Graphing Quadratics from Vertex Form

VERTEX FORM: $y = a(x - h)^2 + k$

Vertex: (h, k) **If a > 0, opens** up **If a < 0, opens** down

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To graph a quadratic in VERTEX FORM

1. Find the vertex. Identify whether the graph should open up or down.
2. Create a table. Put the vertex as the CENTER VALUE of the table.
3. Fill in your table with the two values of x that come before and after the x-value of your vertex.
4. Plug all x-values into your equation to find the y-value that goes with them.
   If done correctly, the y-values should have a PATTERN!!
   The 1st and 5th y-values should match. So should the 2nd and 4th y-values.

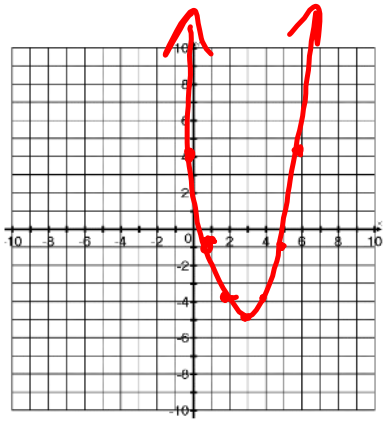
Example 1 $f(x) = (x - 3)^2 - 5$

VERTEX: (3, -5)

OPENS: up

$(1-3)^2-5$
$(2-3)^2-5$
$(3-3)^2-5$
$(4-3)^2-5$
$(5-5)^2-5$

X	Y
1	-1 *
2	-4 *
3	-5
4	-4 *
5	-1 *



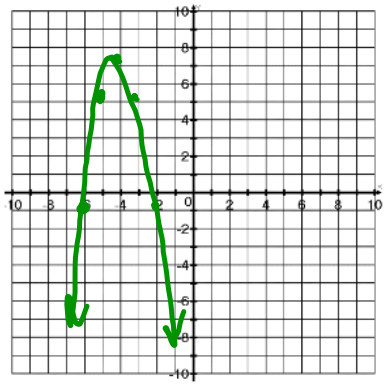
Example 2 $f(x) = -2(x + 4)^2 + 7$

VERTEX: (-4, 7)

OPENS: down

$-2(-6+4)^2+7$
$-2(-5+4)^2+7$
$-2(-3+4)^2+7$
$-2(-2+4)^2+7$

X	Y
-6	-1
-5	5
-4	7
-3	5
-2	-1



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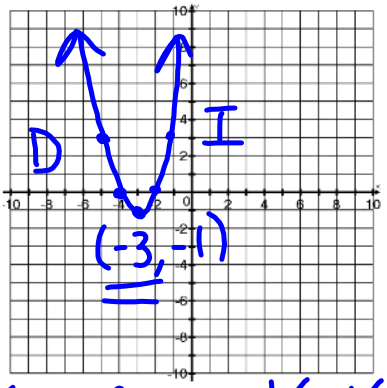
Graph each of the following quadratic functions. Find the characteristics of your graph.

1. $f(x) = (x+3)^2 - 1$

Vertex: (-3,-1) Opens: up

X	Y
-5	3
-4	0
-3	-1
-2	0
-1	3



Domain: $-\infty < x < \infty$ Range: $-1 \le y < \infty$

Zeroes: $x = -4, -2$ Y-Int: (0, 8)

Increase: $-3 < x < \infty$ Decrease: $-\infty < x < -3$

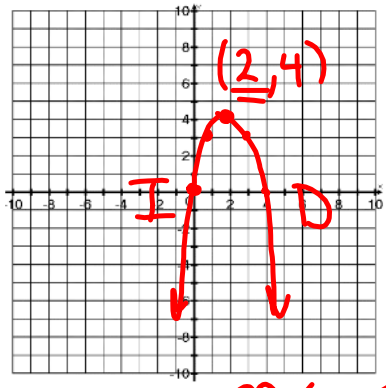
End Behavior: As x→ -∞, f(x) → ∞

As x→ ∞, f(x) → ∞

2. $f(x) = -(x-2)^2 + 4$

Vertex: (2,4) Opens: down

X	Y
0	0
1	3
2	4
3	3
4	0



Domain: $-\infty < x < \infty$ Range: $-\infty < y \le 4$

Zeroes: $x = 0, 4$ Y-Int: (0,0)

Increase: $-\infty < x < 2$ Decrease: $2 < x < \infty$

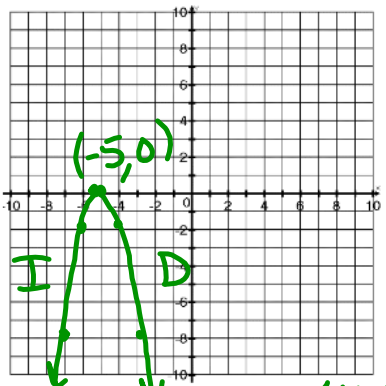
End Behavior: As x→ -∞, f(x) → -∞

As x→ ∞, f(x) → -∞

3. $f(x) = -2(x+5)^2$

Vertex: (-5,0) Opens: down

X	Y
-7	-8
-6	-2
-5	0
-4	-2
-3	-8



Domain: $-\infty < x < \infty$ Range: $-\infty < y \le 0$

Zeroes: $x = -5$ Y-Int: (0,-50)

Increase: $-\infty < x < -5$ Decrease: $-5 < x < \infty$

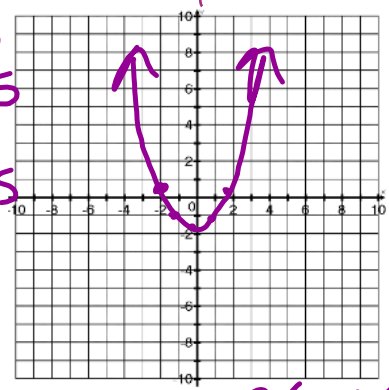
End Behavior: As x→ -∞, f(x) → -∞

As x→ ∞, f(x) → -∞

4. $f(x) = \frac{1}{2}x^2 - 2$

Vertex: (0,-2) Opens: up

X	Y
-2	0
-1	-1.5
0	-2
1	-1.5
2	0



Domain: $-\infty < x < \infty$ Range: $-2 \le y < \infty$

Zeroes: $x = -2, 2$ Y-Int: (0,-2)

Increase: $0 < x < \infty$ Decrease: $-\infty < x < 0$

End Behavior: As x→ -∞, f(x) → ∞

As x→ ∞, f(x) → ∞