Mathematics 30-2 Name: ______________________________

5.1 Exploring the Graphs of Polynomial Functions Date: ______________________________

New Vocabulary

Scatterplot: A set of points on a grid, used to visualize a relationship or possible trend in data.

Polynomial Function: A function that contains only the operations of multiplication and addition with real-number coefficients, whole-number exponents, and two variables.
For example: $y = 5x^3 - 3x + 7$, $y = -4x + 8$, $f(x) = x^2 - 3x + 4$

Degree: The highest exponent in a polynomial function.
For example: The degree of $y = 4x^3 - 8x^2 + 5$ is '3'.

Leading Coefficient: The coefficient of the term with the greatest degree in the polynomial function in standard form.
For example: The leading coefficient in the function $f(x) = -5x^2 + 8x - 7$ is '-5'.

Constant Term: The term in the polynomial function that has no variable, i.e. the degree is '0'.
For example: The constant term in the function $y = 4x^3 - 6x^2 - 7x + 1$ is '1'.

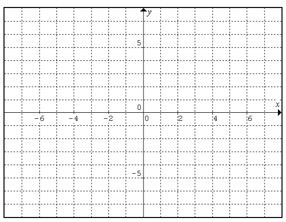
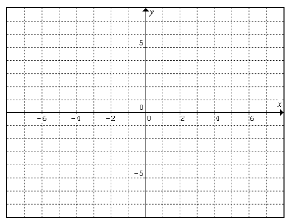
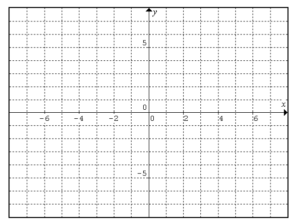
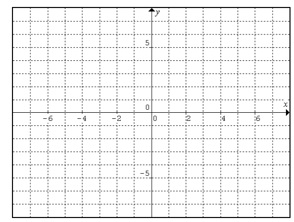
Linear Function	Quadratic Function	Cubic Function
A polynomial function of first degree, whose greatest exponent is '1'.	A polynomial function of second degree, whose greatest exponent is '2'.	A polynomial function of third degree, whose greatest exponent is '3'.
Standard Form is $f(x) = ax + b$, where $a \neq 0$.	Standard Form is $f(x) = ax^2 + bx + c$, where $a \neq 0$.	Standard Form is $f(x) = ax^3 + bx^2 + cx + d$, where $a \neq 0$.
Examples: $y = 2x - 3$, $f(x) = -\frac{2}{3}x + 4$	Examples: $y = x^2 - 3x + 4$, $f(x) = -\frac{1}{2}x^2 + 4x + 5$	Examples: $y = x^3 - 3x + 2$, $f(x) = -2x^3 + 4x^2 + \frac{3}{4}$

End Behaviour: The behaviour of the y-values of the function as $|x|$ becomes very large.

Turning Point: Any point where the graph of a function changes from increasing to decreasing or decreasing to increasing.

Investigate the Math

Using your graphing calculator, graph each of the following functions then complete the table.

Type of Function	**Constant**	**Linear**	**Quadratic**	**Cubic**
Function	$y = 4$	$y = \frac{1}{2}x - 3$	$y = x^2 - 3x - 4$	$y = x^3 - 2x^2 - 3x$
Degree				
Leading Coefficient				
Constant Term				
Sketch				
Number of x-intercepts				
Domain				
Range				

Let's look at the end behaviour if the leading coefficient is positive versus if it is negative. Describe where the arms are extended.

1. Graph $y = 2x - 4$ and $y = -x + 1$ and discuss end behaviour.

2. Graph $y = x^2 - 4x - 5$ and $y = -x^2 + 4$ and discuss end behaviour.

3. Graph $y = x^3 - x^2 - 2$ and $y = -x^3 + 4x^2 - 3x$ and discuss end behaviour.