# 6.5 Similarity and Measurement
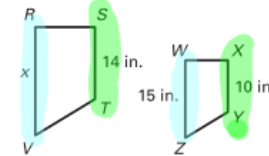
**Goal:** Find unknown side lengths of similar figures.

**Example 1** **Finding an Unknown Side Length in Similar Figures**

Given $RSTV \sim WXYZ$, find $VR$.

**Solution** _Similar_

Use the ratios of the lengths of corresponding sides to write a proportion involving the unknown length, $VR$.

$\dfrac{Small}{Large}$ $\dfrac{XY}{ST} = \dfrac{WZ}{RV}$    Write proportion involving $VR$.

$\dfrac{10}{14} = \dfrac{15}{X}$    Substitute.

$10 \cdot X = 14 \cdot 15$    Cross products property

$\dfrac{10x}{10} = \dfrac{210}{10}$    Multiply.

$x = 21$    Divide each side by $10$.

**Answer:** The length of $\overline{VR}$ is $21$ inches.

✔ **Checkpoint**

1. Given $\triangle PQR \sim \triangle VTS$, find $TS$.

$\dfrac{Big}{Little}$ $\dfrac{PR}{VS} = \dfrac{QR}{TS}$

$\dfrac{15}{10} = \dfrac{12}{X}$
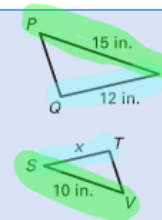
$15x = 12 \cdot 10$

$\dfrac{15x}{15} = \dfrac{120}{15}$

$X = 8\ in.$

**Example 2**    *Using Indirect Measurement*

**Height** At a certain time of day, a person who is 6 feet tall casts a 3-foot shadow. At the same time, a tree casts an 11-foot shadow. The triangles formed are similar. Find the height of the tree.

*h*

6 ft

3 ft    11 ft

**Solution**

Write and solve a proportion to find the height *h* of the tree.

$\dfrac{\text{Height of tree}}{\text{Height of person}}$

$\dfrac{6}{3} \bowtie \dfrac{h}{11}$    $\dfrac{\text{height}}{\text{Shadow}}$

$\square = \square$    Substitute values.

$\square \cdot \square = \square \cdot \square$    Cross products property    $\dfrac{3h}{3} = \dfrac{66}{3}$

$\square = \square$    Multiply.
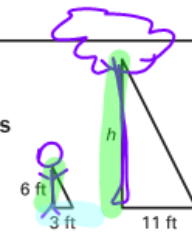
$h = \square$    Divide each side by $\square$.    $\boxed{h = 22 \text{ feet}}$

**Answer:** The tree has a height of $\square$ feet.

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**Example 3**    *Using Algebra and Similar Triangles*

**Given** $\triangle ABC \sim \triangle DEC$, **find** $BE$.

To find $BE$, write and solve a proportion.

30 in.   E   x   B

16 in.    24 in.

C   D   A

30 + x    B

24    C    A

C   30   E   16   D

$\dfrac{\text{Big}}{\text{Little}}$    $\dfrac{AB}{DE} = \dfrac{CB}{CE}$    Write proportion.

$\dfrac{24}{16} = \dfrac{(30+x)}{30}$    Use fact that $BC = \boxed{30+x}$.

$\square = \square$    Substitute.

$24 \cdot 30 = 16(30+x)$    Cross products property

$720 = 480 + 16x$    Multiply.

$-480 \quad -480$

$\dfrac{240}{16} = \dfrac{16x}{16}$    Subtract $\boxed{480}$ from each side.

$\boxed{15} = x$    Divide each side by $\boxed{16}$.

**Answer:** The length of $\overline{BE}$ is $\boxed{15}$ inches.