Math 4 Honors
Lesson 6-2 Learning Check
U7 L1 I2 Learning Check

Name _____

Date _____

In this learning check, you will be assessed on the following concepts:
- *I can use the definition of derivative to find f'(x) for any function f(x) and any value of x.*
- *I can use the derivative of a function to solve problems.*

Let f be the function $f(x) = 3x^2 - 2x + 4$.

1. Use the *definition of derivative* to find $f'(4)$. ***Work vertically; do not skip any steps.***

$$f'(x) = \lim_{\Delta x \to 0} \frac{3(x+\Delta x)^2 - 2(x+\Delta x) + 4 - (3x^2 - 2x + 4)}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{3(x^2 + 2x\Delta x + (\Delta x)^2) - 2x - 2\Delta x + 4 - 3x^2 + 2x - 4}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{3x^2 + 6x\Delta x + 3(\Delta x)^2 - 2x - 2\Delta x + 4 - 3x^2 + 2x - 4}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{6x\Delta x + 3(\Delta x)^2 - 2\Delta x}{\Delta x}$$

$$= \lim_{\Delta x \to 0} 6x + 3\Delta x - 2 = 6x - 2$$

$$f'(4) = 6 \cdot 4 - 2 = 22$$

2. Find the derivative of the function when $x = -8$. Is f increasing or decreasing when $x = -8$? Without looking at the graph, how do you know?

$$f'(-8) = 6 \cdot -8 - 2 = -50$$

Decreasing b/c $f'(-8)$ is negative.

3. Describe in words the graphical meaning of $f'(-8)$.

The slope of the tangent line when $x = -8$ is -50

4. Write the equation of the tangent line where $x = 4$.

$f(4) = 44$

Slope of T.L. $= f'(4) = 22$

$$y = mx + b$$

$$44 = 22(4) + b$$

$$44 = 88 + b$$

$$b = -44$$

$$y = 22x - 44$$