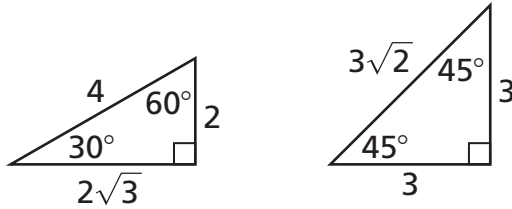


9.6 Start Thinking

Use the triangles shown in the diagram and the definitions of $\sin \theta$, $\cos \theta$, and $\tan \theta$ to determine the value of θ .



1. $\sin \theta = \frac{2\sqrt{3}}{4}$

2. $\cos \theta = \frac{3}{3\sqrt{2}}$

3. $\tan \theta = \frac{2}{2\sqrt{3}}$

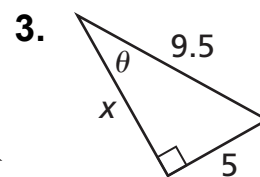
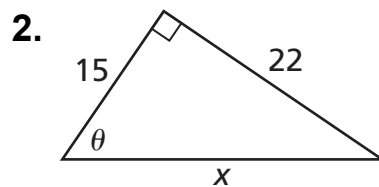
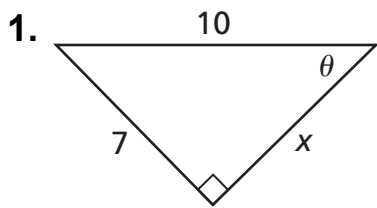
4. $\sin \theta = \frac{1}{2}$

5. $\cos \theta = \frac{1}{2}$

6. $\tan \theta = 1$

9.6 Warm Up

Find the value of x . Then find the value of $\sin \theta$, $\cos \theta$, and $\tan \theta$ for the triangle.



9.6 Cumulative Review Warm Up

Decide whether you can use the given information to prove $\triangle ABC \cong \triangle XYZ$. Explain your reasoning.

1. $\angle A \cong \angle X$, $\angle Z \cong \angle C$, $\overline{BC} \cong \overline{YZ}$

2. $\angle Y \cong \angle B$, $\angle A \cong \angle X$, $\angle Z \cong \angle C$

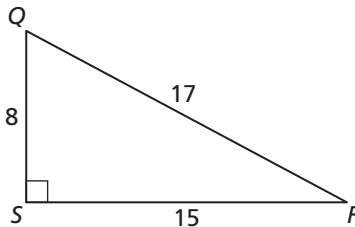
3. $\overline{CA} \perp \overline{AB}$, $\overline{ZX} \perp \overline{XY}$, $\overline{CB} \cong \overline{ZY}$, $\overline{YX} \cong \overline{BA}$

9.6

Practice A

In Exercises 1–3, determine which of the two acute angles has the given trigonometric ratio.

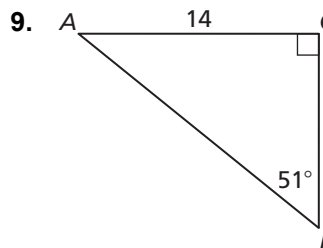
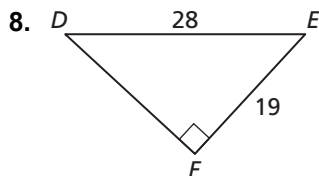
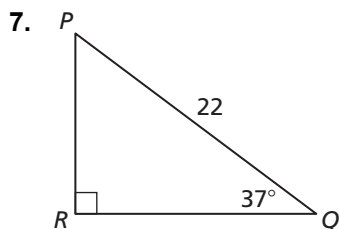
- The sine of the angle is $\frac{8}{17}$.
- The cosine of the angle is $\frac{15}{17}$.
- The tangent of the angle is $\frac{15}{8}$.



