

Inverse Trig Functions:

$$\sin^{-1}(x) = \arcsin(x)$$

$$\cos^{-1}(x) = \arccos(x)$$

$$\tan^{-1}(x) = \arctan(x)$$

Inverse Function Properties

$$\sin(\sin^{-1}(x)) = x$$

$$\cos(\cos^{-1}(x)) = x$$

$$\tan(\tan^{-1}(x)) = x$$

$$\sin^{-1}(\sin(x)) = x$$

$$\cos^{-1}(\cos(x)) = x$$

$$\tan^{-1}(\tan(x)) = x$$

Recall the below Trig ratios:

SOH-CAH-TOA

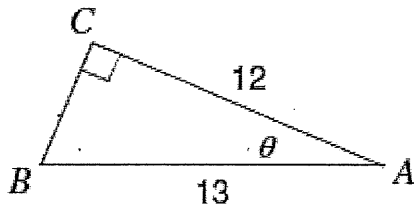
$$\sin \angle A = \frac{\text{Opp}}{\text{Hyp}}$$

$$\cos \angle A = \frac{\text{Adj}}{\text{Hyp}}$$

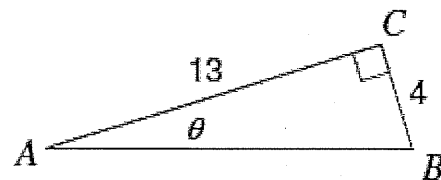
$$\tan \angle A = \frac{\text{Opp}}{\text{Adj}}$$

Find the value of indicated angle

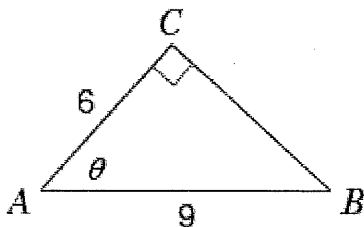
1.



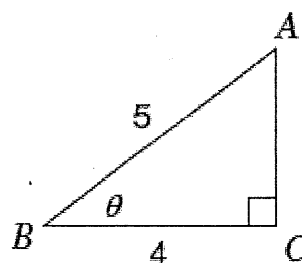
2.



3.



4.



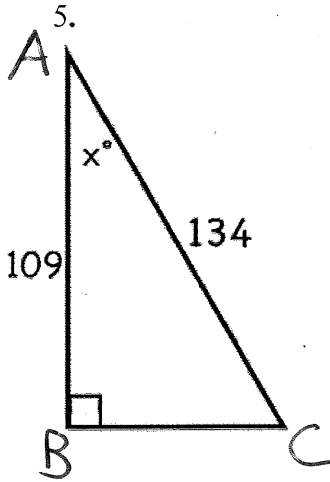
SOH-CAH-TOA

$$\sin \angle A = \frac{\text{Opp}}{\text{Hyp}}$$

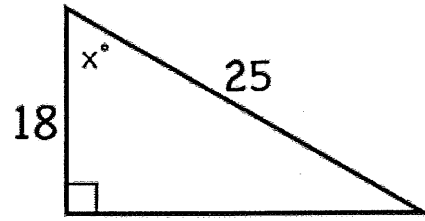
$$\cos \angle A = \frac{\text{Adj}}{\text{Hyp}}$$

$$\tan \angle A = \frac{\text{Opp}}{\text{Adj}}$$

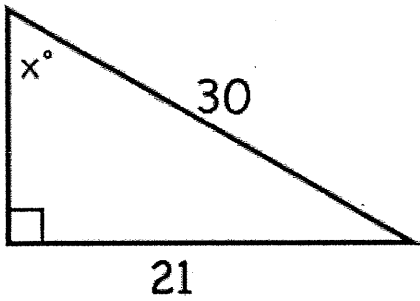
Find the value of indicated angle



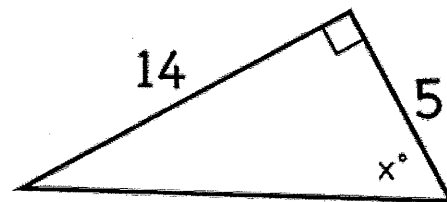
6.



7.



8.



