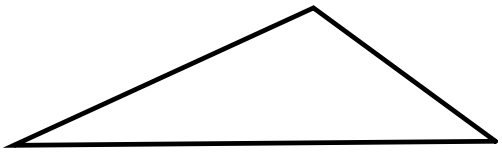
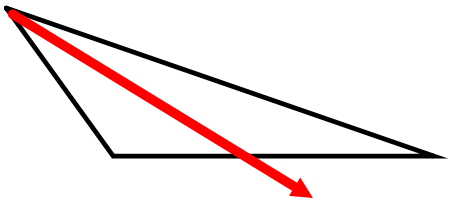
Essential Question

What proportionality relationships exist in a triangle intersected by an angle bisector or by a line parallel to one of the sides?

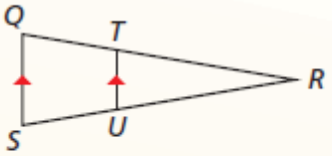




Theorems

Theorem 8.6 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.

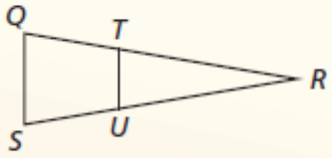


If $\overline{TU} \parallel \overline{QS}$, then $\frac{RT}{TQ} = \frac{RU}{US}$.

Proof Ex. 27, p. 451

Theorem 8.7 Converse of the Triangle Proportionality Theorem

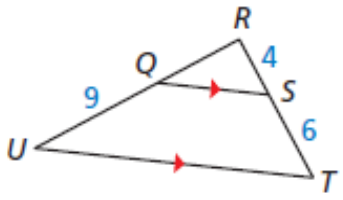
If a line divides two sides of a triangle proportionally, then it is parallel to the third side.



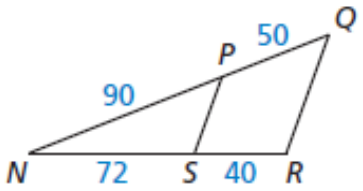
If $\frac{RT}{TQ} = \frac{RU}{US}$, then $TU \parallel QS$.

Proof Ex. 28, p. 451

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



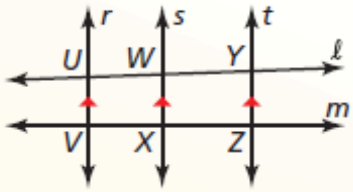
Determine whether $\overline{PS} \parallel \overline{QR}$



Theorem

Theorem 8.8 Three Parallel Lines Theorem

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

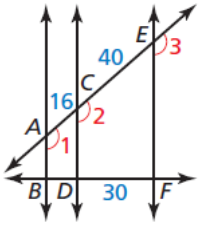


$$\frac{UW}{WY} = \frac{VX}{XZ}$$

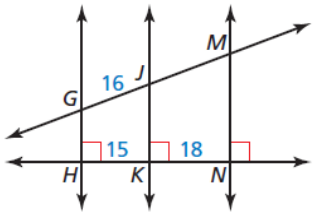
Proof Ex. 32, p. 451

Find the length of the given line segment.

3. $\overline{BD}$

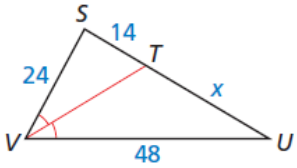


4. $\overline{JM}$

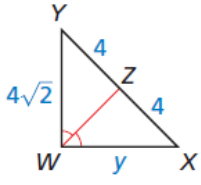


Find the value of the variable.

5.



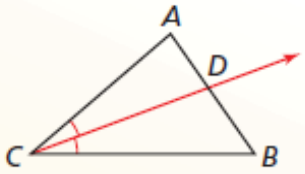
6.



Theorem

Theorem 8.9 Triangle Angle Bisector Theorem

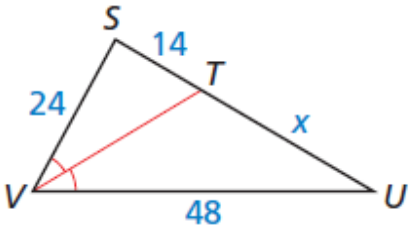
If a ray bisects an angle of a triangle, then it divides the opposite side into segments whose lengths are proportional to the lengths of the other two sides.



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

Proof Ex. 35, p. 452

Find the value of the variable.



In the diagram, $\angle QPR \cong \angle RPS$ Use the given side lengths to find the length of $\overline{RS}$.