$\qquad$
$\qquad$ Period : $\qquad$

- I can identify sine and cosine ratios in right triangles.
- I can use sine and cosine ratios to find missing side lengths in right triangles.
- I can apply trigonometric ratios to real-world problems.

| Trigonometric Ratios |  |
| :---: | :---: |
| Let $\triangle A B C$ be a right triangle with acute $\angle A$, then the sine of $\angle A($ abbreviated $\sin A)$ is defined as: $\sin A=\frac{\text { length of leg opposite } \angle A}{\text { length of hypotenuse }}$ |  |
| Let $\triangle A B C$ be a right triangle with acute $\angle A$, then the cosine of $\angle A($ abbreviated $\cos A)$ is defined as: $\cos A=\frac{\text { length of leg adjacent to } \angle A}{\text { length of hypotenuse }}$ |  |

## Example 1 : Finding trigonometric ratios

Write each trigonometric ratio as a fraction and as a decimal rounded to four decimal places.
a) $\sin R=$
d) $\sin S=$
b) $\cos R=$
e) $\cos S=$


We can use scientific and graphing calculators to calculate a trigonometric ratio! Since the angle measures of right triangles are measured in degrees, we need to make sure that our calculator mode is set to DEGREES!!!!

## Example 2: Using Trigonometric Ratios to Find Lengths.

a) Find the value of $x$.

b) Find the value of $x$.


## Example 4 : Applying Trigonometric Ratios to Real World Situations

a) A rope staked 20 feet from the base of a building goes to the roof and forms an angle of $58^{\circ}$ with the ground. To the nearest tenth of a foot, how long is the rope?


If you look up at an object, the angle your line of sight makes with a horizontal line is called the angle of elevation. If you look down at an object, the angle your line of sight makes with a horizontal line is called the angle of depression.

Since they form a pair of alternate interior angles within parallel lines, angle of elevation = angle of depression
b) A pilot is looking at an airport from her plane. The angle of depression is $29^{\circ}$. If the plane is at an altitude of 10,000 feet, approximately how far is it from the airport?

c) A 450 foot tall building is near a shorter building. A person on top of the shorter building finds the angle of elevation of the roof of the taller building to be 25 and the angle of depression of its base to be 35 . How far apart are the two buildings to the nearest foot? How tall is the shorter building to the nearest foot?


