Name: _____ **TC**

Classwork 27

1. a. Let $f(x) = x^2$. Find $f(x + h)$.

b. Let $f(x) = x^3$. Find $f(x + h)$

c. Let $f(x) = 3x + 1$. Find $f(x + h)$.

d. Let $f(x) = x^2 - x$. Find $f(x + 3)$

2. Let's say we are dealing with the graph of $f(x) = x^2$

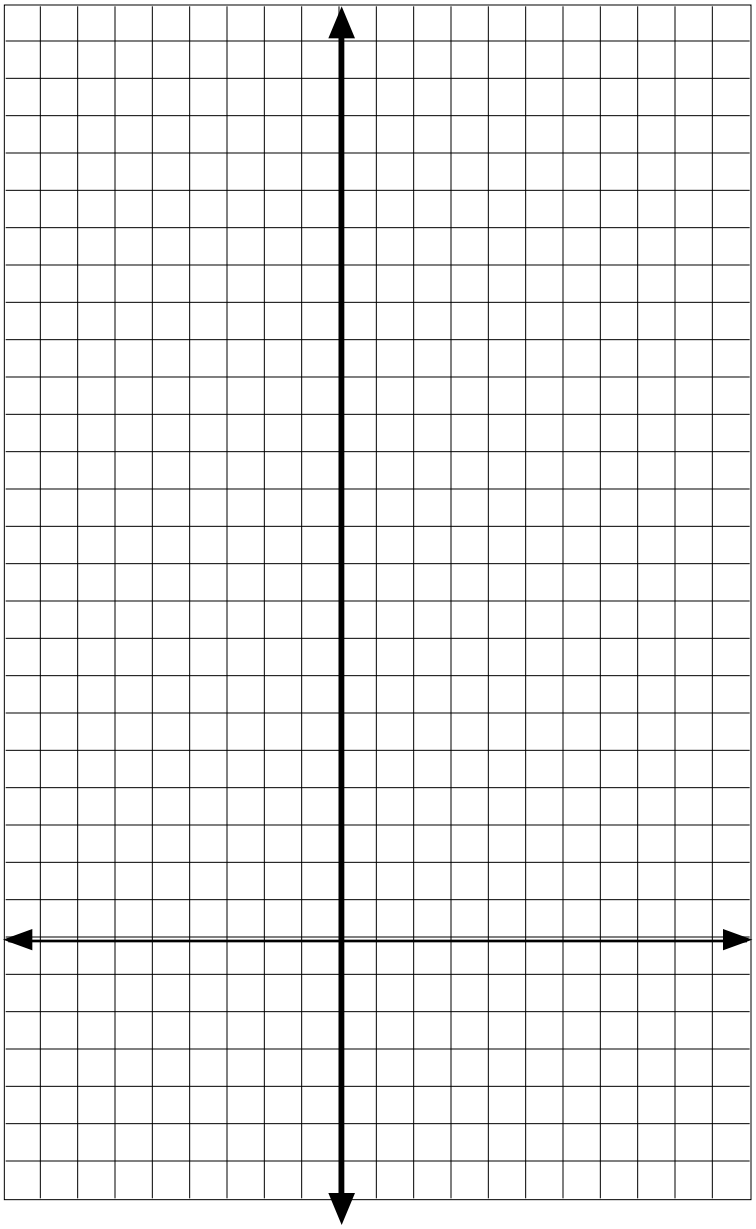
a) Investigate the slope around $x = 3$ using the chart. This time, however, Δx is given.

First point		Second point		Δx **"h"**	$\Delta f(x)$	slope
3				.8		
				.2		
				.1		
				.05		
				.001		
So in general, in terms of only **x** , **h**, and **f(x)....** **(A)**	**(B)**	**(C)**	**(D)**	**(E)**	**(F)**	**(G)**
x						
First point		Second point		Δx **"h"**	$\Delta f(x)$	slope

c) Write a limit to express the exact slope at a point **x.**

d) Could we manipulate the limit to make this happen?

