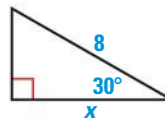


EXAMPLE 3 Find an unknown side length of a right triangle

Find the value of x for the right triangle shown.



Solution

Write an equation using a trigonometric function that involves the ratio of x and 8. Solve the equation for x .

$$\cos 30^\circ = \frac{\text{adj}}{\text{hyp}} \quad \text{Write trigonometric equation.}$$

$$\frac{\sqrt{3}}{2} = \frac{x}{8} \quad \text{Substitute.}$$

$$4\sqrt{3} = x \quad \text{Multiply each side by 8.}$$

▶ The length of the side is $x = 4\sqrt{3} \approx 6.93$.

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SOLVING A TRIANGLE Finding *all* unknown side lengths and angle measures of a triangle is called *solving* the triangle. Solving right triangles that have acute angles other than 30° , 45° , and 60° may require the use of a calculator.

To find values of the sine, cosine, and tangent functions on a calculator, use the keys **SIN**, **COS**, and **TAN**. Use these keys and the reciprocal key for cosecant, secant, and cotangent. Be sure the calculator is set in degree mode.

EXAMPLE 4 Use a calculator to solve a right triangle

Solve $\triangle ABC$.

Solution

A and B are complementary angles, so $B = 90^\circ - 28^\circ = 62^\circ$.

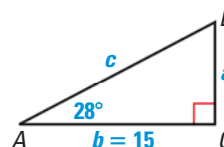
$$\tan 28^\circ = \frac{\text{opp}}{\text{adj}} \quad \sec 28^\circ = \frac{\text{hyp}}{\text{adj}} \quad \text{Write trigonometric equation.}$$

$$\tan 28^\circ = \frac{a}{15} \quad \sec 28^\circ = \frac{c}{15} \quad \text{Substitute.}$$

$$15(\tan 28^\circ) = a \quad 15\left(\frac{1}{\cos 28^\circ}\right) = c \quad \text{Solve for the variable.}$$

$$7.98 \approx a \quad 17.0 \approx c \quad \text{Use a calculator.}$$

▶ So, $B = 62^\circ$, $a \approx 7.98$, and $c \approx 17.0$.



READING

Throughout this chapter, a capital letter is used to denote both an angle of a triangle and its measure. The same letter in lowercase is used to denote the length of the side opposite that angle.

GUIDED PRACTICE for Examples 3 and 4

Solve $\triangle ABC$ using the diagram at the right and the given measurements.

5. $B = 45^\circ$, $c = 5$

6. $A = 32^\circ$, $b = 10$

7. $A = 71^\circ$, $c = 20$

8. $B = 60^\circ$, $a = 7$

