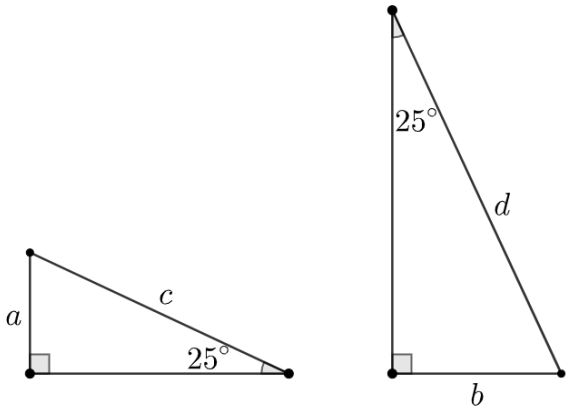
Name: _____

Lesson 4.05
Trigonometric Ratios to Find Sides

Geometry GT

Recall

Consider $\frac{a}{c}$ and $\frac{b}{d}$. Which is greater, or are they equal? Explain how you know.



Explore

Choose an acute angle, and draw a right triangle that includes the acute angle. Use the right angle given as one vertex of your triangle.

Label the sides as opposite, adjacent, and hypotenuse relative to your chosen angle.

Measure the sides of the triangle with a ruler, in millimeters, and label them.

Calculate the following ratios:

$\frac{\text{opposite}}{\text{hypotenuse}} =$ $\frac{\text{adjacent}}{\text{hypotenuse}} =$ $\frac{\text{opposite}}{\text{adjacent}} =$

Put your calculator into degree mode, then calculate sin, cos, and tan for your chosen angle (hit the button for the function, then type in the angle).

sin( ) = cos( ) = tan( ) =

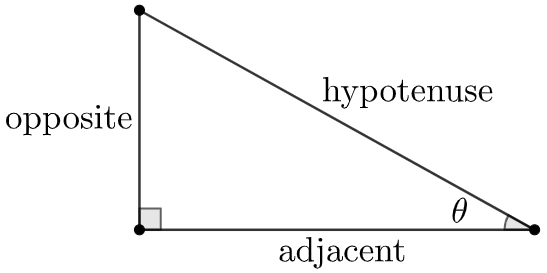
What do you notice?

Definitions of Trigonometric Ratios

The **sine** of an acute angle in a right triangle is the ratio of the length of the opposite leg to the length of the hypotenuse.

The **cosine** of an acute angle in a right triangle is the ratio of the length of the adjacent leg to the length of the hypotenuse.

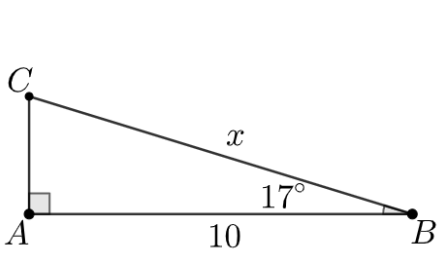
The **tangent** of an acute angle in a right triangle is the ratio of the length of the opposite leg to the length of the adjacent leg.

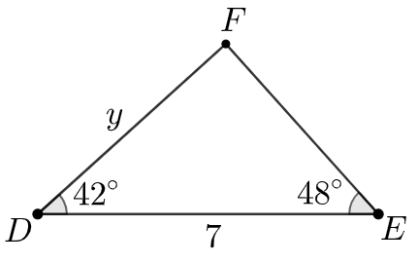


$\sin(\theta) = \frac{\text{opposite}}{\text{hypotenuse}}$ $\cos(\theta) = \frac{\text{adjacent}}{\text{hypotenuse}}$ $\tan(\theta) = \frac{\text{opposite}}{\text{adjacent}}$

Discuss

Solve for x and y in the following triangles. Round answers to the nearest hundredth.





Demonstrate

Triangle ΔXYZ has a right angle at $\angle X$. If $m\angle Y = 12°$ and $XZ = 2$cm, find all missing sides and angle measures.

Practice

1. Select **all** true statements:

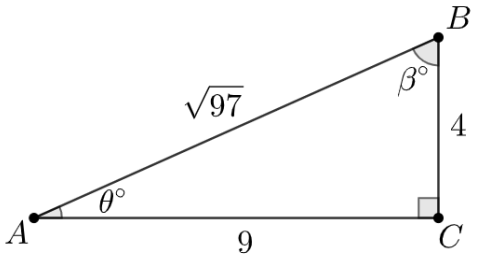
A. $\sin(\theta) = \dfrac{4}{\sqrt{97}}$

B. $\tan(\beta) = \dfrac{9}{4}$

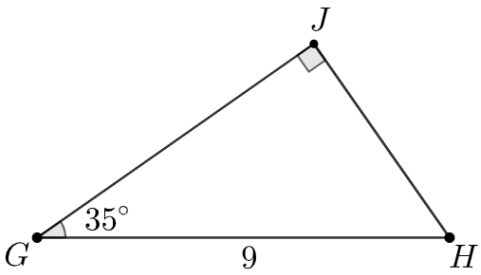
C. $\tan(\beta) = \dfrac{4}{9}$

D. $\cos(\beta) = \dfrac{4}{\sqrt{97}}$

E. $4^2 + 9^2 = 97$



2. Write an expression that can be used to find the length of $\overline{JH}$ and an expression that can be used to find the length of $\overline{GJ}$.



3. Lauren wants to calculate the height of a tree in her neighborhood park. Since she can't stretch a measuring tape from the ground to the top, she stands 100 feet away from the tree and measures the angle of elevation to the top of the tree as 10 degrees.

Draw this scenario, and find the height of the tree.