3. a) Graph $y = x^2$ on the graph below and fill out the table.



x	x^2	
x	$x^2 + 2x - 6$	

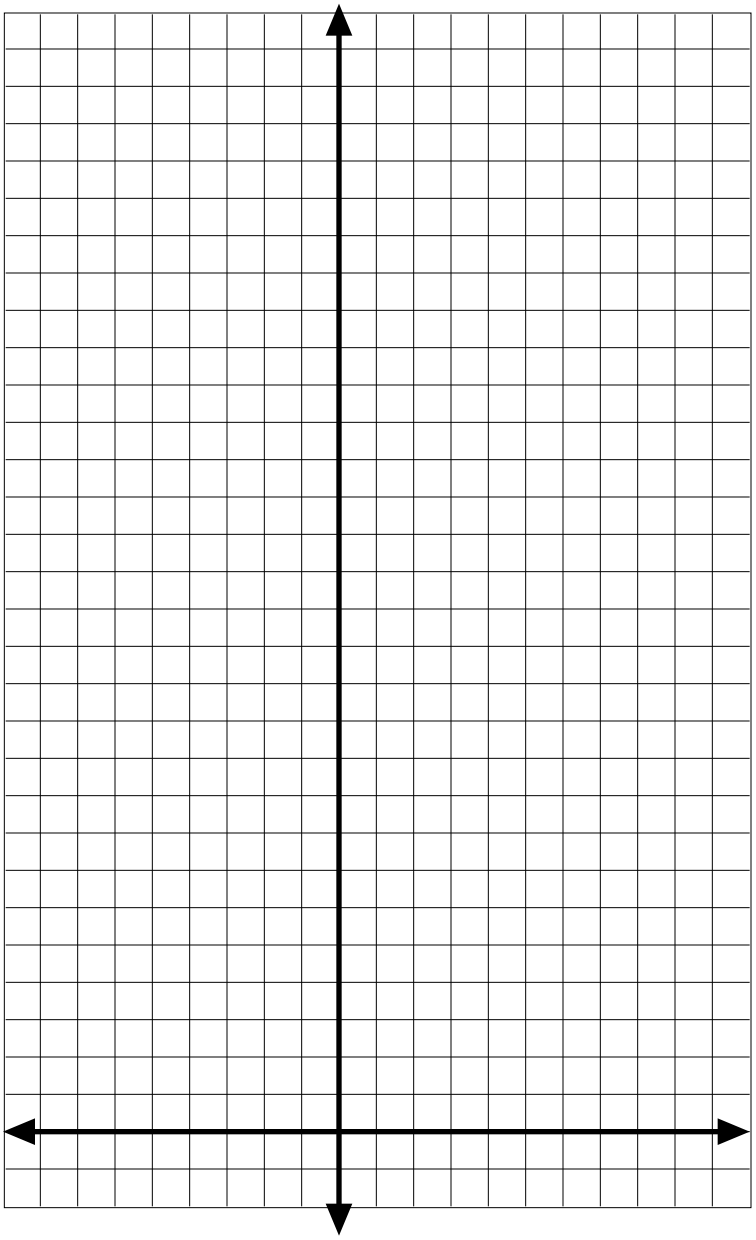
b) How much does y increase by every time x goes up by 1?

c) Write a formula for that increase.

d) Let the first y value be x_1. Prove your regularity mathematically.

e) Use the second chart for the function $y = x^2 + 2x - 6$ and then **graph it on the same axes.** Does the same pattern hold?

4. a) Graph $y = 2x^2$ and $y = 2x^2 - 4x + 1$ on the graph below.



b) How much does y increase every time x increases by 1?

c) Prove mathematically that this regularity is true.

d) What pattern do you predict for parabolas that start with $3x^2$?

e) What pattern do you predict for $\mathbf{c}x^2$? Can you prove it?

f) Discuss how slope changes in a parabola.

Practice Problems

1. Use a small Δx near the point given to find the approximate slope.

a) $f(x) = 4x - 1 \qquad x = 7$

b) $f(x) = 3x^2 - 4 \qquad x = 2$

c) $f(x) = \log x \qquad x = 5$

2. Evaluate each expression for $f(x) = x^2 + x$

a) $f(3)$ b) $f(m)$ c) $f(x + 1)$ d) $f(x + h)$