

SOH CAH TOA

Round all answers to TWO decimal places.

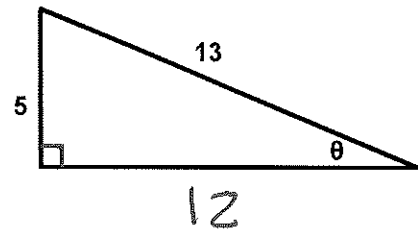
1. a) Use the sides of the triangle below and the **Pythagorean theorem** to find the third side:

$$5^2 + b^2 = 13^2$$

$$b^2 = 169 - 25 = 144$$

$$b = \pm \sqrt{144} = \pm 12$$

length > 0



- b) Find the values of the three trig functions of θ :

$$\sin \theta = \frac{5}{13}$$

$$\cos \theta = \frac{12}{13}$$

$$\tan \theta = \frac{5}{12}$$

2. a) Use the sides of the triangle below and the **Pythagorean theorem** to find the third side:

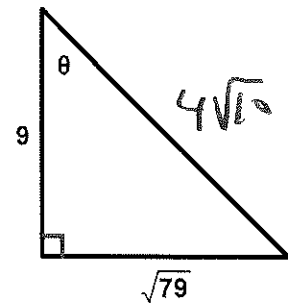
$$9^2 + (\sqrt{79})^2 = c^2$$

$$81 + 79 = c^2$$

$$\pm \sqrt{160} = c$$

$$c = 4\sqrt{10}$$

length > 0



- b) Find the values of the three trig functions of θ :

$$\sin \theta = \frac{\sqrt{79}}{4\sqrt{10}} \left(\frac{\sqrt{5}}{\sqrt{10}} \right) = \frac{\sqrt{790}}{40}$$

$$\cos \theta = \frac{9}{4\sqrt{10}} \left(\frac{\sqrt{10}}{\sqrt{10}} \right) = \frac{9\sqrt{10}}{40}$$

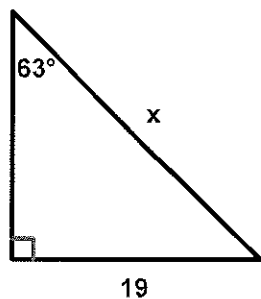
$$\tan \theta = \frac{\sqrt{79}}{9}$$

- c) Now use **one** of your three functions above to **solve** for θ :

