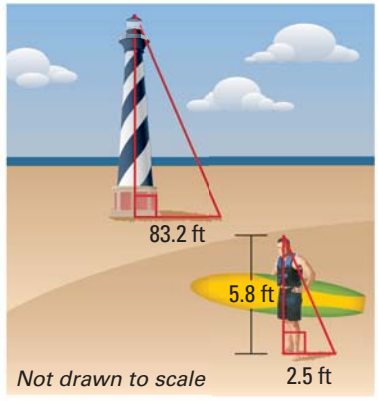
INDIRECT MEASUREMENT You can use similar figures to find lengths that are difficult to measure directly.

EXAMPLE 2 Use similar figures to measure indirectly

CAPE HATTERAS LIGHTHOUSE A man stands next to the Cape Hatteras Lighthouse in North Carolina. The lighthouse and the man are perpendicular to the ground. The sun's rays strike the lighthouse and the man at the same angle, forming two similar triangles. Use indirect measurement to approximate the height of the lighthouse.



Solution

Write and solve a proportion to find the height h (in feet) of the lighthouse.

ANOTHER WAY
You can also use the proportion below to find the height of the lighthouse.

$$\frac{5.8}{2.5} = \frac{h}{83.2}$$

$$\frac{\text{height} \rightarrow 5.8}{\text{height} \rightarrow h} = \frac{2.5 \leftarrow \text{length of shadow}}{83.2 \leftarrow \text{length of shadow}}$$

$2.5h = 5.8 \cdot 83.2$ **Cross products property**

$2.5h = 482.56$ **Multiply.**

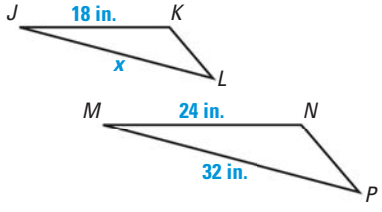
$h = 193.024$ **Divide each side by 2.5.**

▶ The height of the lighthouse is about 193 feet.

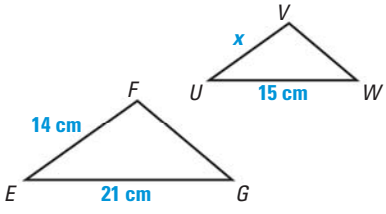
PRACTICE

EXAMPLE 1 on p. 174 for Exs. 1–4

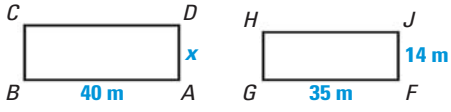
1. Given $\triangle JKL \sim \triangle MNP$, find JL.



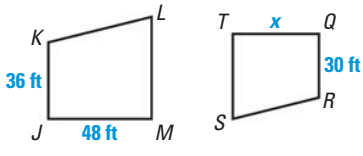
2. Given $\triangle EFG \sim \triangle UVW$, find UV.



3. Given $ABCD \sim FGHJ$, find AD.



4. Given $JKLM \sim QRST$, find QT.



EXAMPLE 2 on p. 175 for Ex. 5

5. FLAGPOLES A 5 foot tall student stands near a flagpole. The flagpole and the student are perpendicular to the ground. The sun's rays strike the flagpole and the student at the same angle, forming two similar triangles. The flagpole casts a 15 foot shadow, and the student casts a 2 foot shadow. Use indirect measurement to find the height of the flagpole.