

Searching for Patterns

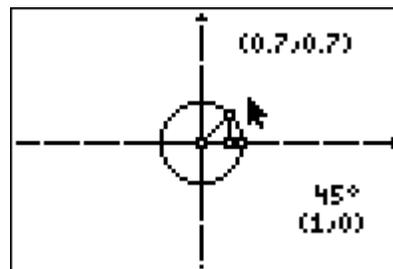
Using the unit circle, the trig functions can be defined as follows:

$$\sin(\theta) = \frac{y}{h}$$

$$\cos(\theta) = \frac{x}{h}$$

$$\tan(\theta) = \frac{y}{x}$$

Using the *Cabri Jr.* application, drag the point on the circle in the first quadrant by pressing the **[ALPHA]** key and recording the value for $\sin \theta$, $\cos \theta$ and $\tan \theta$ using the displayed x- and y-values.



Use the unit circle to complete the table.

θ	$\sin \theta$	$\cos \theta$	$\tan \theta$
30°			
45°			
60°			
90°			
120°			
135°			
150°			
180°			
210°			
225°			
240°			
270°			
300°			
315°			
330°			
360°			

Use the values in the table to answer the following questions.

1. For what values of θ is $\sin \theta$ positive?
2. For what values of θ is $\cos \theta$ negative?
3. For what values of θ is $\tan \theta$ positive? Negative? Why?
4. For what angle θ does $\cos \theta = \cos(30^\circ)$?
5. Name two other pairs of angles where the cosine of the angle is the same.
6. For what angle θ does $\tan \theta = \tan(45^\circ)$?
7. Name two other pairs of angles where the tangent of the angle is the same.
8. Record all the patterns you see with the sine function.
9. Are there any other patterns you see? If so, describe them.



Extension – Patterns in Reciprocal Functions

Using the unit circle, the reciprocal trig functions can also be defined as:

$$\csc(\theta) = \frac{h}{y}$$

$$\sec(\theta) = \frac{h}{x}$$

$$\cot(\theta) = \frac{x}{y}$$

Complete the following table by finding the reciprocals from the computed values on the table on page 1.

θ	$\sec \theta$	$\csc \theta$	$\cot \theta$
30°			
45°			
60°			
90°			
120°			
135°			
150°			
180°			
210°			
225°			
240°			
270°			
300°			
315°			
330°			
360°			

Record any patterns you see.