Slope of the Sine Function (Part 2)

In this activity, you will continue to explore what it means to find the slope of the sine function.

EXPLORE

1. Graph the function function $f(x) = \sin(x)$.

2. Construct a point $(x, f(x))$ on the graph.

3. Construct a parameter h and use it to plot $(x + h, f(x + h))$.

4. Connect the two plotted points with a line. Animate $(x, f(x))$ and observe the behavior of the line.

5. Calculate the slope of the secant line. Plot and trace the point $(x, slope)$. Observe the behavior of this traced point as you animate $(x, f(x))$.

6. Try different values of h, observing the animation each time. For what values of h does the line come closer to following the sine graph? What do you think is the best value of h to use? Explain your reasoning. Are there values of h that you should not use?

7. When you animate using the very best value of h that you can, what shape do the traces make? Can you graph a function that matches the traces? If so, how close do you think the match really is?

8. To summarize your work, write down the calculation you used to find the slope of your line. Then explain how you adjusted h to make the line follow the sine graph as closely as possible. Say whether or not your line exactly matches the slope of the sine function, and explain how you know this.