2/8 p.16-17

Graphing Quadratics from Standard Form

STANDARD FORM: $y = ax^2 + bx + c$

Vertex: ($-\frac{b}{2a}$, $f(-\frac{b}{2a})$) plugging in h-value **If a > 0, opens** up **If a < 0, opens** down **Y-Int:** (0, c)

To graph a quadratic in STANDARD FORM

1. Label a, b, and c.
2. Plug into your formula $x = -\frac{b}{2a}$ to find the X-VALUE of the VERTEX.
3. Plug your X-VALUE back into the equation to find the Y-VALUE of the VERTEX.
4. Create a table. Put the vertex as the CENTER VALUE of the table.
5. Fill in your table with the two values of x that come before and after the x-value of your vertex.
6. 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 $f(x) = x^2 - 6x + 5$

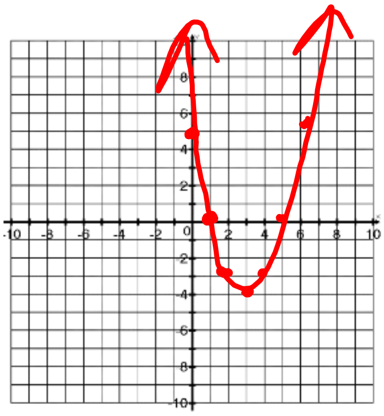
VERTEX: (3, -4)

OPENS: up

a = 1
b = -6
c = 5

$h = \frac{-(-6)}{2(1)} = 3$*

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



Example 2 $f(x) = -2x^2 + 8x - 7$

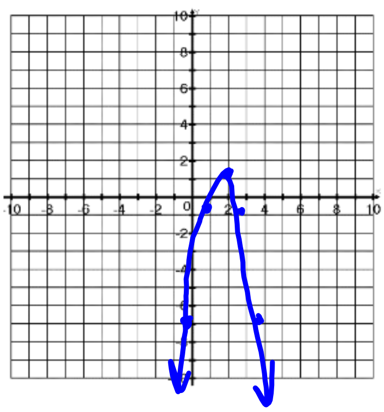
VERTEX: (2, 1)

OPENS: down

a = -2
b = 8
c = -7

$h = \frac{-(8)}{2(-2)} = 2$*

X	Y
0	-7
1	-1
*2	1
3	-1
4	-7



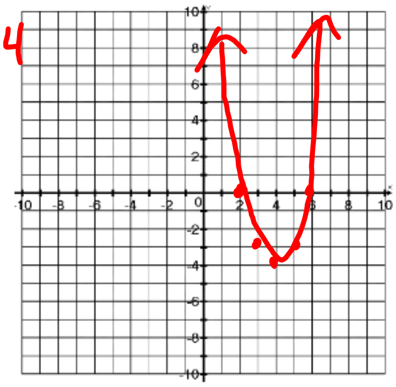
Graph each of the following quadratic functions. Find the characteristics of your graph.

1. $f(x) = x^2 - 8x + 12$ $a=1$ $b=-8$ $c=12$

Vertex: $(4,-4)$ Opens: up

$h = \frac{-(-8)}{2(1)} = 4$

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



Domain: $-\infty < x < \infty$ Range: $-4 \le y < \infty$
Zeroes: $x = 2, 6$ Y-Int: $(0, 12)$
Increase: $4 < x < \infty$ Decrease: $-\infty < x < 4$

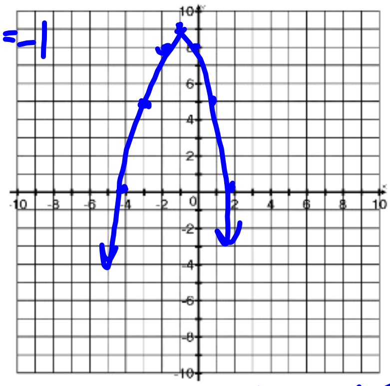
End Behavior: As $x \to -\infty$, $f(x) \to \infty$
As $x \to \infty$, $f(x) \to \infty$

2. $f(x) = -x^2 - 2x + 8$ $a=-1$ $b=-2$ $c=8$

Vertex: $(-1,9)$ Opens: down

$h = \frac{-(-2)}{2(-1)} = -1$

X	Y
-3	5
-2	8
-1	9
0	8
1	5



Domain: $-\infty < x < \infty$ Range: $-\infty < y \le 9$
Zeroes: $x = -4, 2$ Y-Int: $(0, 8)$
Increase: $-\infty < x < -1$ Decrease: $-1 < x < \infty$

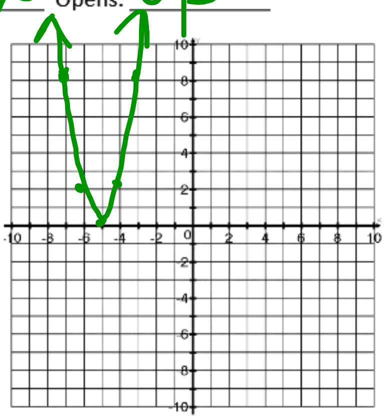
End Behavior: As $x \to -\infty$, $f(x) \to -\infty$
As $x \to \infty$, $f(x) \to -\infty$

3. $f(x) = 2x^2 + 20x + 50$ $a=2$ $b=20$ $c=50$

Vertex: $(-5,0)$ Opens: up

$h = \frac{-20}{2(2)} = -5$

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



Domain: $-\infty < x < \infty$ Range: $0 \le y < \infty$
Zeroes: $x = -5$ Y-Int: $(0, 50)$
Increase: $-5 < x < \infty$ Decrease: $-\infty < x < -5$

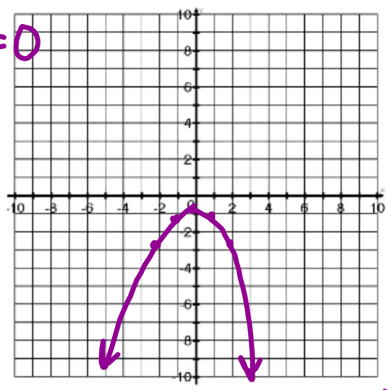
End Behavior: As $x \to -\infty$, $f(x) \to \infty$
As $x \to \infty$, $f(x) \to \infty$

4. $f(x) = -\frac{1}{2}x^2 - 1$ $a=-\frac{1}{2}$ $b=0$ $c=-1$

Vertex: $(0,-1)$ Opens: down

$h = \frac{-(0)}{2(-\frac{1}{2})} = 0$

X	Y
-2	-3
-1	-1.5
0	-1
1	-1.5
2	-3



Domain: $-\infty < x < \infty$ Range: $-\infty < y \le -1$
Zeroes: none Y-Int: $(0, -1)$
Increase: $-\infty < x < 0$ Decrease: $0 < x < \infty$

End Behavior: As $x \to -\infty$, $f(x) \to -\infty$
As $x \to \infty$, $f(x) \to -\infty$