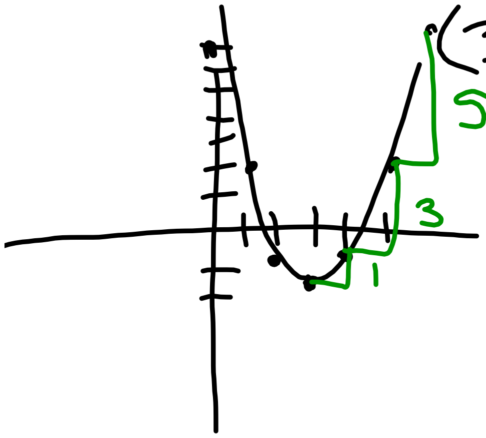
Bellwork:

Graph the polynomial $f(x)=(x-3)^2-2$ using your calculator



$(3,-2)$

x	y		
1	2		
		-3	
2	-1		2
		-1	
3	-2		2
		1	
4	-1		2
		3	
5	2		2
		5	
6	7		

Lesson 3.1 Objectives:

I can recognize forms and features of quadratics

What are Quadratics?

Any **expression**, **equation**, or **function** in terms of x, for which 2 is the highest degree of x. $\left(x^2\right)$

Expression: (no equal sign) **Example:** $3x^2+2x-1$

Equation: (equal sign) **Example:** $3x^2+2x=1$

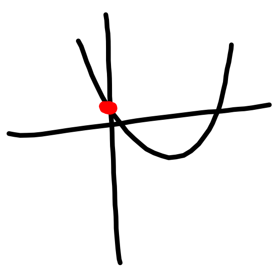
Function: (equal sign with y or $f(x)$) **Example:** $f(x)=3x^2+2x-1$

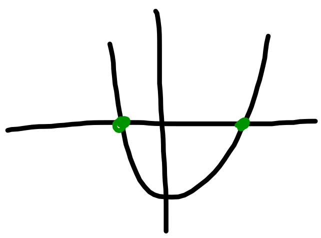
Quadratics can be written in three useful forms as follows:

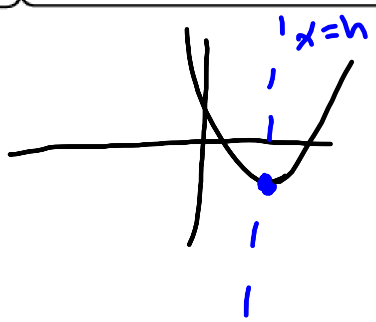
Polynomial Form	Intercept Form	Vertex Form
$f(x)=ax^2+bx+c$	$f(x)=a(x-p)(x-q)$	$f(x)=a(x-h)^2+k$

What information does each form provide?

Polynomial Form	Intercept Form	Vertex Form
The c is the y-intercept: $(0,c)$. The a is the vertical stretch. The sign of a indicates whether the graphed parabola opens up (+) or down (–).	The p and the q are x-intercepts: $(p,0)$, $(q,0)$. In the formula they are negative, so use the opposite. The a does the same as in polynomial form.	The vertex of the graphed parabola is found at (h,k). Use the opposite for h. The axis of symmetry is at $x=h$. The a does the same job.

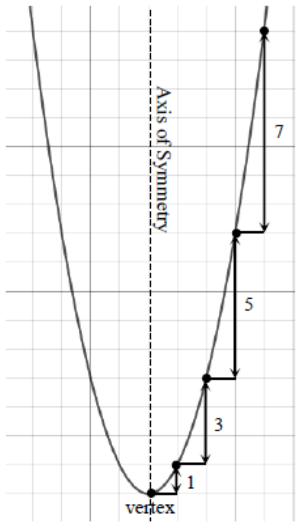






Graphing

The graph below illustrates how the parabola of a quadratic function is graphed with NO STRETCHING.



Starting from the vertex, for each horizontal change of 1, the vertical change is a sequence of odd numbers.

The pattern is repeated symmetrically on the other side of the vertex.

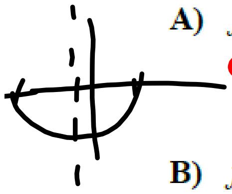
If necessary, multiply the odd numbers by a vertical stretch factor *a*.

1. Which expressions are quadratic? Circle all that qualify.

A) $2x^2 - x$ ~~B)~~ $x(x+3)(x+2)$ x^3

~~C)~~ $6(2x+4)-9$ D) $(x-5)^2$ $(x-5)(x-5)$

2. Identify key features of each quadratic function.



A) $f(x) = +(x-3)(x+5)$ opens up

$\boxed{\text{x-int: } (3,0)\ (-5,0)}$

symmetry $x = -1$

B) $f(x) = -(x-6)^2 + 9$

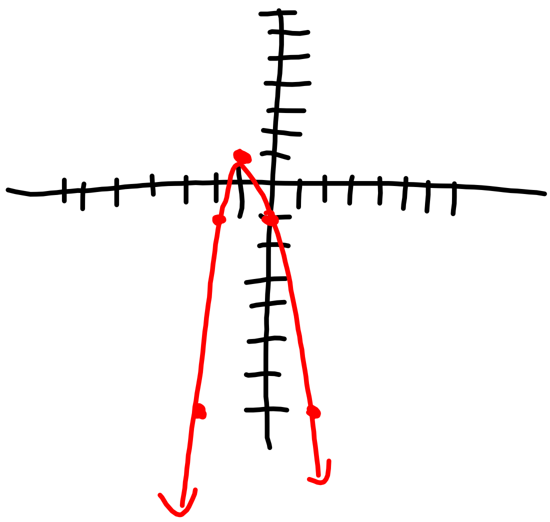
vertex: $(6,9)$ symmetry: $x = 6$ open down

C) $f(x) = 2x^2 + 12x + 10$

y-int: $(0,10)$ vert. stretch by 2

+ open up

17) $-2(x+1)^2 + 1$



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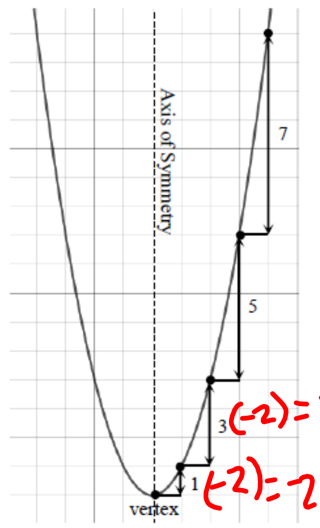

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