The Slope of the Tangent of a Function NAME _____
Student Worksheet

Period_____ Date _____

In this activity you will explore the slope of a line that is tangent to the graph of a polynomial function. When you get to certain pages in the TI-Nspire document, you will be asked questions. Enter them in the calculator and on this worksheet. On other pages you will collect data by moving the point of tangency to various locations on a curve. The data points will be plotted on the same graph screen as you collect them. These points are of the form (x, m) where x is the x-coordinate of the point of tangency, and m is the slope of the tangent line at that location. The pattern of the points will suggest a new function rule which you will then attempt to write. This new function is called the derivative of the original function and has a very important role in calculus.

The goal is to find a pattern that will allow you to find the rule for writing the derivative of any polynomial equation. At the end we will test this rule on monomial functions in the form $f(x) = a \bullet x^n$

Page	Question	Answer
1.3-1.4	f1(x)= For what values of x is the slope of the tangent negative?	
	For what values of x is the slope of the tangent positive?	
	For what values of x is the slope of the tangent zero?	
2.1-2.3	As you move point P from left to right, if the graph **opens up** the slope of the tangent *increases* or *decreases*?	
	As you move point P from left to right, if the graph **opens down** the slope of the tangent *increases* or *decreases*?	
	As you move point P from left to right, the slope of the tangent is always **zero** at what special point?	
	Function f1(x)	**Derivative f2(x)**
3.2	f1(x) =	f2(x) =
4.1	f1(x) =	f2(x) =
5.1	f1(x) =	f2(x) =
6.1	f1(x) =	f2(x) =
	Question	**Answer**
7.2-7.4	f1(x) = What is the lowest value for m?	
	What are the coordinates of the inflection point?	
	Prediction: the pattern of the points (x,m) will form…	

8.2	f1(x) =	f2(x) =
9.2	Basic monomial function: $f1(x) = a \bullet x^n$	Formula for derivative: f2(x) =
	Question	**Answer**
9.4	Slope of the tangent of $y = -2x^3$ at $x = 3$	
9.5	Slope of the tangent of $y = \frac{1}{2}x^4$ at $x = -1$	
9.6	**Bonus question!** f1(x) =	f2(x) = x

Summary questions:

1. The derivative of a polynomial function is the collection of all points (x, m) where m is the …

_____

_____

2. The derivative of a cubic function is what kind of function? _____
(Hint: see page 8.2)

3. The derivative of a quadratic function is what kind of function? _____
(Hint: see pages 3.2, 4.1 etc.)

4. The derivative of a linear function would be what kind of function? _____
(Hint: does the slope of a linear function change as the value of x changes? Or, use the value 1 for **n** on page 9.2 and different integers for **a** and observe the derivative function)

5. What is the general form for the derivative of a quadratic function in standard form: $y = ax^2 + bx + c$

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6. What is an inflection point? _____

_____

7. Label the inflection point of the function graphed below.
Will the derivative function *open up* or *open down*?

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