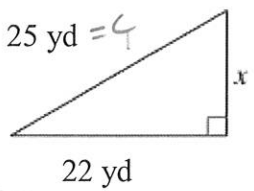


Name: \_\_\_\_\_  
 Date: Key  
 Period: \_\_\_\_\_

**Geometry Chapter 8 Study Guide**

Find the missing side in each triangle. Write answers in simplest radical form.

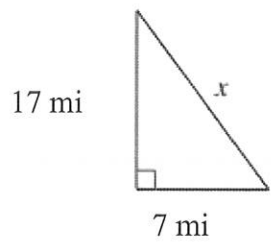
1.



$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 x^2 + 22^2 &= 25^2 \\
 x^2 + 484 &= 625 \\
 -484 \quad -484 & \\
 \hline
 x^2 &= 141 \\
 x &= \sqrt{141} \text{ yd}
 \end{aligned}$$

$$\begin{array}{r}
 141 \\
 \sqrt{\phantom{00}} \\
 3 \ 47
 \end{array}$$

2.



$$\begin{aligned}
 17^2 + 7^2 &= x^2 \\
 289 + 49 &= x^2 \\
 \sqrt{338} &= \sqrt{x^2} \\
 x &= \sqrt{338} \\
 x &= 13\sqrt{2} \text{ mi}
 \end{aligned}$$

$$\begin{array}{r}
 338 \\
 \sqrt{\phantom{00}} \\
 2 \ 169 \\
 \phantom{2} \ 13 \ 13
 \end{array}$$

Find the missing side of each right triangle. Side c is the hypotenuse. Sides a and b are the legs. Leave your answers in simplest radical form.

3. a = 9 m, c = 12 m

$$\begin{aligned}
 9^2 + b^2 &= 12^2 \\
 81 + b^2 &= 144 \\
 -81 \quad -81 & \\
 \hline
 b^2 &= 63
 \end{aligned}$$

$$\begin{aligned}
 \sqrt{b^2} &= \sqrt{63} \\
 b &= \sqrt{63} \\
 b &= 3\sqrt{7}
 \end{aligned}$$

$$\begin{array}{r}
 63 \\
 \sqrt{\phantom{00}} \\
 7 \ 9 \\
 \phantom{7} \ 3 \ 3
 \end{array}$$

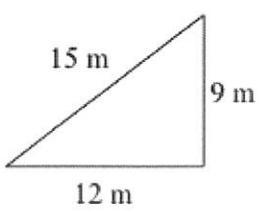
4. b =  $\sqrt{5}$  yd, c = 3 yd

$$\begin{aligned}
 a^2 + (\sqrt{5})^2 &= 3^2 \\
 a^2 + 5 &= 9 \\
 -5 \quad -5 & \\
 \hline
 a^2 &= 4
 \end{aligned}$$

$$\begin{aligned}
 \sqrt{a^2} &= \sqrt{4} \\
 a &= 4
 \end{aligned}$$

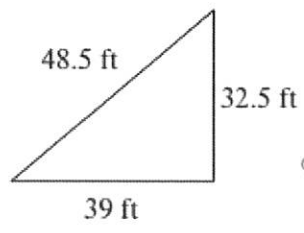
5. State if each triangle is a right triangle.

a.



$$\begin{aligned}
 12^2 + 9^2 &\stackrel{?}{=} 15^2 \\
 144 + 81 &\stackrel{?}{=} 225 \\
 225 &= 225 \\
 \text{yes}
 \end{aligned}$$

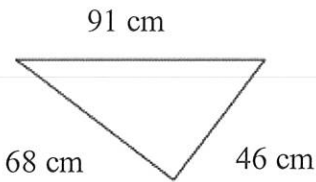
b.



$$\begin{aligned}
 39^2 + 32.5^2 &\stackrel{?}{=} 48.5^2 \\
 1521 + 1056.25 &\stackrel{?}{=} 2352.25 \\
 2577.25 &\neq 2352.25 \\
 \text{No}
 \end{aligned}$$

State if each triangle is acute, obtuse, or right.

