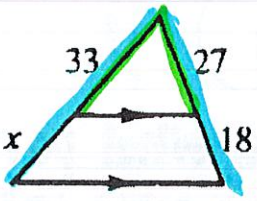
Triangle Proportionality Theorem: If a line parallel to one side of a triangle intersects the other two sides, then it divides the two sides proportionally.

Find the value of x:

9.



$\frac{27}{45} = \frac{33}{33+x}$ $\frac{x}{33} = \frac{18}{27}$ $\frac{33}{27} = \frac{x}{18}$

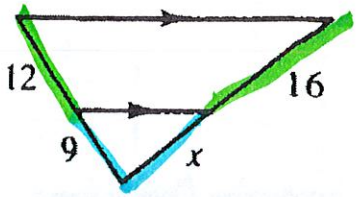
$27(33+x) = 45(33)$ $27x = 594$ $594 = 27x$

$891 + 27x = 1485$

$27x = 594$

$x = 22$

10.

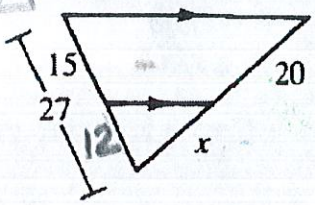


$\frac{x}{9} = \frac{16}{12}$ $\frac{12}{21} = \frac{16}{16+x}$ $\frac{x}{16} = \frac{9}{12}$

$12x = 144$

$x = 12$

11.

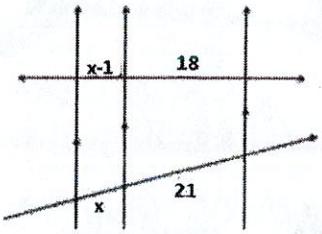


$\frac{15}{27} = \frac{20}{x+20}$ $\frac{x}{12} = \frac{20}{15}$ $\frac{x}{20} = \frac{12}{15}$

$15x = 240$

$x = 16$

12.



$\frac{x}{x-1} = \frac{21}{18}$

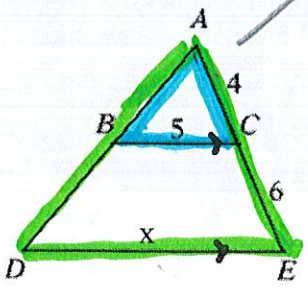
$18x = 21(x-1)$

$18x = 21x - 21$

$-3x = -21$

$x = 7$

13.



$\frac{4}{5} = \frac{16}{x}$

$\frac{4}{5} = \frac{\text{whole}}{\text{bottom}}$

$\frac{10}{x} = \frac{\text{whole}}{\text{bottom}}$

$\frac{4}{5} = \frac{10}{x}$

$4x = 50$

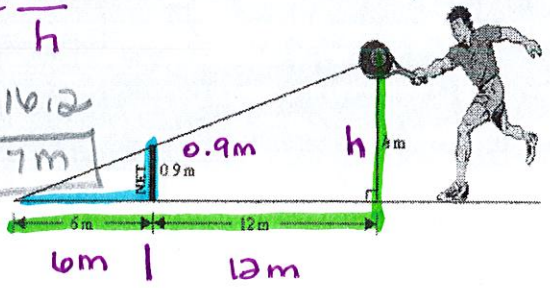
$x = 12.5$

14.

$\frac{6}{0.9} = \frac{18}{h}$

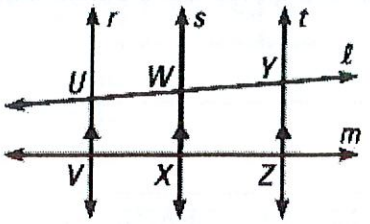
$6h = 16.2$

$h = 2.7\text{m}$



Theorem 6.6

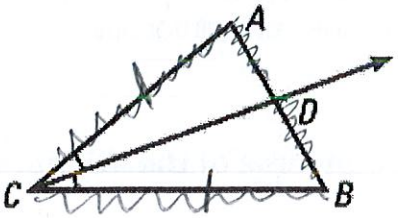
If three parallel lines intersect two transversals, then they divide the transversals proportionally.



$$\frac{UW}{WY} = \frac{VX}{XZ}$$

Theorem 6.7

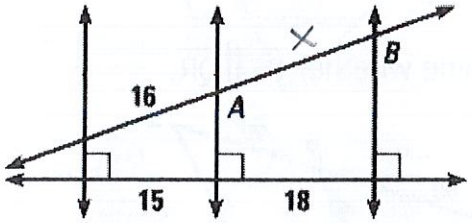
If a ray bisects an angle of a triangle, then it divides the opposite side into segments whose lengths are proportional to the lengths of the other two sides.



$$\frac{AD}{DB} = \frac{CA}{CB}$$

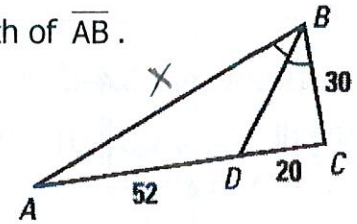
Practice Theorems 6.6-6.7:

6.6 3.) Find the length of $\overline{AB}$.