$$\sin^{-1} \left(\frac{\sqrt{790}}{40} \right) \approx 44.64^\circ$$

PreCalculus Review – Right Triangle Trigonometry

3. Solve for x; round to the nearest hundredth:

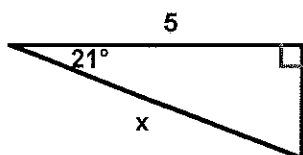


$$\sin 63^\circ = \frac{19}{x}$$

$$x = \frac{19}{\sin 63^\circ} \approx \boxed{21.32}$$

x = _____

4. Solve for x; round to the nearest hundredth:

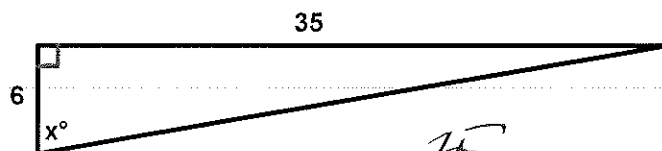


$$\cos 21^\circ = \frac{x}{5}$$

$$\Rightarrow x = \frac{5}{\cos 21^\circ} \approx \boxed{5.36}$$

x = _____

5. Solve for x; round to the nearest hundredth:



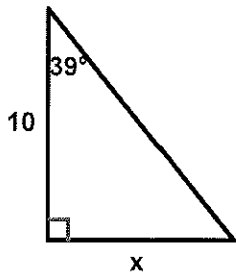
$$\tan x^\circ = \frac{6}{35}$$

$$\Rightarrow \tan^{-1}\left(\frac{6}{35}\right) \approx \boxed{9.73^\circ}$$

x = _____

PreCalculus Review – Right Triangle Trigonometry

6. Solve for x ; round to the nearest hundredth:

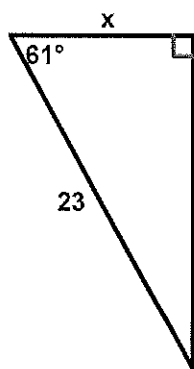


$$\tan 39^\circ = \frac{x}{10}$$

$$\Rightarrow x = 10 \tan 39^\circ \approx \boxed{8.10}$$

$x =$ _____

7. Solve for x ; round to the nearest hundredth:

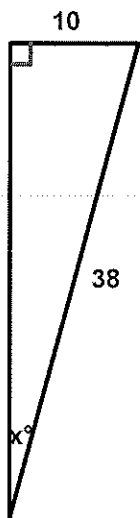


$$\cos 61^\circ = \frac{x}{23}$$

$$\Rightarrow x = 23 \cos 61^\circ \approx \boxed{11.15}$$

$x =$ _____

8. Solve for x ; round to the nearest hundredth:



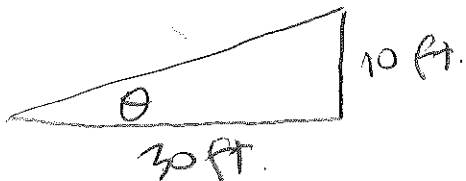
$$\sin x^\circ = \frac{10}{38}$$

$$\Rightarrow \sin^{-1}\left(\frac{10}{38}\right) \approx \boxed{15.26^\circ}$$

$x =$ _____

PreCalculus Review – Right Triangle Trigonometry

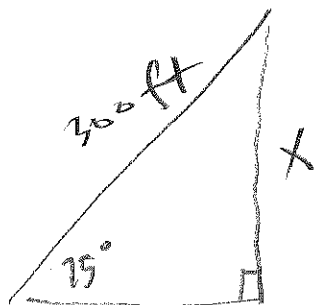
9. A water ski jump is built to rise 10 feet out of the water. If the ramp covers 30 feet on the water (horizontally) what is the angle of elevation of the ramp out of the water?



$$\tan \theta = \frac{10}{30} = \frac{1}{3}$$

$$\tan^{-1}\left(\frac{1}{3}\right) \approx \boxed{18.43^\circ}$$

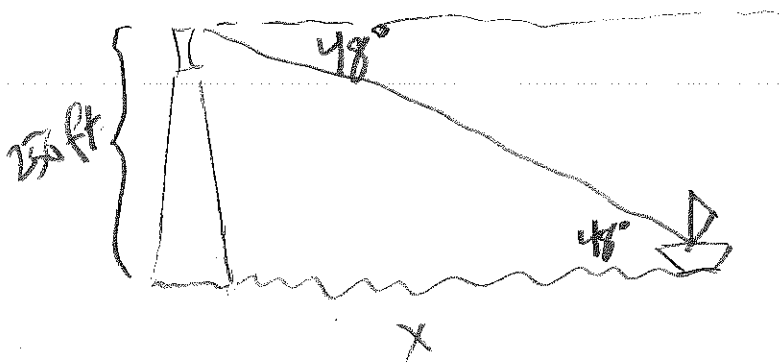
10. Dylan launches a rocket from the ground at a 75° angle. How high off the ground will the rocket be when it has traveled 300 feet in the air?



$$\sin 75^\circ = \frac{x}{300}$$

$$x = 300(\sin 75^\circ) \approx \boxed{289.78 \text{ ft.}}$$

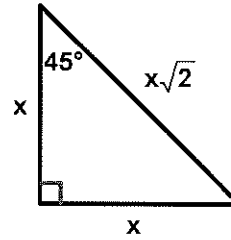
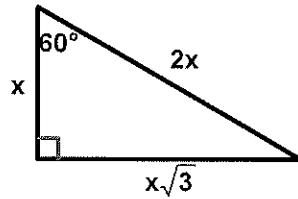
11. The top of a lighthouse is 250 feet above sea level. From the top, the measure of the angle of depression to a boat is 48° . How far is the boat from the bottom of the lighthouse?