6.



$$68^2 + 46^2 \stackrel{?}{=} 91^2$$

$$4624 + 2116 \stackrel{?}{=} 8281$$

$$6740 < 8281$$

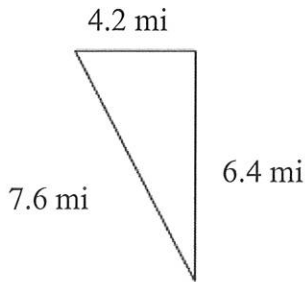
Obtuse

Test  
 $a^2 + b^2 > c^2$   
Acute

$$a^2 + b^2 < c^2$$

Obtuse

7.



$$4.2^2 + 6.4^2 \stackrel{?}{=} 7.6^2$$

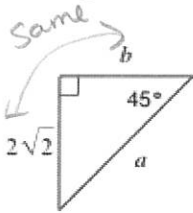
$$17.64 + 40.96 \stackrel{?}{=} 57.76$$

$$58.6 > 57.76$$

Acute

Find the missing side lengths. Leave your answers as radicals in simplest form.

8.



$$b = 2\sqrt{2}$$

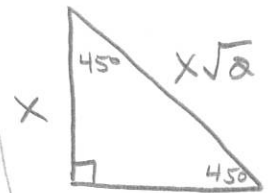
$$a = b \cdot \sqrt{2}$$

$$= 2\sqrt{2} \cdot \sqrt{2} = 2 \cdot \sqrt{4}$$

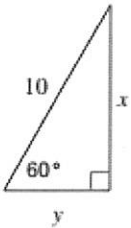
$$= 2 \cdot 2 = 4$$

$$a = 4$$

45° - 45° - 90°



9.



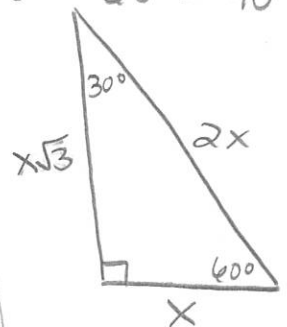
$$\frac{10}{2} = \frac{2y}{2}$$

$$y = 5$$

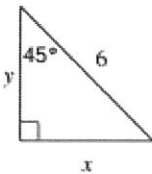
$$x = y\sqrt{3}$$

$$x = 5\sqrt{3}$$

30° - 60° - 90°



10.



$$\frac{x\sqrt{2}}{\sqrt{2}} = \frac{6}{\sqrt{2}}$$

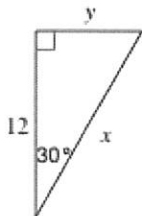
$$x = y$$

$$x = 3\sqrt{2}$$

$$y = 3\sqrt{2}$$

$$x = \frac{6}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{6\sqrt{2}}{2} = 3\sqrt{2}$$

11.



$$\frac{y\sqrt{3}}{\sqrt{3}} = \frac{12}{\sqrt{3}}$$

$$x = 2y$$

$$x = 2 \cdot 4\sqrt{3}$$

$$x = 8\sqrt{3}$$

$$y = \frac{12}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$y = \frac{12\sqrt{3}}{3} = 4\sqrt{3}$$

$$y = 4\sqrt{3}$$

# Soh Cah Toa

Use a special right triangle to write each trigonometric ratio as a fraction.

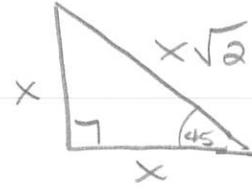
12.  $\sin 45^\circ$

$$\frac{\text{opp}}{\text{hyp}}$$

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

$$\sin 45 = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

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

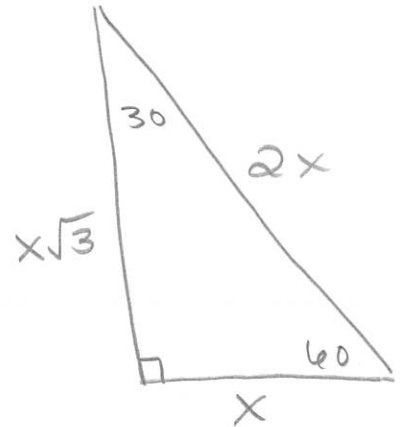


13.  $\cos 30^\circ$

$$\frac{\text{adj}}{\text{hyp}}$$

$$\cos 30 = \frac{x\sqrt{3}}{2x}$$

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



14.  $\tan 60^\circ$

$$\frac{\text{opp}}{\text{adj}}$$

$$\tan 60 = \frac{x\sqrt{3}}{x}$$

$$\tan 60^\circ = \sqrt{3}$$

Use your calculator to find each trigonometric ratio. Round to the nearest hundredth.