Inverse Trig Functions:

$\sin^{-1}(x) = \arcsin(x)$
 $\cos^{-1}(x) = \arccos(x)$
 $\tan^{-1}(x) = \arctan(x)$

Inverse Function Properties

$\sin(\sin^{-1}(x)) = x$	$\sin^{-1}(\sin(x)) = x$
$\cos(\cos^{-1}(x)) = x$	$\cos^{-1}(\cos(x)) = x$
$\tan(\tan^{-1}(x)) = x$	$\tan^{-1}(\tan(x)) = x$

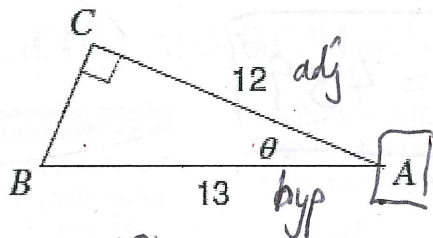
Recall the below Trig ratios:

SOH-CAH-TOA

$$\sin \angle A = \frac{\text{Opp}}{\text{Hyp}} \qquad \cos \angle A = \frac{\text{Adj}}{\text{Hyp}} \qquad \tan \angle A = \frac{\text{Opp}}{\text{Adj}}$$

Find the value of indicated angle

1.

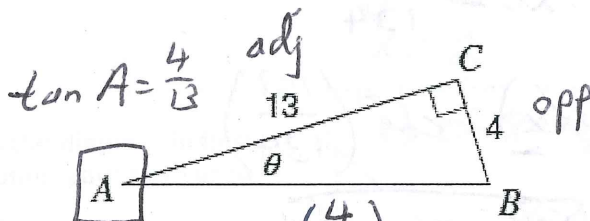


$\cos(A) = \frac{12}{13}$
 Inverse cosine of $\frac{12}{13}$

$\cos^{-1}[\cos(A)] = \cos^{-1}\left(\frac{12}{13}\right)$

$A = \cos^{-1}\left(\frac{12}{13}\right)$ $A = 22.6^\circ$

2.

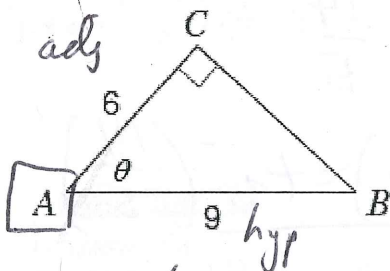


$\tan^{-1}(\tan A) = \tan^{-1}\left(\frac{4}{13}\right)$

$A = \tan^{-1}\left(\frac{4}{13}\right)$

$A = 17.1^\circ$

3.

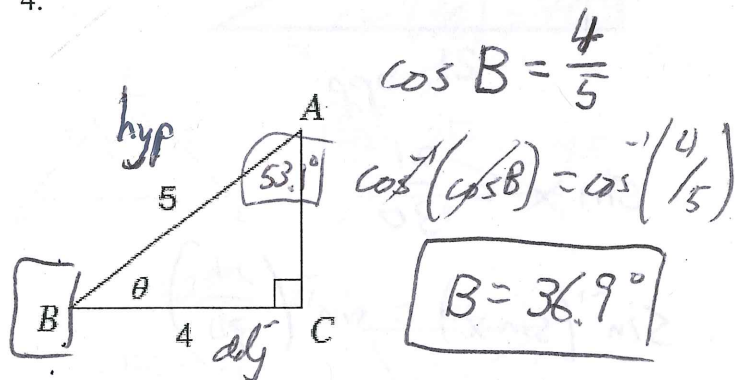


$\cos A = \frac{6}{9}$

$\cos^{-1}(\cos A) = \cos^{-1}\left(\frac{6}{9}\right)$

$A = 48.2^\circ$

4.



$\cos B = \frac{4}{5}$

$\cos^{-1}(\cos B) = \cos^{-1}\left(\frac{4}{5}\right)$

$B = 36.9^\circ$

$AC = 3$

SOH-CAH-TOA

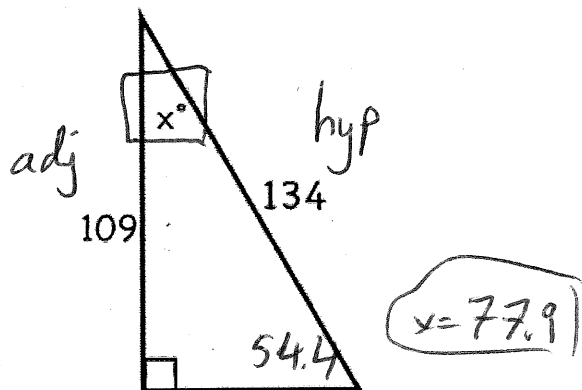
$$\sin \angle A = \frac{\text{Opp}}{\text{Hyp}}$$

$$\cos \angle A = \frac{\text{Adj}}{\text{Hyp}}$$

$$\tan \angle A = \frac{\text{Opp}}{\text{Adj}}$$

Find the value of indicated angle

5.