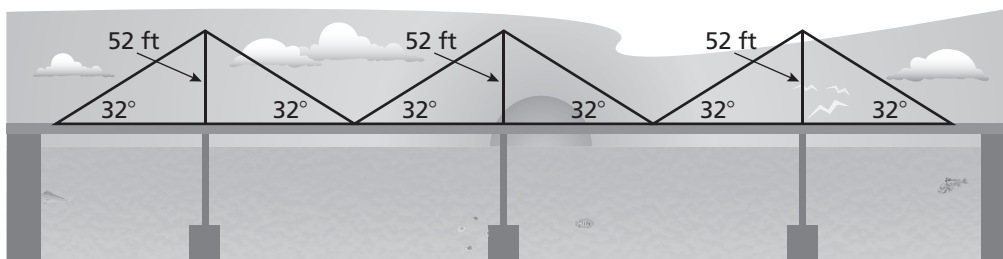
In Exercises 4–6, let $\angle B$ be an acute angle. Use a calculator to approximate the measure of $\angle B$ to the nearest tenth of a degree.

- $\sin B = 0.64$
- $\cos B = 0.12$
- $\tan B = 2.18$

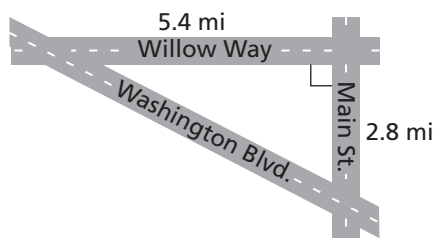
In Exercises 7–9, solve the right triangle. Round decimal answers to the nearest tenth.



10. Use the diagram to find the distance across the suspension bridge. Round your answer to the nearest foot.



11. Use the diagram to find the acute angle formed by Washington Boulevard and Willow Way. Round your answer to the nearest tenth.

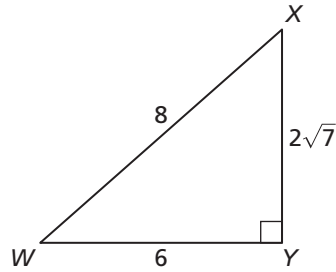


9.6

Practice B

In Exercises 1 and 2, determine which of the two acute angles has the given trigonometric ratio.

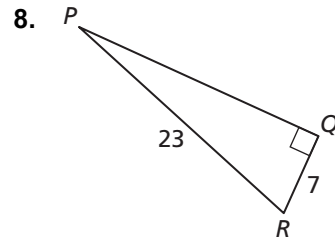
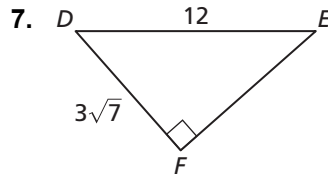
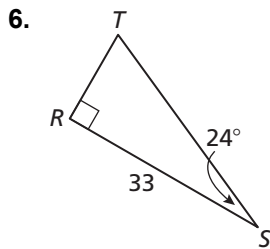
- The cosine of the angle is $\frac{3}{4}$.
- The tangent of the angle is $\frac{3\sqrt{7}}{7}$.



In Exercises 3–5, let $\angle H$ be an acute angle. Use a calculator to approximate the measure of $\angle H$ to the nearest tenth of a degree.

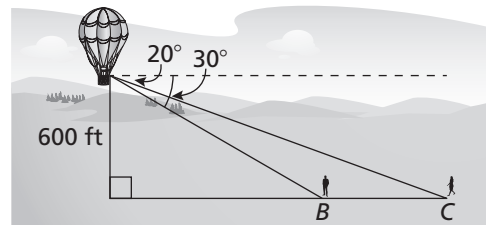
- $\sin H = 0.41$
- $\cos H = 0.05$
- $\tan H = 5.18$

In Exercises 6–8, solve the right triangle. Round decimal answers to the nearest tenth.



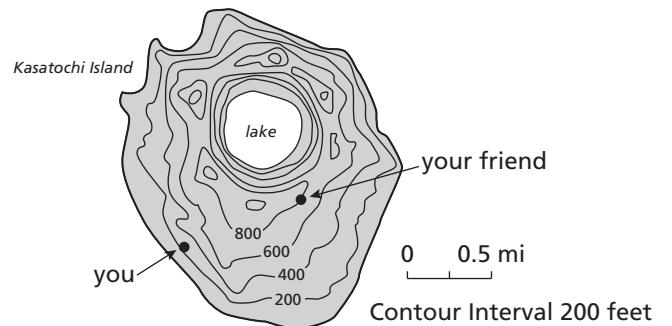
9. You are in a hot air balloon that is 600 feet above the ground. You can see two people. The angles of depression to person B and to person C are 30° and 20° , respectively.

