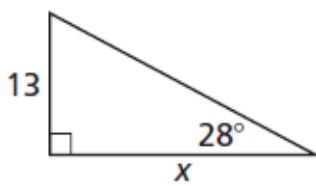
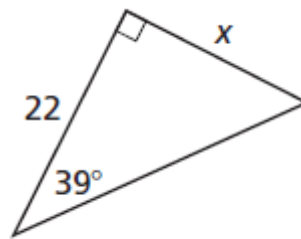


Find the value of x . Round your answer to the nearest tenth.

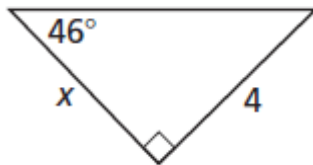
1.



2.



3.



Essential Question

How is a right triangle used to find the sine and cosine of an acute angle? Is there a unique right triangle that must be used?

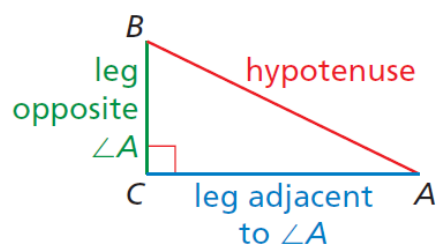
Core Concept

Sine and Cosine Ratios

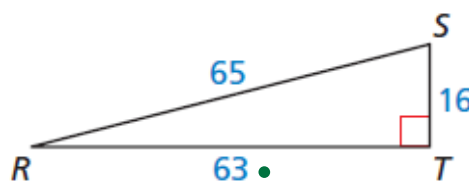
Let $\triangle ABC$ be a right triangle with acute $\angle A$. The sine of $\angle A$ and cosine of $\angle A$ (written as $\sin A$ and $\cos A$) are defined as follows.

$$\sin A = \frac{\text{length of leg opposite } \angle A}{\text{length of hypotenuse}} = \frac{BC}{AB}$$

$$\cos A = \frac{\text{length of leg adjacent to } \angle A}{\text{length of hypotenuse}} = \frac{AC}{AB}$$



Find $\sin S$, $\sin R$, $\cos S$, and $\cos R$. Write each answer as a fraction and as a decimal rounded to four places.



$$\sin S = \frac{63}{65} = 0.9692$$

$$\cos S = \frac{16}{65} = 0.2462$$

$$\sin R = \frac{16}{65} = 0.2462$$

$$\cos R = \frac{63}{65} = 0.9692$$

 **Core Concept****Sine and Cosine of Complementary Angles**

The sine of an acute angle is equal to the cosine of its complement. The cosine of an acute angle is equal to the sine of its complement.

Let A and B be complementary angles. Then the following statements are true.

$$\sin A = \cos(90^\circ - A) = \cos B \qquad \sin B = \cos(90^\circ - B) = \cos A$$

$$\cos A = \sin(90^\circ - A) = \sin B \qquad \cos B = \sin(90^\circ - B) = \sin A$$

Write $\sin 56^\circ$ in terms of cosine.

$$\sin 56 = \cos (90 - 56)$$



$$\sin 56^\circ = \cos 34^\circ$$

Find the values of x and y using sine and cosine.

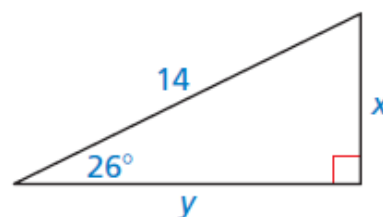
Round your answers to the nearest tenth.

$$\sin 26^\circ = \frac{x}{14}$$

$$x = 14 \sin 26^\circ = 6.1$$

$$\cos 26^\circ = \frac{y}{14}$$

$$y = 14 \cos 26^\circ = 12.6$$

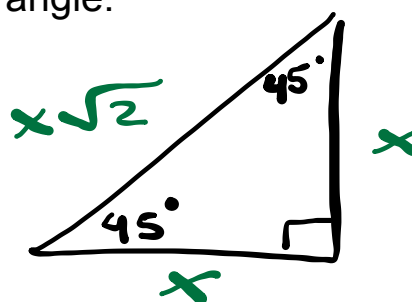


Find the sine and cosine of a 45° angle.

$$\sin 45 = \frac{x}{x\sqrt{2}}$$

$$\sin 45 = \frac{1}{\sqrt{2}} \left(\frac{\sqrt{2}}{\sqrt{2}} \right)$$

$$\sin 45^\circ = \frac{\sqrt{2}}{2}$$



$$\cos 45^\circ = \frac{x}{x\sqrt{2}}$$

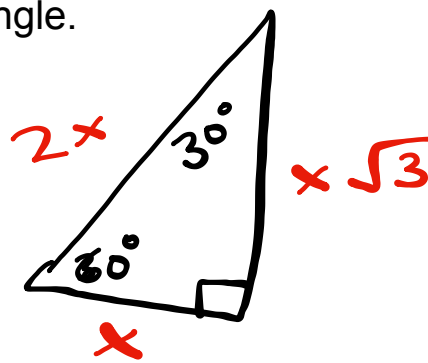
$$\boxed{\cos 45^\circ = \frac{\sqrt{2}}{2}}$$

Find the sine and cosine of a 30° angle.

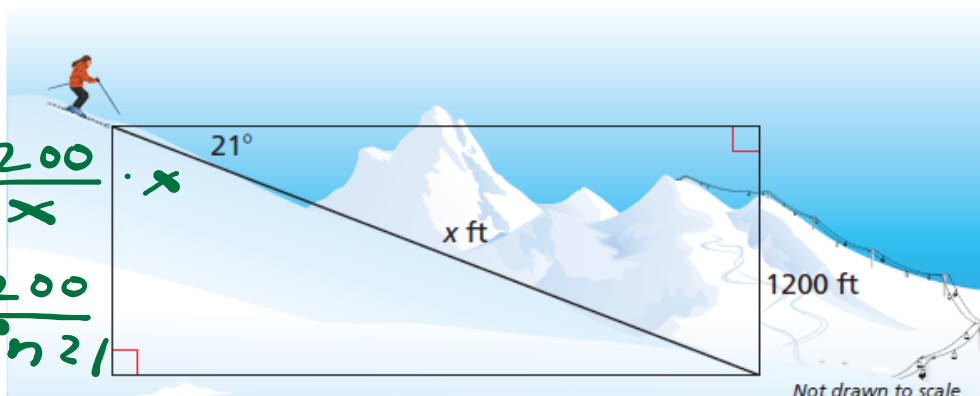
$$\sin 30^\circ = \frac{x}{2x}$$

$$\sin 30^\circ = \frac{1}{2}$$

$$\cos 30^\circ = \frac{\sqrt{3}}{2}$$



You are skiing on a mountain with an altitude of 1200 feet. The angle of depression is 21° . Find the distance x you ski down the mountain to the nearest foot.



$$\sin 21 = \frac{1200}{x}$$

$$x \sin 21 = \frac{1200}{\sin 21}$$

$$x = \frac{1200}{\sin 21} = 3349 \text{ feet}$$

5. **WHAT IF?** In Example 6, the angle of depression is 28° . Find the distance x you ski down the mountain to the nearest foot.

Give Me Five: Select one or more of the prompts on page T-492 for students to reflect on.