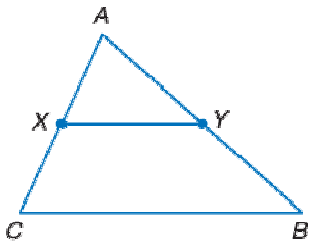
Lesson 7-5

Example 1

Given: Y is midpoint of $\overline{AB}$.
X is midpoint of $\overline{AC}$.

Prove: $XY = \frac{1}{2}CB$



Solution

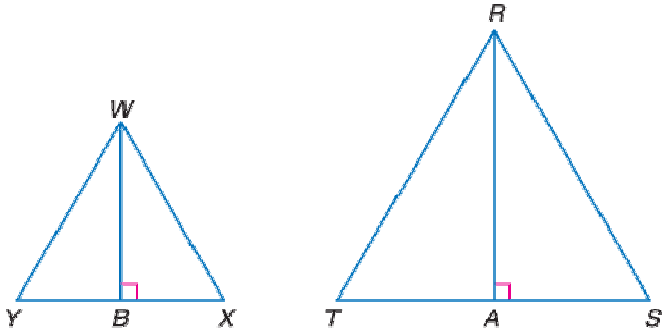
Statements	Reasons
1. Y is midpoint of $\overline{AB}$. X is midpoint of $\overline{AC}$.	1. Given
2. $AX = \frac{1}{2}AC;\ AY = \frac{1}{2}AB;$	2. Definition of midpoint
3. $\frac{AX}{AC} = \frac{1}{2};\ \frac{AY}{AB} = \frac{1}{2}$	3. Division Property of Equality
4. $m\angle A = m\angle A$	4. Reflexive Property of Equality
5. $\angle A \cong \angle A$	5. Definition of congruent angles
6. $\triangle ABC \sim \triangle AYX$	6. SAS Similarity Postulate
7. $\frac{XY}{CB} = \frac{1}{2}$	7. Corresponding parts of similar triangles are proportional.
8. $XY = \frac{1}{2}CB$	8. Multiplication Property of Equality

Example 2

SCALE MODELS Amy is building a scale model of neighborhood houses with roof bracing forms of large and small similar triangles throughout the models. She believes she will not need to measure the altitudes of all the triangles in her model since the altitudes should be in the same proportion as the sides of the triangles. To be certain, Amy draws $\triangle WXY$ and $\triangle RST$ and proves the theorem.

Given: $\triangle WXY \sim \triangle RST$
$\overline{WB} \perp \overline{XY}$, $\overline{RA} \perp \overline{ST}$

Prove: $\frac{WB}{RA} = \frac{WX}{RS}$

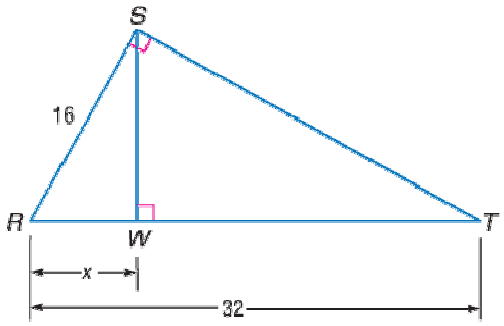


Solution

Statements	Reasons
1. $\triangle WXY \sim \triangle RST$, $\overline{WB} \perp \overline{XY}$, $\overline{RA} \perp \overline{ST}$	1. Given
2. $\angle WBX$ and $\angle RAS$ are right angles.	2. Definition of perpendicular lines
3. $m\angle WBX = 90$, $m\angle RAS = 90$	3. Definition of right angles
4. $m\angle WBX = m\angle RAS$	4. substitution
5. $\angle WBX \cong \angle RAS$	5. Definition of congruent angles
6. $\angle WXY \cong \angle RST$	6. Corresponding angles of similar triangles are congruent.
7. $\triangle WXB \sim \triangle RSA$	7. AA Similarity Postulate
8. $\frac{WB}{RA} = \frac{WX}{RS}$	8. Corresponding parts of similar triangles are in proportion.

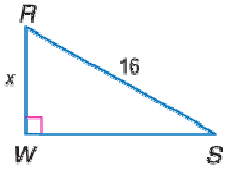
Example 3

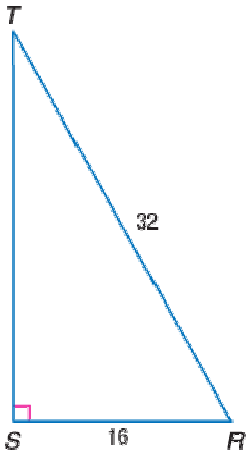
Find x in right triangle RST if $\overline{SW}$ is the altitude to the hypotenuse.



Solution

Identify which two of the three triangles include x. You may find it helpful to redraw the two triangles separately.





Because $\triangle RWS \sim \triangle RST$,

$$\frac{RW}{RS} = \frac{RS}{RT}$$

$$\frac{x}{16} = \frac{16}{32}$$

$$x = 8$$

So, the value of x in this triangle is 8.