$$\tan 48^\circ = \frac{250}{x}$$

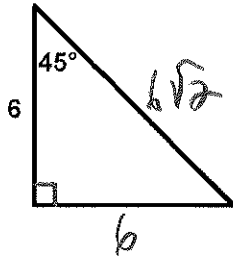
$$\Rightarrow x = \frac{250}{\tan 48^\circ} \approx \boxed{225.10 \text{ ft.}}$$

PreCalculus Review – Right Triangle Trigonometry

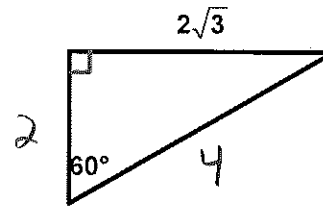


12. Using special right triangles (shown above), solve for the missing sides for the triangles below (leave all answers in radical form, not decimals).

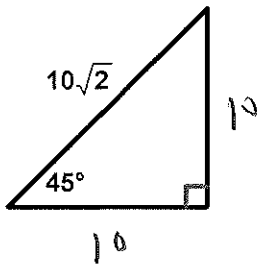
a)



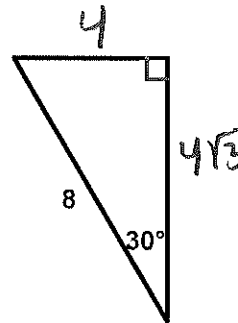
b)



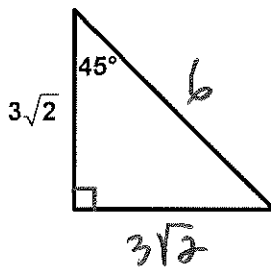
c)



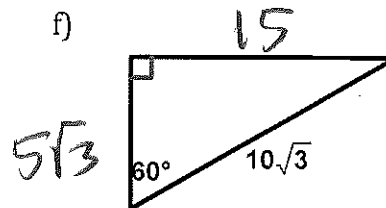
d)



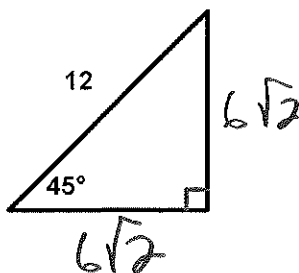
e)



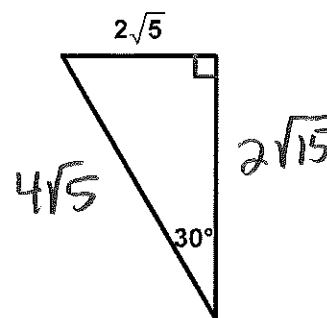
f)



g)



h)



PreCalculus Review – Right Triangle Trigonometry

Use the converse of the Pythagorean theorem to determine if the triangle is acute, right or obtuse:

13. A triangle with sides of length 7, 24, 25

$$7^2 + 24^2 \stackrel{?}{=} 25^2$$

$$49 + 576 = 625 \quad \checkmark \quad \boxed{\text{Right!}}$$

14. A triangle with sides of length 8, 15, 19

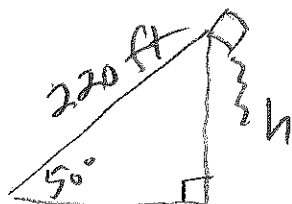
$$8^2 + 15^2 \stackrel{?}{=} 19^2$$

$$64 + 225 = 289 < 361 \quad \boxed{\text{Obtuse!}}$$

Some multiple choice practice:

1. The straight string of a kite makes an angle of elevation from the ground of 50° . The length of the string is 220 feet. What is the best approximation of the height of the kite?

