

Geometry 1.2
Class-Notes

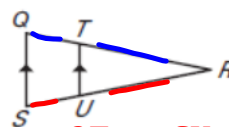
Name _____
Date _____ Period _____

6.6 Use Proportionality Theorems

Goal • Use proportions with a triangle or parallel lines.

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.

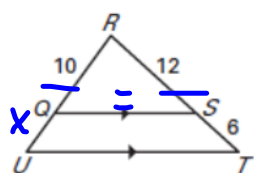


If $\overline{TU} \parallel \overline{QS}$, then $\frac{QT}{TR} = \frac{SU}{UR}$ and $\frac{QT}{QR} = \frac{SU}{SR}$

Example 1 Find the length of a segment

and $\frac{QR}{TR} = \frac{SR}{UR}$ and $\frac{RT}{RU} = \frac{QT}{SU}$

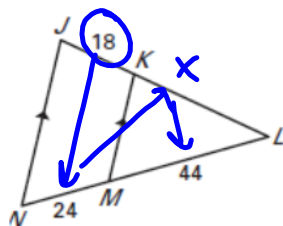
In the diagram, $\overline{QS} \parallel \overline{UT}$, $RQ = 10$, $RS = 12$, and $ST = 6$. What is the length of \overline{QU} ?



$$\frac{10}{x} = \frac{12}{6} \quad 12x = 60$$

$$x = 5$$

1. Find the length of \overline{KL} .



$$\frac{44}{24} = \frac{x}{18} \quad \frac{18}{24} = \frac{x}{44}$$

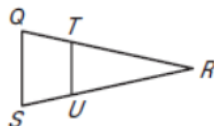
$$24x = 18(44)$$

$$x = 33$$

THEOREM 6.5: CONVERSE OF THE TRIANGLE PROPORTIONALITY THEOREM

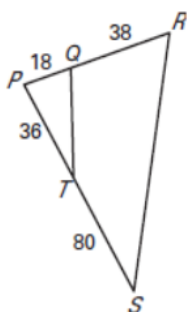
If a line divides two sides of a triangle proportionally, then it is parallel to the third side.

(the one it doesn't intersect...)



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

1. Determine whether $\overline{QT} \parallel \overline{RS}$.



$$\frac{18}{36} \neq \frac{38}{80}$$

$$\frac{3}{6}$$

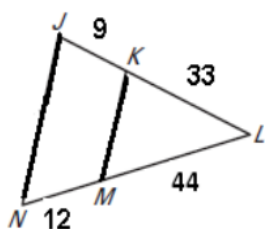
$$\frac{1}{2} = \frac{19}{40}$$

$$38(36) = 18(80)$$

$$1368 = 1440$$

NO, NOT \parallel

2. Determine whether $\overline{JN} \parallel \overline{KM}$.



$$\frac{9}{12} = \frac{33}{44}$$

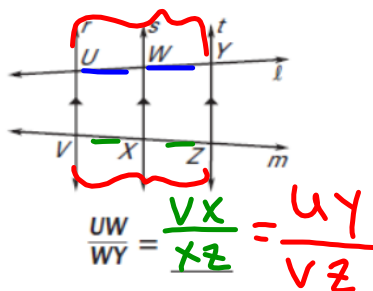
$$\frac{3}{4} = \frac{3}{4}$$

So: $\overline{JN} \parallel \overline{KM}$

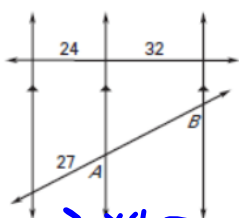
THEOREM 6.6

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

PROPORTIONALLY



1. Find AB.



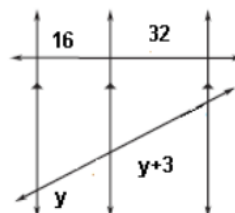
$$\frac{24}{32} = \frac{27}{AB}$$

$$24AB = 27(32)$$

$$\frac{24}{27} = \frac{32}{AB}$$

$$AB = 36$$

2. Find the value of y.



$$\frac{16}{y} = \frac{32}{y+3}$$

$$\frac{16}{32} = \frac{y}{y+3}$$

$$16y + 48 = 32y$$

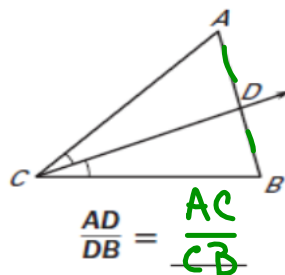
$$16(y+3) = 32y$$

$$y+3 = 2y$$

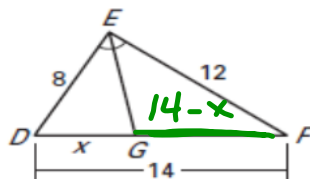
$$3 = y$$

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.

**Example 4** Use Theorem 6.7

In the diagram, $\angle DEG \cong \angle GEF$. Use the given side lengths to find the length of DG .



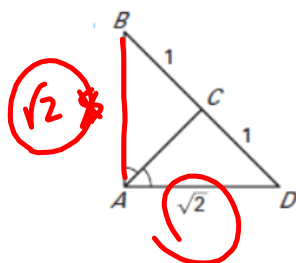
$$\frac{2}{3} = \frac{x}{14-x}$$

$$28 - 2x = 3x$$

$$28 = 5x$$

$$\frac{28}{5} = x \rightarrow x = 5.6$$

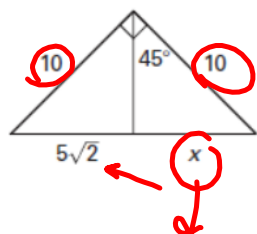
1. Find the length of \overline{AB} .



$$\frac{1}{x} = \frac{1}{\sqrt{2}}$$

$$x = \sqrt{2}$$

2. Find the value of x .



$$x = 5\sqrt{2}$$