$\frac{16}{15} = \frac{x}{18}$ $15x = 288$ $x = 19.2$

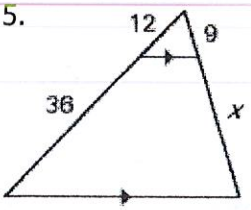
6.7 4.) Find the length of $\overline{AB}$.



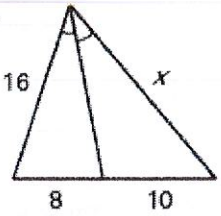
$\frac{52}{20} = \frac{x}{30}$ $20x = 1560$ $x = 78$

Use the diagrams to find the value of each variable.

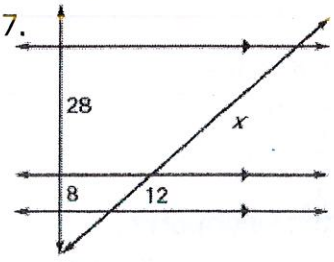
5.



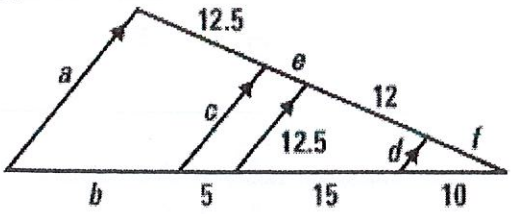
6.



7.



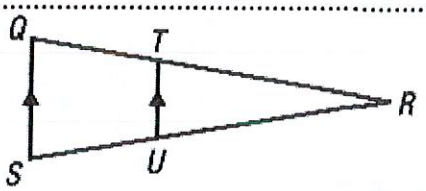
8.



6.6: Proportions in Similar Triangles

Theorem 6.4: **Triangle Proportionality Theorem**

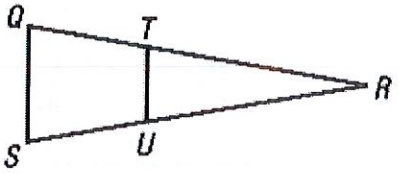
If a line parallel to one side of a triangle intersects the other two sides, then it divides the two sides proportionally.



If $\overline{TU} \parallel \overline{QS}$, then $\frac{RT}{TQ} = \frac{RU}{US}$.

Theorem 6.5: **Converse of the Triangle Proportionality Theorem**

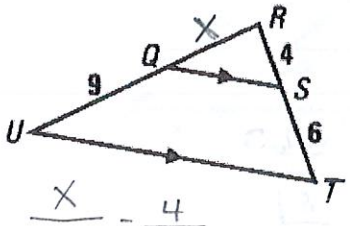
If a line divides two sides of a triangle proportionally, then it is parallel to the third side.



If $\frac{RT}{TQ} = \frac{RU}{US}$, then $\overline{TU} \parallel \overline{QS}$.

Practice Theorems 6.4-6.5:

6.4 1.) In the diagram, $\overline{QS} \parallel \overline{UT}$, RS = 4, ST = 6, and QU = 9. What is the length of $\overline{RQ}$?



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

$6X = 36$

$X = 6$

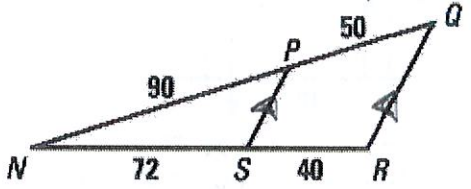
$\frac{X}{X+9} = \frac{4}{10}$

$10X = 4X + 36$

$6X = 36$

$X = 6$

6.5 2.) Determine whether $\overline{PS} \parallel \overline{QR}$.

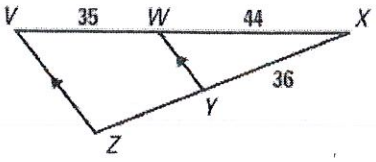


$\frac{90}{72} \stackrel{?}{=} \frac{50}{40}$

$1.25 \stackrel{?}{=} 1.25$ ✓

On your Own:

a. Find the length of $\overline{YZ}$.



b. Determine whether $\overline{PS} \square \overline{QR}$.