15.  $\sin 16^\circ$

0.2756373558

0.28

\* must check your mode  
you must be in degree

16.  $\cos 79^\circ$

0.1908089954

0.19

17.  $\tan^{-1} \frac{7}{5}$

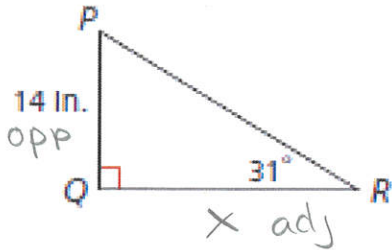
54.46232221

54.46°

# Soh Cah Toa

Find each length. Round to the nearest hundredth.

18. QR



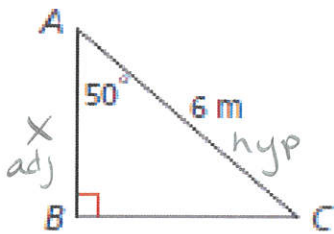
$$x \cdot \tan 31 = \frac{14}{x} \cdot x$$

$$\frac{x \tan 31}{\tan 31} = \frac{14}{\tan 31}$$

$$x \approx 23.29991275$$

$$x \approx 23.30 \text{ in}$$

19. AB



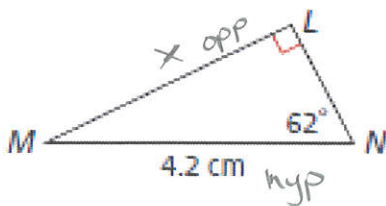
$$6 \cdot \cos 50 = \frac{x}{6} \cdot 6$$

$$x = 6 \cos 50$$

$$x \approx 3.856725658$$

$$x \approx 3.86 \text{ m}$$

20. LM



$$4.2 \cdot \sin 62 = \frac{x}{4.2} \cdot 4.2$$

$$x = 4.2 \sin 62$$

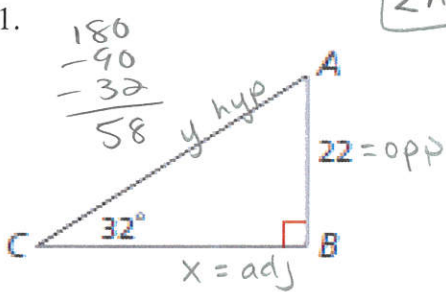
$$x \approx 3.70837989$$

$$x \approx 3.71 \text{ cm}$$

# Soh Cah Toa

Find ALL unknown measures. Round lengths to the nearest hundredth and angle measures to the nearest degree.

21.



$$\angle A = 58^\circ$$

$$x \cdot \tan 32 = \frac{22}{x} \cdot x$$

$$\frac{x \tan 32}{\tan 32} = \frac{22}{\tan 32}$$

$$x \approx 35.20735964$$

$$\boxed{x \approx 35.21}$$

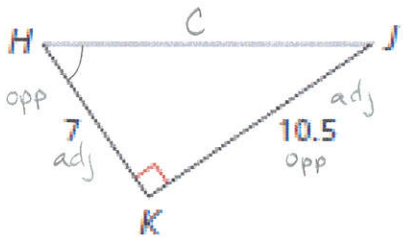
$$y \cdot \sin 32 = \frac{22}{y} \cdot y$$

$$\frac{y \sin 32}{\sin 32} = \frac{22}{\sin 32}$$

$$y \approx 41.5157583$$

$$\boxed{y \approx 41.52}$$

22.



