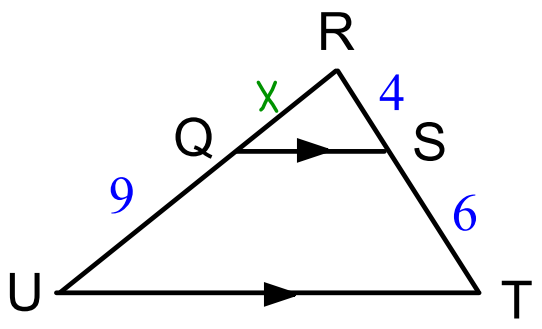
$\overline{QS} \parallel \overline{UT}$

What is the length of $\overline{RQ}$?

$\frac{x}{9} = \frac{4}{6}$

$6x = 36$

$x = 6$



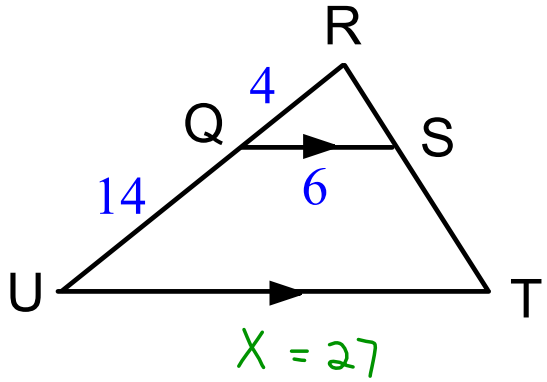
$\overline{QS} \parallel \overline{UT}$

What is the length of $\overline{UT}$?

$\frac{4}{6} = \frac{18}{x}$

$4x = 108$

$x = 27$



Find the value of x and y.

$\frac{x}{9} = \frac{x+5}{12}$

$12x = 9x + 45$

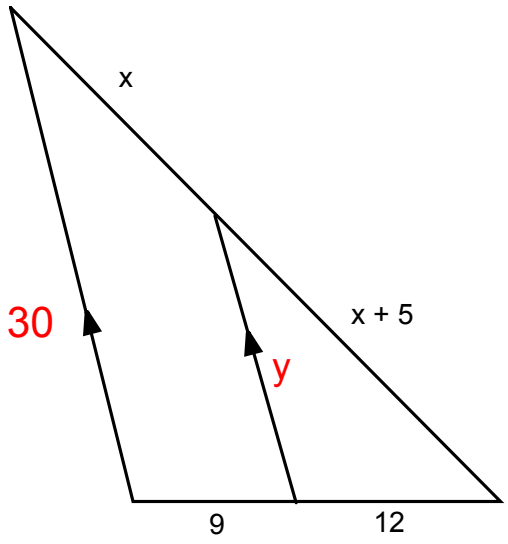
$3x = 45$

$x = 15$

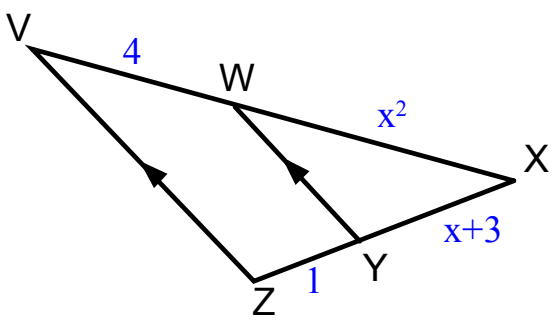
$\frac{12}{y} = \frac{21}{30}$

$21y = 360$

$y = 17.15$



What is the length of $\overline{WX}$?



$\frac{4}{1} = \frac{x^2}{x+3}$

$4x + 12 = x^2$

$x^2 - 4x - 12 = 0$

$(x-6)(x+2) = 0$

$x = 6, \; x = -2$

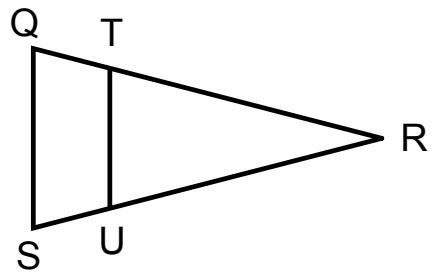
Both work!

Converse of the Triangle Proportionality Theorem

If a line divides two sides of a triangle proportionally, then it is parallel to the third side.

If $\frac{RT}{TQ} = \frac{RU}{US}$,

then $\overline{TU} \parallel \overline{QS}$



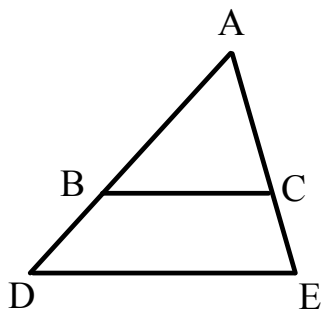
Determine whether $\overline{BC}$ is parallel to $\overline{DE}$ from the given proportions.