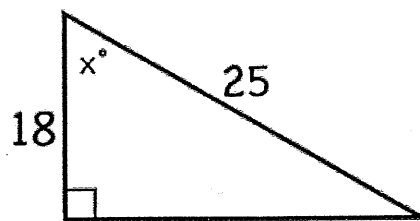


$$\cos x = \frac{109}{134}$$

$$\cos^{-1}(\cos x) = \cos^{-1}\left(\frac{109}{134}\right)$$

$$x = 35.6^\circ$$

6.

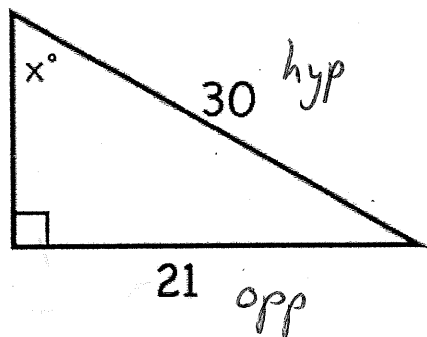


$$\cos x = \frac{18}{25}$$

$$\cos^{-1}(\cos x) = \cos^{-1}\left(\frac{18}{25}\right)$$

$$x = 43.9^\circ$$

7.

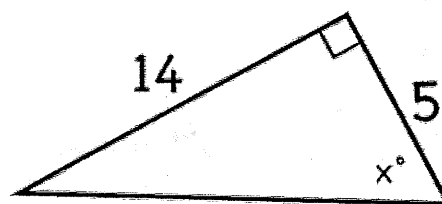


$$\sin x = \frac{21}{30}$$

$$\sin^{-1}(\sin x) = \sin^{-1}\left(\frac{21}{30}\right)$$

$$x = 44.4^\circ$$

8.



$$\tan x = \frac{14}{5}$$

$$\tan^{-1}(\tan x) = \tan^{-1}\left(\frac{14}{5}\right)$$


$$x = 70.3^\circ$$

GUIDED PRACTICE

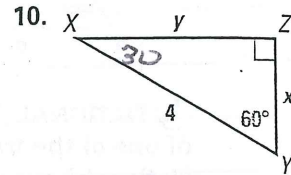
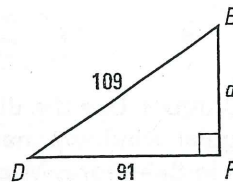
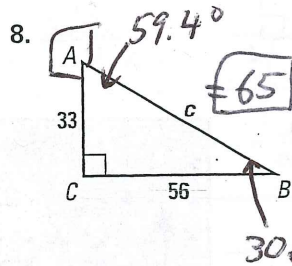
Vocabulary Check ✓

Concept Check ✓

Skill Check ✓

1. Explain what is meant by *solving* a right triangle.
 2. You can solve a right triangle if you are given the lengths of any two sides.
 3. You can solve a right triangle if you know only the measure of one acute angle.
-  **CALCULATOR** In Exercises 4–7, $\angle A$ is an acute angle. Use a calculator to approximate the measure of $\angle A$ to the nearest tenth of a degree.
4. $\tan A = 0.7$ 5. $\tan A = 5.4$ 6. $\sin A = 0.9$ 7. $\cos A = 0.1$

Solve the right triangle. Round decimals to the nearest tenth.



Handwritten: $y = 6\sqrt{3}$
 $x = 2$

8) $a^2 + b^2 = c^2$
 $c = 65$

10) $\cos 60$
8) $\tan^{-1}\left(\frac{56}{33}\right)$

PRACTICE AND APPLICATIONS

STUDENT HELP

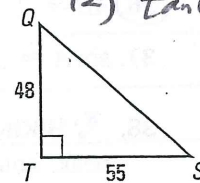
→ Extra Practice to help you master skills is on p. 820.