$$a^2 + b^2 = c^2$$

$$7^2 + 10.5^2 = c^2$$

$$49 + 110.25 = c^2$$

$$\sqrt{159.25} = \sqrt{c^2}$$

$$c \approx 12.61942946$$

$$\boxed{c \approx 12.62}$$

$$\tan^{-1}(\tan H) = \tan^{-1}\left(\frac{10.5}{7}\right)$$

$$H \approx 56.30993247$$

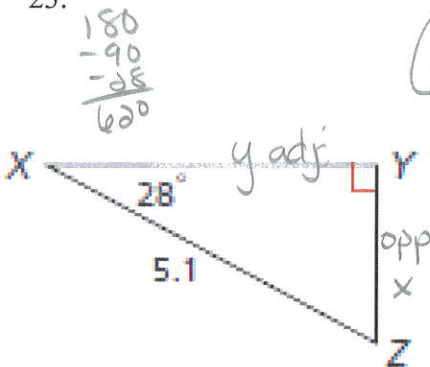
$$\boxed{H \approx 56.31^\circ}$$

$$\tan^{-1}(\tan J) = \tan^{-1}\left(\frac{7}{10.5}\right)$$

$$J \approx 33.690069753$$

$$\boxed{J \approx 33.69^\circ}$$

23.



$$\angle Z = 62^\circ$$

$$5.1 \cdot \sin 28 = \frac{x}{5.1} \cdot 5.1$$

$$x = 5.1 \sin 28$$

$$x \approx 2.39430497$$

$$\boxed{x \approx 2.39}$$

$$5.1 \cdot \cos 28 = \frac{y}{5.1} \cdot 5.1$$

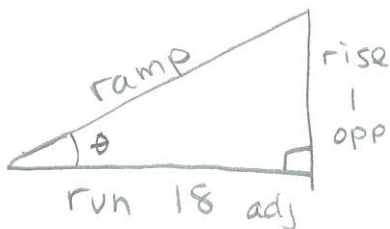
$$y = 5.1 \cos 28$$

$$y \approx 4.503032724$$

$$\boxed{y \approx 4.50}$$

24. The wheelchair ramp at the entrance of Mission Bay Library has a slope of  $\frac{1}{18}$ . What angle does the ramp make with the sidewalk? Round to the nearest degree.

$$\frac{1}{18} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x}$$



$$\tan^{-1}(\tan \theta) = \tan^{-1}\left(\frac{1}{18}\right)$$

$$\theta = \tan^{-1}\left(\frac{1}{18}\right)$$

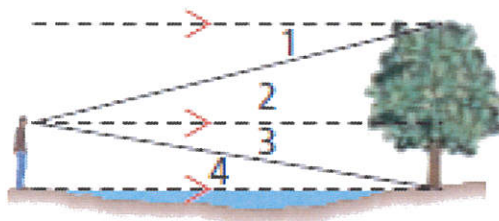
$$\theta \approx 3.17983012$$

$$\boxed{\theta \approx 3^\circ}$$

Classify each angle as an angle of elevation or angle of depression/

25.  $\angle 1$

Depression



26.  $\angle 2$

Elevation

27. When the angle of elevation to the sun is  $37^\circ$ , a flagpole casts a shadow that is 24.2 feet long. What is the height of the flagpole to the nearest foot?

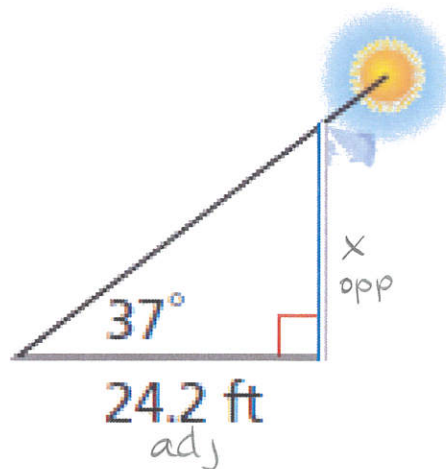
$$24.2 \cdot \tan 37 = \frac{x}{24.2} \cdot 24.2$$

$$x = 24.2 \tan 37$$

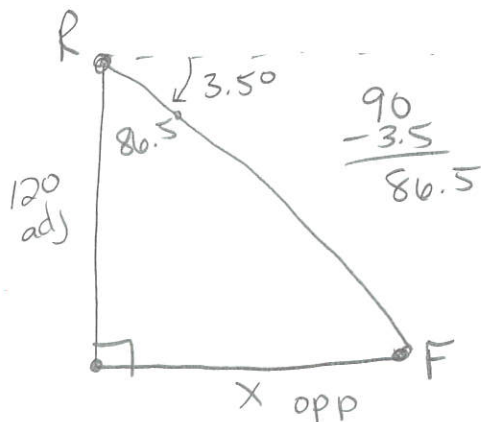
$$x \approx 18.23600801$$

$$x \approx 18 \text{ ft}$$

The flag pole is about 18 ft tall



28. A forest ranger in 120 foot observation tower sees a fire. The angle of depression to the fire is  $3.5^\circ$ . What is the horizontal distance between the tower and the fire? Round to the nearest foot.