1. $\frac{AB}{BD} = \frac{AC}{CE}$ yes

2. $\frac{AC}{CE} = \frac{BC}{DE}$ NO

AE

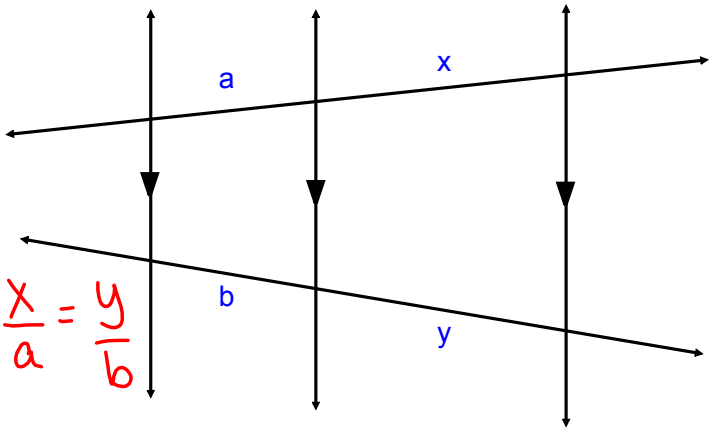
3. $\frac{BD}{CE} = \frac{AB}{AC}$ yes



Three parallel lines Theorem

If three or more parallel lines intersect two transversals, then they divide the transversals proportionally.

$$\frac{a}{b} = \frac{x}{y}$$



$\frac{a}{x} = \frac{b}{y}$ $\frac{b}{a} = \frac{y}{x}$ $\frac{x}{a} = \frac{y}{b}$

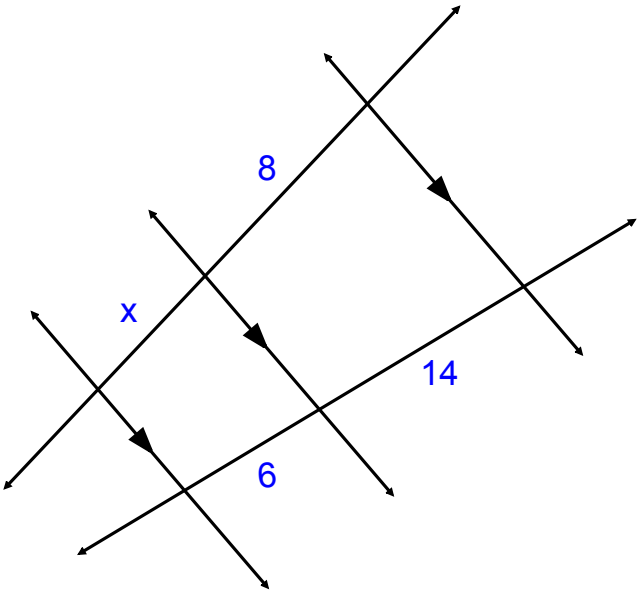
Write 3 other proportions that are true.

Find the value of x.

$\frac{x}{6} = \frac{8}{14}$

$14x = 48$

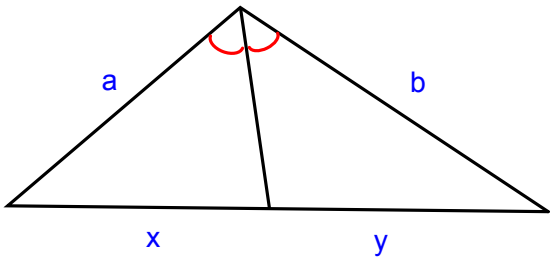
$x = \frac{48}{14} = \frac{24}{7} \approx 3.4$



Triangle Angle Bisector Theorem

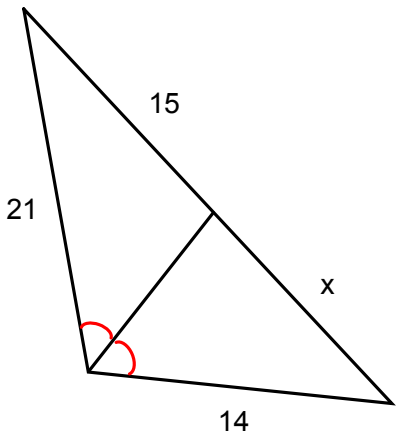
An angle bisector of a triangle will divide the opposite side into segments whose lengths are proportional to the lengths of the other two sides.

$$\frac{a}{b} = \frac{x}{y}$$



Write another true proportion. $\frac{a}{x} = \frac{b}{y}$

Find the value of x.

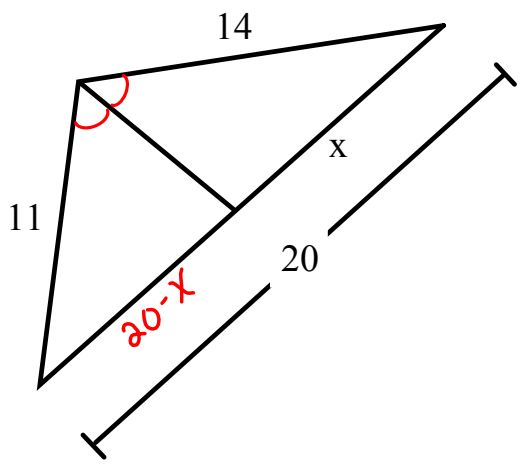


$\frac{21}{15} = \frac{14}{x}$

$21x = 210$

$x = 10$

Find x



$$\frac{11}{20-x} = \frac{14}{x}$$

$$11x = 280 - 14x$$

$$25x = 280$$

$$x = 11.2$$