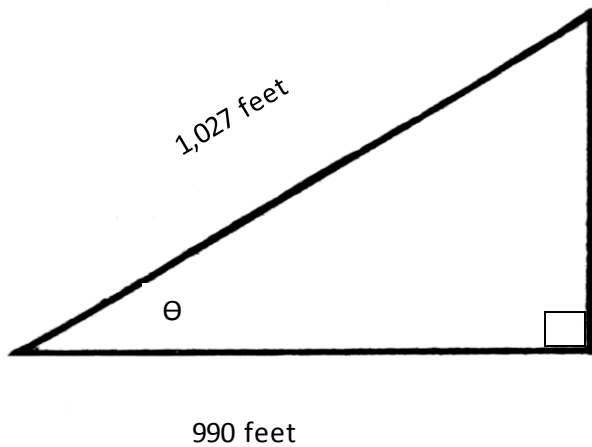


UNIT 5 LESSON 4 – APPLYING TRIGONOMETRY TO REAL WORLD APPLICATIONS

- 1) A trucker drives 1,027 feet up a hill that has a constant slope. When the trucker reaches the top of the hill, he has traveled a horizontal distance of 990 feet. At what angle did the trucker drive to reach the top? Round your answer to the nearest degree.

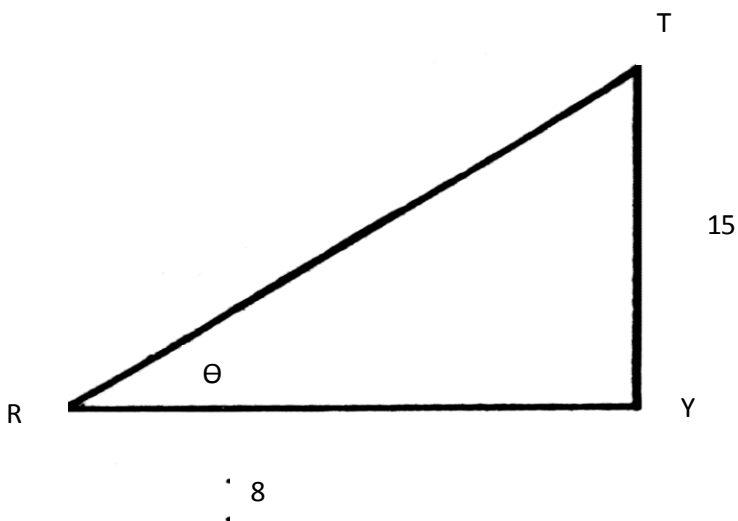


Label your triangle before you begin to solve the problem.

Based on the angle, we will use cosine inverse to find the angle

$$\cos^{-1}\left(\frac{990}{1027}\right) = 15^\circ$$

- 2) In $\triangle TRY$, $\angle Y$ is a right angle and $\tan T = \frac{8}{15}$. What is $\sin R$? Express the answer as a fraction and as a decimal.



Label your triangle before you begin to solve the problem.

Based on the problem, we need to find the $\sin R$? The ratio for \sin is $\frac{\text{opposite}}{\text{hypotenuse}}$ but we do not know the value of hypotenuse.

Pythagorean Theorem will solve for the hypotenuse.

$$8^2 + 15^2 = c^2$$

$$c = 17$$

Now we can find $\sin R$.

$$\sin^{-1}\left(\frac{15}{17}\right) = 62^\circ$$

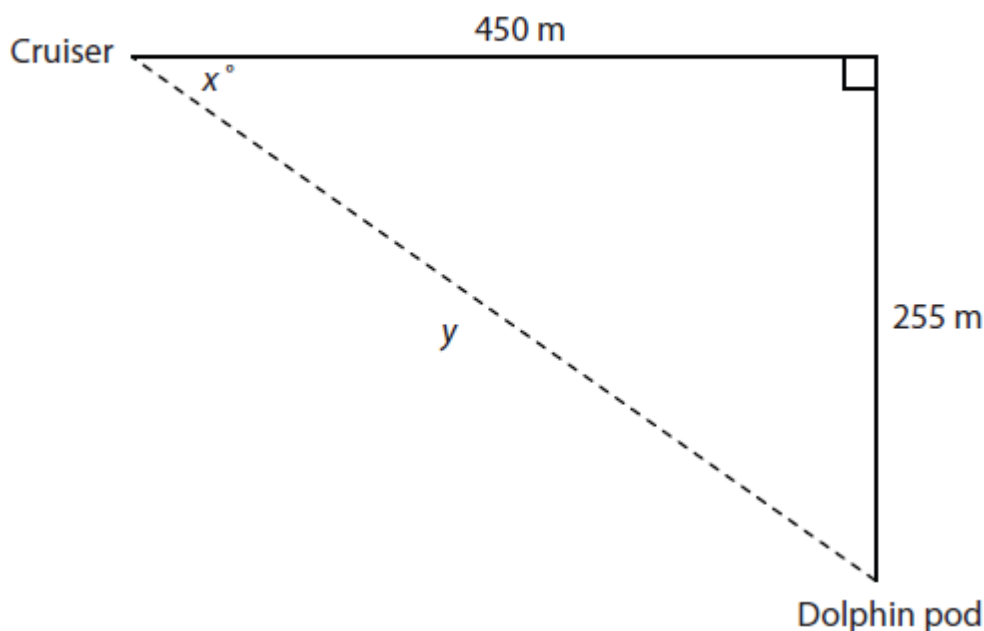
$$\text{As a decimal} - \left(\frac{15}{17}\right) = 0.882$$

3)

Example 3

A sonar operator on an anchored cruiser detects a pod of dolphins feeding at a depth of about 255 meters directly below. If the cruiser travels 450 meters west and the dolphins remain at the same depth to feed, what is the angle of depression, x , from the cruiser to the pod? What is the distance, y , between the cruiser and the pod? Round your answers to the nearest whole number.

1. Make a drawing of the scenario.



2. Find the angle of depression. Identify the given information to determine which trigonometric function to use.

Since you are calculating an angle, use the inverse of the trigonometric function. Notice that because of the orientation of the triangle and the horizontal side, the angle of depression lies above the diagonal.

We are given the distances opposite and adjacent to the angle of depression. Therefore, use the tangent function.

$$\tan x = \frac{255}{450}$$

$$x = \tan^{-1}\left(\frac{255}{450}\right)$$

On a TI-83/84:

Step 1: Press [2ND][TAN][255][÷][450].

Step 2: Press [ENTER].

$$x \approx 29.539$$

3. Determine the distance, y .

Since two side lengths were given, to determine the distance between the cruiser and the pod, there is the option of using either a trigonometric ratio or the Pythagorean Theorem. However, since the value of the angle of depression was not given and had to be approximated, using the Pythagorean Theorem given the two distances will yield a more precise answer.

$$450^2 + 255^2 = y^2$$

$$202,500 + 65,025 = y^2$$

$$267,525 = y^2$$

$$\pm\sqrt{267,525} = y$$

$$y \approx 517$$

The distance from the cruiser to the dolphin pod after travelling 450 meters west of the vertical is about 517 meters.