FINDING MEASUREMENTS Use the diagram to find the indicated measurement. Round your answer to the nearest tenth.

11. QS

12. $m\angle Q$


13. $m\angle S$



Handwritten: $\tan Q = \frac{55}{48}$

Handwritten: $Q = \tan^{-1}\left(\frac{55}{48}\right)$

Handwritten: $Q = 48.9^\circ$

 **CALCULATOR** In Exercises 14–21, $\angle A$ is an acute angle. Use a calculator to approximate the measure of $\angle A$ to the nearest tenth of a degree.

14. $\tan A = 0.5$

15. $\tan A = 1.0$

16. $\sin A = 0.5$

17. $\sin A = 0.35$

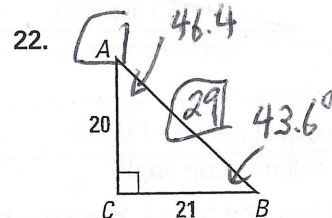
18. $\cos A = 0.15$

19. $\cos A = 0.64$

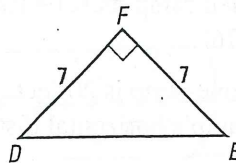
20. $\tan A = 2.2$

21. $\sin A = 0.11$

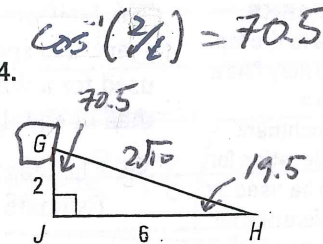
SOLVING RIGHT TRIANGLES Solve the right triangle. Round decimals to the nearest tenth.



23.



24.



STUDENT HELP

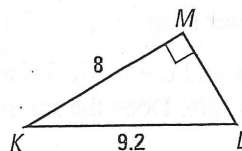
HOMEWORK HELP

Example 1: Exs. 11–27, 34–37

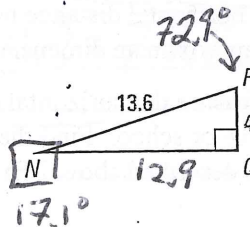
Example 2: Exs. 28–33

Example 3: Exs. 38–41

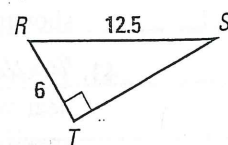
25.



26.

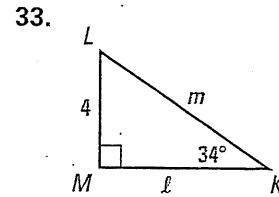
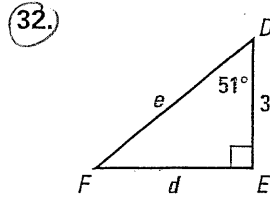
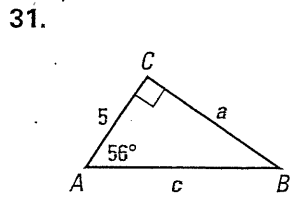
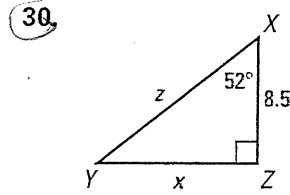
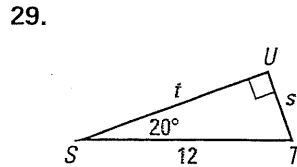
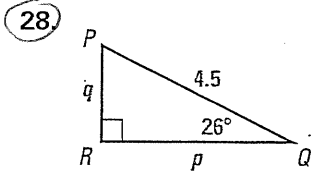


27.



Handwritten: $26) \sin^{-1}\left(\frac{4}{13.6}\right) = 17.1^\circ$

SOLVING RIGHT TRIANGLES Solve the right triangle. Round decimals to the nearest tenth.



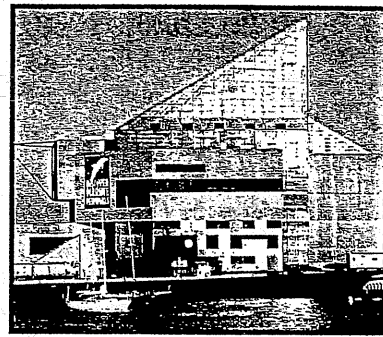
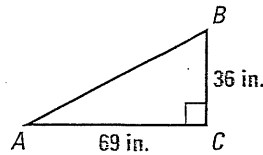
NATIONAL AQUARIUM Use the diagram of one of the triangular windowpanes at the National Aquarium in Baltimore, Maryland, to find the indicated value.

