Hamilton Hardison

Activity 4 Procedure
Constructing Graphs of Trigonometric Functions

In this activity you will construct the graphs of the six trigonometric functions using the geometrical ideas we have developed in previous activities. Each tab contains the same initial constructions. You will be given same triangles from the previous activity in which we discovered lengths that represented the trigonometric ratios constructed on the unit circle. There will be a point x on the x-axis which controls the angle AOB. This point x will act as in input value for your trig function. The basic process for constructing the graphs is outlined below.

1.) Identify a segment whose length corresponds to the desired trigonometric ratio (meaning the length in the denominator has to be one).

2.) If necessary, translate the segment so that one endpoint lies on the x-axis. In some cases, this step will not be necessary.

3.) Rotate the segment so that it is perpendicular to the x-axis. Begin this step with the angle AOB in the first quadrant, (since all trig ratios are positive here). When the angle is in the first quadrant, the rotation should result in a vertical segment that does not go below the x-axis.

4.) Coordinate the input value, (the angle measure x on the x-axis), with the output value, (the height of the segment whose length corresponds to the value of the trig function). This is most easily done by constructing a line perpendicular to the x-axis through the point x and by constructing a line perpendicular to the y-axis through the endpoint of the transformed segment not on the x-axis. The intersection of these perpendicular lines is the coordination of the input and output values.

5.) Construct the graph of the trig function by constructing a locus. To do this, select the point x and the intersection and, from the construct menu, select locus. You should see the graph of your trig function.

The cosine construction is done for you as an example. The sine construction should be the easiest for you to complete.

Once you have constructed each of your trigonometric functions, it is easy to check that your graphs are correct by plotting the function using the Graph menu. Make sure that the graphed function lies on top of your locus.

When you are sure your construction is correct comment on the domain and range of the function and compare your results to your conjectures from the previous activity. Also examine how long it takes the function to repeat (this is called the period of the function). An easy way to find the period of a function is to look at an easily identifiable point on the curve (maybe a maximum, minimum, or an undefined point) and note its x-value,

then look to the right until you see the same point again with a different x-value. Subtract the x-values and you have your period.

So for each of the functions below identify the **domain, range, zeros, angles that produce an undefined output, and period**. Don't forget to **compare your results** to your conjectures from the previous activity.

Sine –

Cosine-

Tangent-

Cotangent-

Secant-

Cosecant-