

Geometry 1.2
Class-Notes

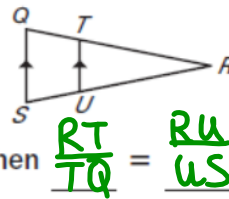
Name _____
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6.6 Use Proportionality Theorems

Goal • Use proportions with a triangle or parallel lines.

THEOREM 6.4: TRIANGLE PROPORTIONALITY THEOREM

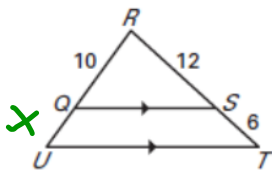
If a line parallel to one side of a triangle intersects the other two sides, then it divides the two sides proportionally.



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

Example 1 Find the length of a segment

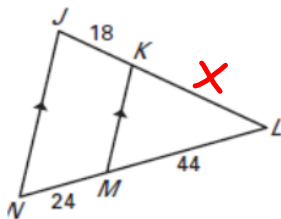
In the diagram, $\overline{QS} \parallel \overline{UT}$, $RQ = 10$, $RS = 12$, and $ST = 6$. What is the length of QU ?



$$\frac{RQ}{QU} = \frac{RS}{ST} \Rightarrow \frac{10}{x} = \frac{12}{6}$$

$$\frac{12x}{12} = \frac{60}{12} \quad x = 5$$

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

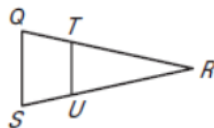


$$\frac{KL}{KJ} = \frac{LM}{MN} \Rightarrow \frac{x}{18} = \frac{44}{24}$$

$$\frac{24x}{24} = \frac{792}{24} \quad x = 33$$

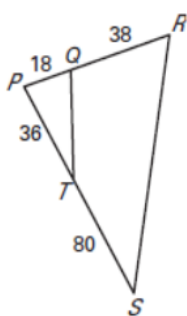
THEOREM 6.5: CONVERSE OF THE TRIANGLE PROPORTIONALITY THEOREM

If a line divides two sides of a triangle proportionally, then it is parallel to the 3rd side



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

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



$$\frac{PQ}{QR} \stackrel{?}{=} \frac{PT}{TS}$$

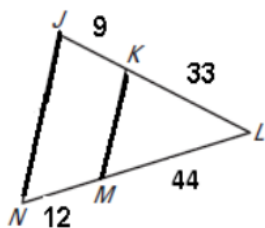
$$\frac{18}{36} \stackrel{?}{=} \frac{36}{80}$$

$$18(80) \stackrel{?}{=} 36(38)$$

$$1440 \neq 1368$$

SO \overline{QT} is not $\parallel \overline{RS}$

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



$$\frac{LK}{JK} \stackrel{?}{=} \frac{LM}{MN} \quad \text{OR} \quad \frac{JK}{KL} \stackrel{?}{=} \frac{NM}{ML}$$

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

$$3(44) \stackrel{?}{=} 12(33)$$

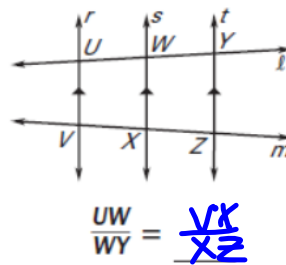
$$396 = 396$$

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

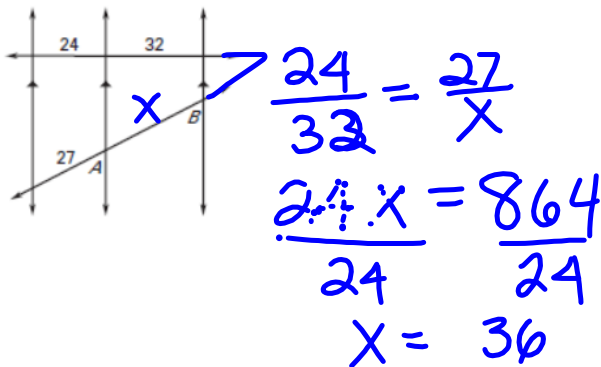
THEOREM 6.6

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

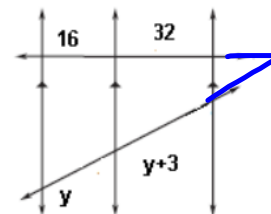
proportionally



1. Find AB.



2. Find the value of y.



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

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

$$16y + 48 = 32y$$

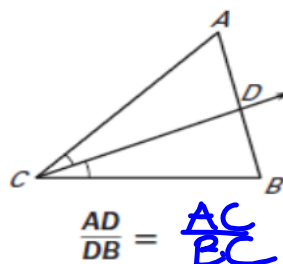
$$\begin{array}{r} -16y \\ \hline 48 = 16y \end{array}$$

$$\frac{48}{16} = \frac{16y}{16}$$

$$3 = y$$

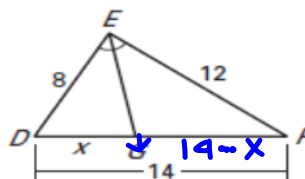
THEOREM 6.7

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 \overline{DG} .



$$\frac{DG}{GF} = \frac{DE}{EF}$$

$$\frac{x}{14-x} = \frac{8}{12}$$

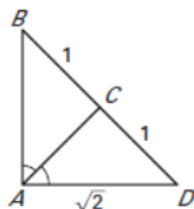
$$12x = 8(14-x)$$

$$12x = 112 - 8x$$

$$\begin{array}{r} 12x \\ + 8x \\ \hline 20x = 112 \end{array}$$

$$x = 5.6$$

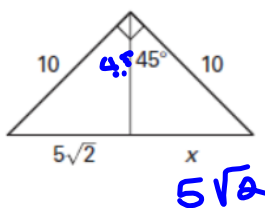
1. Find the length of \overline{AB} .



$$\frac{BC}{CD} = \frac{BA}{AD}$$

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

$$x = \sqrt{2}$$



2. Find the value of x.