34. $\tan B \approx ?$

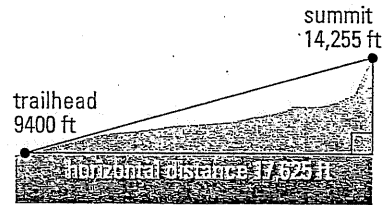
35. $m\angle B \approx ?$

36. $AB \approx ?$

37. $\sin A \approx ?$

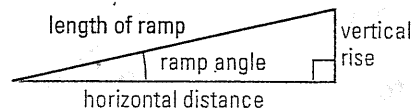


38. **HIKING** You are hiking up a mountain peak. You begin hiking at a trailhead whose elevation is about 9400 feet. The trail ends near the summit at 14,255 feet. The horizontal distance between these two points is about 17,625 feet. Estimate the angle of elevation from the trailhead to the summit.



RAMPS In Exercises 39–41, use the information about wheelchair ramps.

The Uniform Federal Accessibility Standards specify that the ramp angle used for a wheelchair ramp must be less than or equal to 4.76° .



39. The length of one ramp is 20 feet. The vertical rise is 17 inches. Estimate the ramp's horizontal distance and its ramp angle.

40. You want to build a ramp with a vertical rise of 8 inches. You want to minimize the horizontal distance taken up by the ramp. Draw a sketch showing the approximate dimensions of your ramp.

41. *Writing* Measure the horizontal distance and the vertical rise of a ramp near your home or school. Find the ramp angle. Does the ramp meet the specifications described above? Explain.

FOCUS ON APPLICATIONS

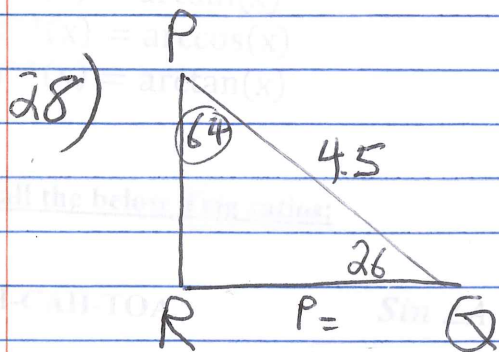


BENCHMARKS

If you hike to the top of a mountain you may find a small metal plate called a benchmark. A benchmark is an official elevation for a point that can be used by surveyors as a reference for measuring elevations of other points.



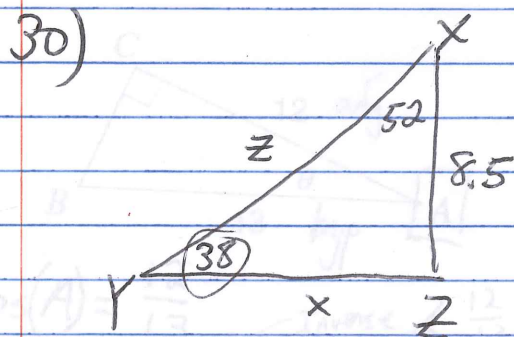
p. 570 8-36 even



$$\cos 26 = \frac{p}{4.5}$$

$$p = 4.0$$

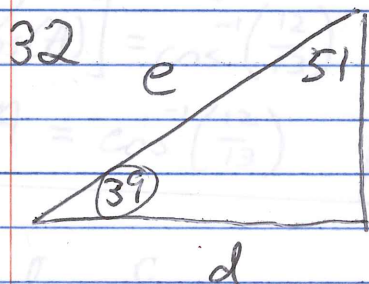
$$q = 2.1$$



$$\cos 52 = \frac{8.5}{z}$$

$$z = \frac{8.5}{\cos 52}$$

$$z = 13.8$$
$$x = 10.9$$



$$\cos 51 = \frac{3}{e}$$

$$e = 4.8$$

$$d = 3.7$$

34) $\tan B = \frac{36}{69}$

$$B = \tan^{-1}\left(\frac{36}{69}\right)$$

$$B = 27.6$$

36) $AB = \sqrt{36^2 + 69^2}$

$$AB = 77.8$$