$$120 \cdot \tan 86.5 = \frac{x}{120} \cdot 120$$

$$x = 120 \tan 86.5$$

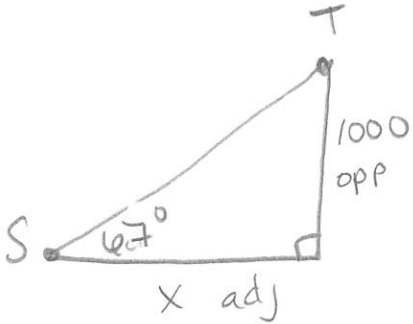
$$x \approx 1961.982657$$

$$x \approx 1962 \text{ ft}$$

The fire is about 1962 feet away from the tower

29. A surveyor finds that the angle of elevation to the top of a 1000 foot tower is  $67^\circ$ .

a. To the nearest foot, how far is the surveyor from the base of the tower?



$$x \cdot \tan 67 = \frac{1000}{x} \cdot x$$

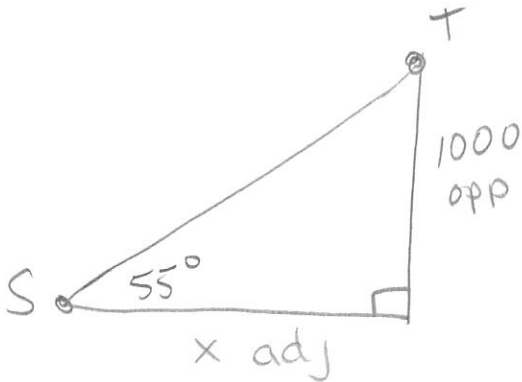
$$\frac{x \tan 67}{\tan 67} = \frac{1000}{\tan 67}$$

$$x \approx 424.4748162$$

$$x \approx 424 \text{ ft}$$

The surveyor is about 424 ft away from the tower

b. How far back would the surveyor have to move so that the angle of elevation to the top of the tower is  $55^\circ$ ? Round to the nearest foot.



$$x \cdot \tan 55 = \frac{1000}{x} \cdot x$$

$$\frac{x \tan 55}{\tan 55} = \frac{1000}{\tan 55}$$

$$x \approx 700.2075382$$

$$x \approx 700 \text{ ft}$$

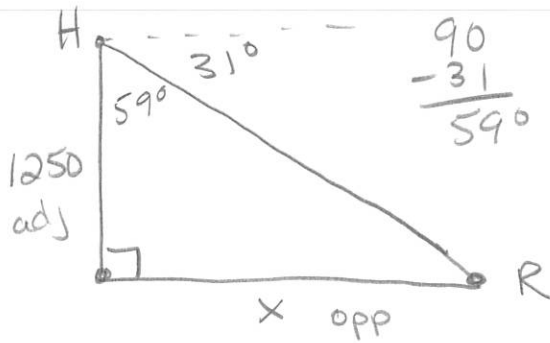
$$\begin{array}{r} 700 \\ - 424 \\ \hline \end{array}$$

$$276 \text{ ft}$$

The surveyor needs to move back 276 ft

30. The pilot of a rescue helicopter is flying over the ocean at an altitude of 1250 feet. The pilot sees a life raft at an angle of depression of  $31^\circ$ .

a. What is the horizontal distance from the helicopter to the life raft, rounded to the nearest foot?



$$1250 \cdot \tan 59 = \frac{x}{1250} \cdot 1250$$

$$x = 1250 \tan 59$$

$$x \approx 2086.349353$$

$$x \approx 2080 \text{ ft}$$

The raft is about 2080 feet away from the helicopter

b. The helicopter travels 150 feet per second. To the nearest second, how long will it take until the helicopter is directly over the raft?

150 ft/sec to go 2080 ft

$$\frac{2080}{150} \approx 13.86666667 \text{ sec}$$

$$x \approx 14 \text{ seconds}$$

It will take about 14 seconds for the helicopter to be over the raft