- a. 169 feet
- b. 141 feet
- c. 287 feet
- d. 262 feet

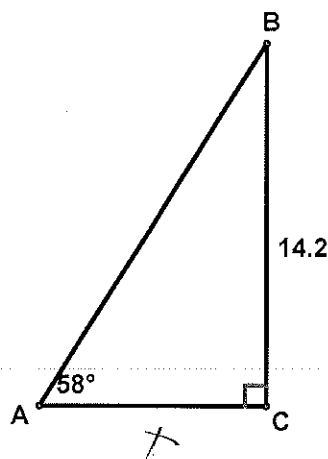


$$\sin 50^\circ = \frac{h}{220}$$

$$h = 220 \sin 50^\circ \approx 168.53$$

2. Which equation could be used to find the length of AC?

- a. $\sin 58^\circ = \frac{14.2}{AC}$
- b. $\tan 58^\circ = \frac{14.2}{AC}$
- c. $\cos 58^\circ = \frac{AC}{14.2}$
- d. $\tan 58^\circ = \frac{AC}{14.2}$



PreCalculus Review – Right Triangle Trigonometry

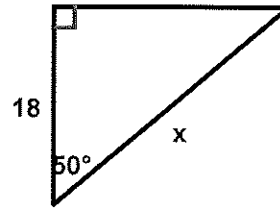
3. Which equation can be used to find x in the right triangle?

a. $\cos 50^\circ = \frac{x}{18}$

b. $\sin 50^\circ = \frac{18}{x}$

c. $\cos 50^\circ = \frac{18}{x}$

d. $\sin 40^\circ = \frac{x}{18}$



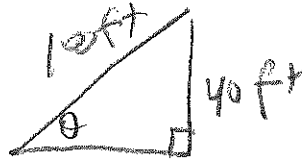
4. A 100-foot wire is extended from the ground to the top of a 40-foot pole, which is perpendicular to the level ground. To the nearest degree, what is the measure of the angle that the wire makes with the ground?

a. 22°

b. 24°

c. 66°

d. 90°



$$\sin \theta = \frac{40}{100} = \frac{2}{5}$$

$$\sin^{-1}\left(\frac{2}{5}\right) \approx 23.58^\circ$$

5. A dead tree was struck by lightning, causing it to fall over at a point 10 feet up from the base of the tree. If the fallen treetop forms a 40° angle with the ground, about how tall was the tree originally?

a. 13 feet

b. 16 feet

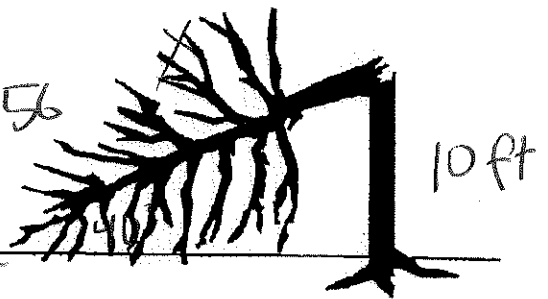
c. 23 feet

d. 26 feet

$$\sin 40^\circ = \frac{10}{x}$$

$$x = \frac{10}{\sin 40^\circ} \approx 15.56$$

$$15.56 + 10 = 25.56 \text{ ft}$$



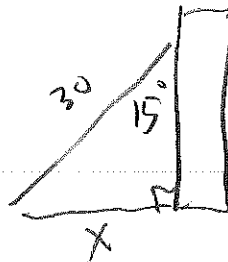
6. A ladder is leaning against the side of a building. The ladder is 30 feet long, and the angle between the ladder and the building is 15° . About how far is the foot of the ladder from the building?

a. 7.76 feet

b. 8.04 feet

c. 18.37 feet

d. 29.98 feet



$$\sin 15^\circ = \frac{x}{30}$$

$$x = 30 \sin 15^\circ \approx 7.76$$

7. Which is the angle of depression?

a. Angle θ

b. Angle β

c. Angle ϕ

d. Angle σ