- How far is person B from the point on the ground below the hot air balloon?
- How far is person C from the point on the ground below the hot air balloon?
- How far apart are the two people?



10. On a *typographic map*, the contour lines show changes in elevation of the land. You and a friend are hiking on Kasatochi Island.

- Find the difference in elevation (in miles) between you and your friend.
- Use a ruler to find the horizontal distance (in miles) between you and your friend.
- What is the angle of elevation from you to your friend?

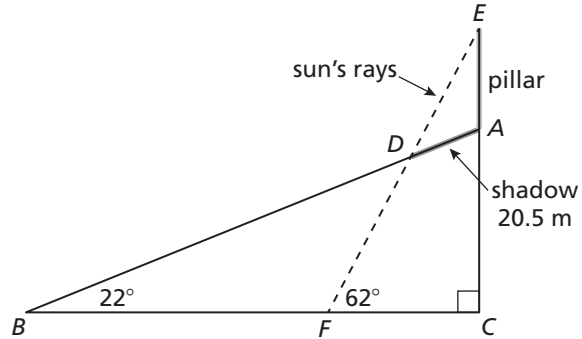


9.6 Enrichment and Extension

Solving Right Triangles

1. A vertical stone pillar stands on a slope that makes a 22° angle with the horizontal. At a time of the day when the angle of elevation of the sun is 62° , the stone pillar casts a shadow that is 20.5 meters long as measured along the slope.

- Find $m\angle DEA$.
- Find $m\angle EDA$.
- Find $m\angle DAE$.



Aside from the trigonometric functions, sine, cosine, and tangent, we can also use the functions *cosecant*, *secant*, and *cotangent* when describing the ratios of sides in a right triangle. The functions are defined as:

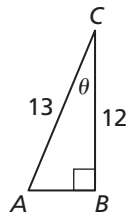
Cosecant, denoted as $\csc \theta = \frac{1}{\sin \theta} = \frac{\text{hyp}}{\text{opp}}$

Secant, denoted as $\sec \theta = \frac{1}{\cos \theta} = \frac{\text{hyp}}{\text{adj}}$

Cotangent, denoted as $\cot \theta = \frac{1}{\tan \theta} = \frac{\text{adj}}{\text{opp}}$

In Exercises 2–4, write the following trigonometric ratios for the triangle to the right.

- $\csc \theta$
- $\sec \theta$
- $\cot \theta$



In Exercises 5–7, find the measure of the acute angle. Round to the nearest tenth, if necessary.

- $\csc \theta = 2$
- $\sec \theta = \frac{7}{5}$
- $\cot \theta = \frac{15}{4}$
- In right triangle RST , $\angle S$ is the right angle, and $\sec T = \frac{14}{5}$. Find $m\angle R$.
Round your answer to the nearest tenth.

9.6 Puzzle Time

What Is The Worst Thing To Make In Pottery Class?

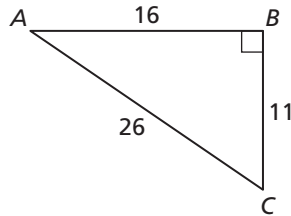
Circle the letter of each correct answer in the boxes below. The circled letters will spell out the answer to the riddle.

Complete the following.

- The inverses of the trigonometric ratios sine, cosine, and tangent permit you to find the measurement of an angle. True or false?
- To solve a right _____ means to find the measures of all of its sides and angles.
- You can solve a right triangle when you know either of the following: (1) two side lengths; (2) one side length and the measure of one acute angle. Yes or no?

Determine which of the two acute angles has the given trigonometric ratio.

- The cosine of the angle is $\frac{8}{13}$.
- The sine of the angle is $\frac{8}{13}$.



Let $\angle A$, $\angle B$, and $\angle C$ be acute angles. Use a calculator to approximate the measures of the indicated angle to the nearest tenth of a degree.

- $m\angle B = \tan^{-1} 0.52$
- $m\angle A = \sin^{-1} 0.38$
- $m\angle C = \cos^{-1} 0.74$

S	H	M	U	S	I	N	S
no	$\angle B$	triangle	27.7	false	22.3	angle	$\angle A$
T	N	A	K	R	E	S	E
27.5	33.5	42.3	true	22.6	yes	$\angle C$	42.4