

## 2.8 Applications of Trig Functions

### Practice Problems

Name: \_\_\_\_\_

Date: \_\_\_\_\_

1. A right triangle has an acute angle of  $75^\circ$  and the hypotenuse is 24 centimeters. Find the length of the legs of the triangle, as well as the measure of the other acute angle.

$$\sin 75^\circ = \frac{y}{24}$$

$$\cos 75^\circ = \frac{x}{24}$$

$$y = 24 \sin 75^\circ$$

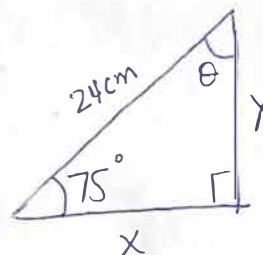
$$x = 24 \cos 75^\circ$$

$$y = 23.18 \text{ cm}$$

$$x = 6.21 \text{ cm}$$

$$\theta = 90 - 75$$

$$\theta = 15^\circ$$



2. A right triangle has legs that measure 8 inches and 7 inches. Find the length of the hypotenuse and the measures of the acute angles.

$$7^2 + 8^2 = x^2$$

$$\tan \theta_1 = \frac{8}{7}$$

$$49 + 64 = x^2$$

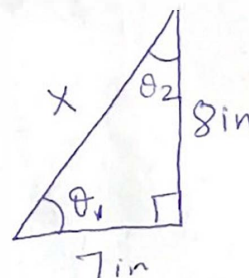
$$\theta_1 = \tan^{-1}(8/7)$$

$$\sqrt{113} \text{ in} = x$$

$$\theta_1 = 48.8^\circ$$

$$\theta_2 = 90 - 48.8$$

$$\theta_2 = 41.2^\circ$$



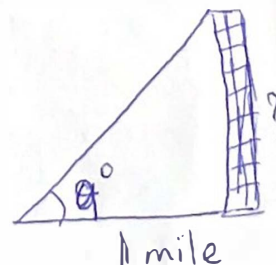
3. The angle of elevation to the top of a building in New York is found to be 9 degrees from the ground at a distance of 1 mile from the base of the building. Using this information, find the height of the building.

$$\tan 9^\circ = \frac{x}{1}$$

$$x = \tan 9^\circ$$

$$= 0.16 \text{ miles}$$

$$\text{or } 836.27 \text{ feet}$$

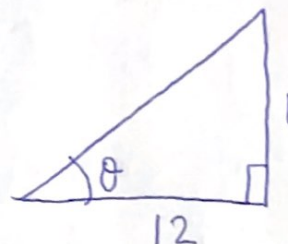


4. The ADA has specified that the maximum slope of a wheel chair ramp is in a 1 unit vertical:12 units horizontal ratio. What is the maximum angle of elevation for a wheelchair ramp that is up to code?

$$\tan \theta = \frac{1}{12}$$

$$\theta = \tan^{-1}\left(\frac{1}{12}\right)$$

$$\theta = 4.76^\circ$$



5. An airplane is flying at an elevation of 7000 feet, directly above a straight road. On one side of the airplane, the pilot sees a barn on the road at an angle of depression of  $24^\circ$ , on the other side of the airplane, the pilot sees a farm silo on the same road, but the angle of depression is only  $15^\circ$ . How far apart are the two farms?

$$\tan 24^\circ = \frac{7000}{y} \quad \tan 15^\circ = \frac{7000}{x}$$

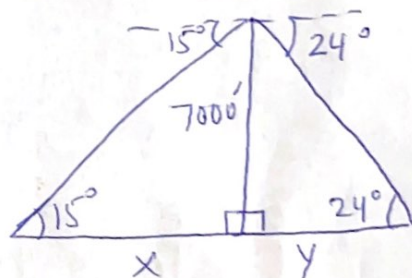
$$y = \frac{7000}{\tan 24^\circ}$$

$$= 15,722.26$$

$$x = \frac{7000}{\tan 15^\circ}$$

$$= 26,124.36$$

$$x + y = 41,846.62 \text{ feet}$$



6. There is lightning rod on the top of a building. From a location 500 feet from the base of the building, the angle of elevation to the top of the building is measured to be  $36^\circ$ . From the same location, the angle of elevation to the top of the lightning rod is measured to be  $38^\circ$ . Find the height of the lightning rod.

$$\tan 38^\circ = \frac{a}{500}$$

$$a = 500 \tan 38^\circ$$

$$a = 390.64$$

$$\tan 36^\circ = \frac{b}{500}$$

$$b = 500 \tan 36^\circ$$

$$b = 363.27$$

$$x = a - b = 27.37 \text{ feet}$$

