Lesson 10: Solving Right Triangle and Word Problems

Are You Ready? Possible Solutions

1. a. $\sin 40^\circ = \dfrac{x}{25\text{ m}}$

$x = (25\text{ m})\sin 40^\circ$

$x = 16.1\text{ m}$

b. $\tan 22^\circ = \dfrac{7\text{ m}}{x}$

$x\tan 22^\circ = 7\text{ m}$

$x = \dfrac{7\text{ m}}{\tan 22^\circ}$

$x = 17.3\text{ m}$

2. a. $\tan x^\circ = \dfrac{6\text{ cm}}{5\text{ cm}}$

$x^\circ = \tan^{-1}\left(\dfrac{6}{5}\right)$

$x = 50^\circ$

b. $\cos x^\circ = \dfrac{35\text{ ft}}{175\text{ ft}}$

$x^\circ = \cos^{-1}\left(\dfrac{35}{175}\right)$

$x = 78^\circ$

3. a. $c^2 = (6\text{ cm})^2 + (5\text{ cm})^2$

$c^2 = 36\text{ cm}^2 + 25\text{ cm}^2$

$c^2 = 61\text{ cm}^2$

$c = \sqrt{61\text{ cm}^2}$

$c = 7.8\text{ cm}$

b. $c^2 = (175\text{ ft})^2 + (35\text{ ft})^2$

$c^2 = 30\,625\text{ ft}^2 + 1225\text{ ft}^2$

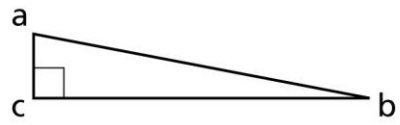
$c^2 = 31\,850\text{ ft}^2$

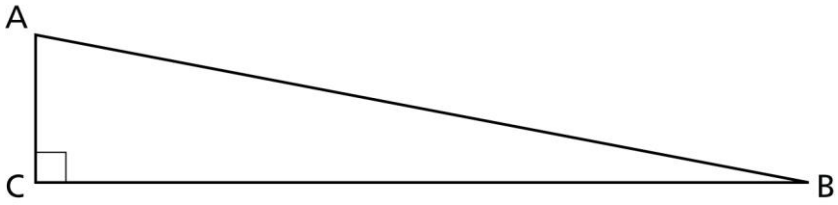
$c = \sqrt{31\,850\text{ ft}^2}$

$c = 178.5\text{ ft}$

4. When two shapes are said to be similar, it means that the dimensions of the two shapes are proportional. For example, if the height of one triangle is twice the height of a second triangle, then the base of the first triangle is also twice the base of the second triangle.

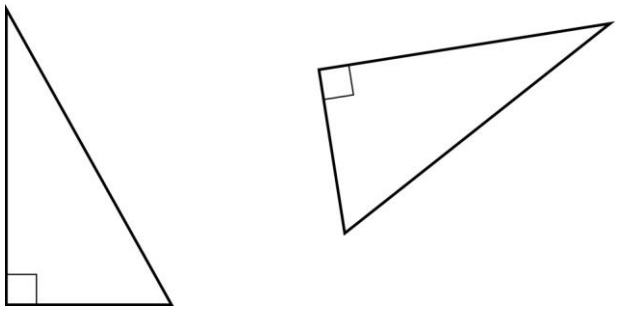
   Likewise, the hypotenuse of the first triangle will be twice as large as the hypotenuse of the second triangle. This proportionality is also applicable to the angles. Similar shapes are identical in shape, but not necessarily in size. See the following graphic.





   Angle a corresponds to angle A, angle b corresponds to angle B, and angle c corresponds to angle C.

   When two shapes are said to be congruent, it means that the dimensions of the two shapes are equal. Congruent shapes are identical in size and shape.



5. a. These triangles are similar, so they have the same angles. Therefore, angle B must be 30° since its corresponding angle in the small triangle is also 30°.

b. Two sides are not given in the small triangle, so the Pythagorean theorem cannot be used. However, since these are corresponding triangles, they are proportional. The triangles are the same shape. In other words, they have the same angles. One triangle is just larger than the other.

Compare the lengths at the bottom of both triangles:

small triangle $=$ 15 ft

large triangle $=$ 45 ft

The large triangle is three times larger than the small triangle; e.g., 15 * 3 $=$ 45. So a person could also say that the small triangle is three times smaller than the large one; e.g., 15 $\times$ 3 $=$ 45.

The student is asked to find length *c* in the small triangle, and the student is given the corresponding or matching length in the large triangle (51 ft). So it can be expressed this way:

$$\frac{51}{3} = 17$$

So side *c* in the small triangle must be 17 ft long.