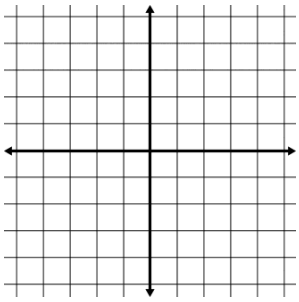
The Making of a Slopes Graph

Name:_____

Yesterday, we used limits to calculate the exact slope of a curve at an individual x-value. Today we will calculate many more of these individual slopes and see what happens when we plot them on a graph.

1. Let $f(x) = -3x + 2$. Sketch the graph below.

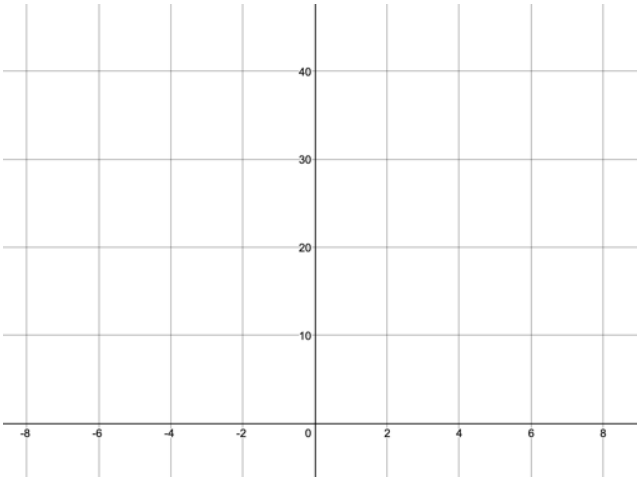


2. Find the slope of the curve f at $x =$ _____ using the limit definition of slope at a point.

3. Use a dot sticker to plot your value from q. 2 on our "slopes" graph. Copy the class graph to the right of your original graph.
4. What do you think will be the slope of the curve f at $x = 53$? Why do you think so?

In questions 5 and 6, we are going to explore the "slopes" graph of two new functions, $g(x) = x^2$ and $h(x) = x^3$.

5. Graph $g(x)$ below.



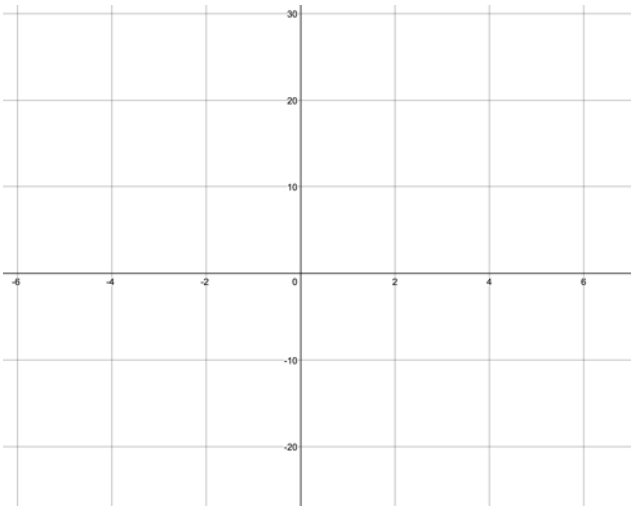
Let's start by plotting several slope values for $g(x)$.

a. Find the slope of the curve g at x=_____ using the limit definition of slope at a point.

b. Use a dot sticker to plot your value from q. 6a on our "slopes" graph. Copy the class graph to the right of your original graph.

c. What do you think will be the slope of the curve $g(x)$ at $x = 53$? Why do you think so?

6. Graph $h(x) = x^3$ below.



Now let's plot several slope values for $h(x)$.

a. Find the slope of the curve $h(x)$ at x=_____ using the limit definition of slope at a point.

b. Use a dot sticker to plot your value from q. 7a on our "slopes" graph. Copy the class graph to the right of your original graph.

c. What do you think will be the slope of the curve $h(x)$ at $x = 53$? Why do you think so?

7. What is the purpose of a "slopes" graph?

Topic 2.2—Defining the Derivative

Important Ideas:

Check Your Understanding!

1. Let $f(x) = 4x^2 - 5$.
   a. Find $f'(x)$ using the definition of the derivative.

   b. What does each point on the graph of $f'(x)$ represent? Be specific.

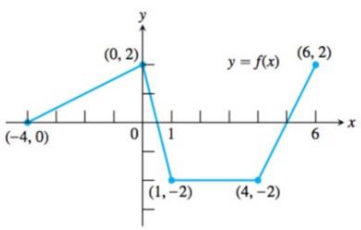
2. Multiple Choice: $\lim_{h\to 0} \frac{\ln(e+h)-1}{h}$ is

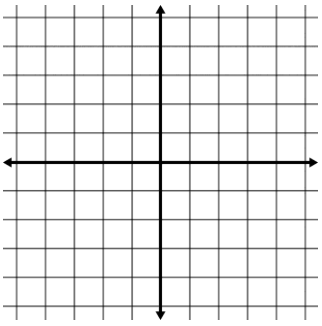
   A. $f'(e)$ where $f(x) = \ln x$
   B. $f'(e)$ where $f(x) = \frac{\ln x}{x}$
   C. $f'(1)$ where $f(x) = \ln x$
   D. $f(1)$ where $f(x) = \ln(x + e)$
   E. $f'(0)$ where $f(x) = \ln x$

3. The line that is tangent to $q(x)$ at $(-2,7)$ passes through $(5,-1)$. What is $q'(-2)$?

4. Find the lines that are tangent and normal to the curve $y = x^3$ at $x = 4$.

5. The graph of $f(x)$, shown below, consists of 4 line segments. Draw $\frac{df}{dx}$ on the coordinate grid.





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