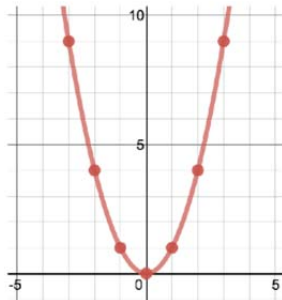


### 5.1 Graph Quadratic Functions in Vertex Form

Quadratic Equation:

$x$	$x^2$
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9



Vertex:

Axis of Symmetry:

Properties of Quadratics in Vertex Form:

The vertex is:

The axis of symmetry is:

If  $a > 0$ :

If  $a < 0$ :

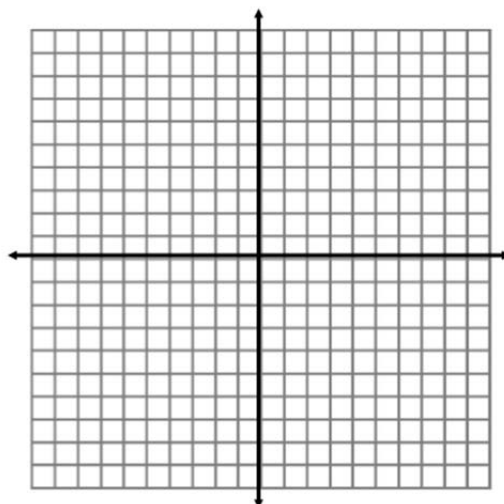
If  $|a| > 1$ :

If  $|a| < 1$ :

Ex 1 Graph:

Axis of Symmetry:

Vertex:



$x$	$f(x)$

Ex 2 Graph:

Axis of Symmetry:

Vertex:

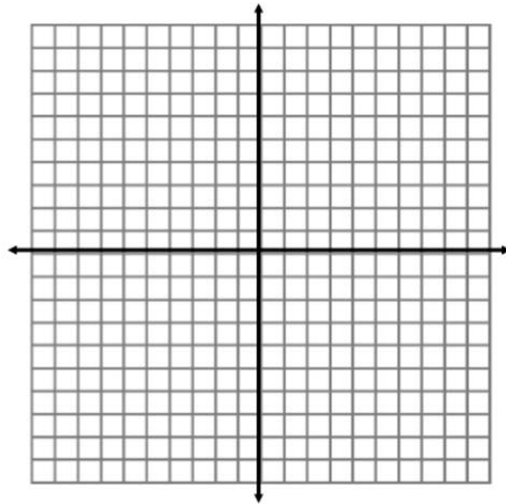
$x$	$f(x)$

### 1-3-5 Graphing Shortcut

Ex. 3:  $f(x) = -(x + 6)^2 + 2$

Ex 4:  $f(x) = \frac{1}{2}(x - 2)^2 - 3$

Ex 5:  $f(x) = 3x^2 - 8$



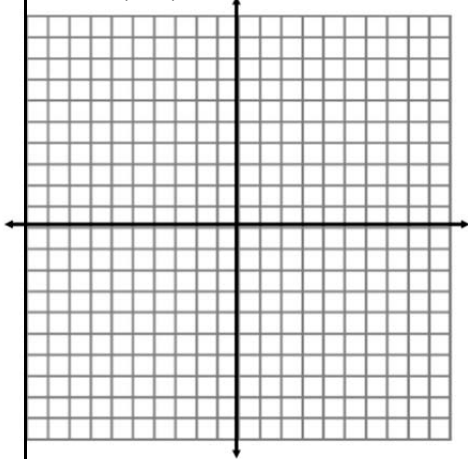
Ex 6: Tell whether the quadratic has a minimum, or maximum value. Then find that value.

$$f(x) = \frac{3}{2}(x - 5)^2 + 6$$

Ex 7: Bean Skywalker started as a pilot and was always kind of cocky. Upon returning from a patrol he requested a flyby. He gave the tower the equation of  $y = \frac{1}{25}(x - 45.6)^2 + 8.5$  as the vector for his approach. How close will Bean Skywalker be to the ground on his flyby? Sketch a rough graph of what his flyby might look like.

You try!

1) Graph:  $y = -2(x - 4)^2 + 7$



2) Tell whether the quadratic has a minimum, or maximum value. Then find that value.

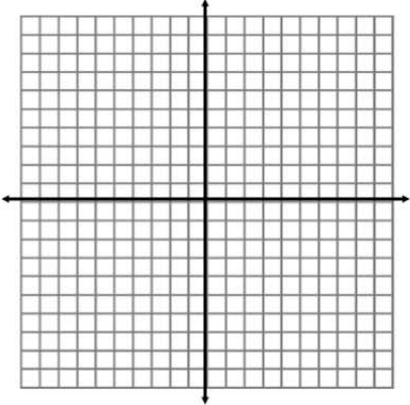
$$f(x) = -\frac{1}{4}(x - 102)^2 + 52$$

Summarize your notes:

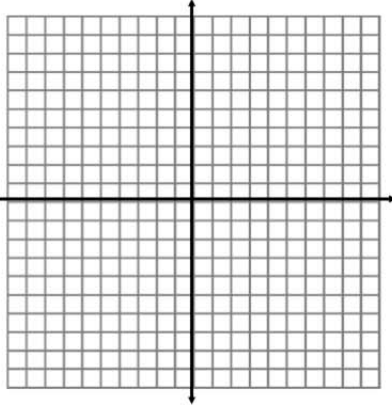
### 5.1 Practice Problems

Directions: Graph. Label the vertex and axis of symmetry. Graph with a table or using 1-3-5 shortcut.

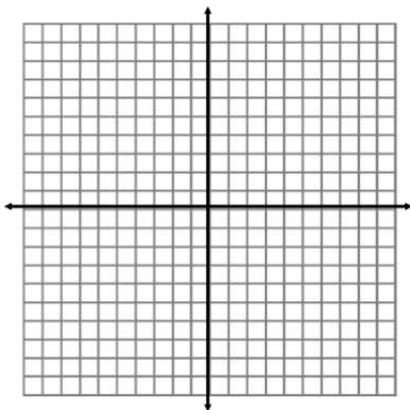
1)  $f(x) = (x - 4)^2 - 5$



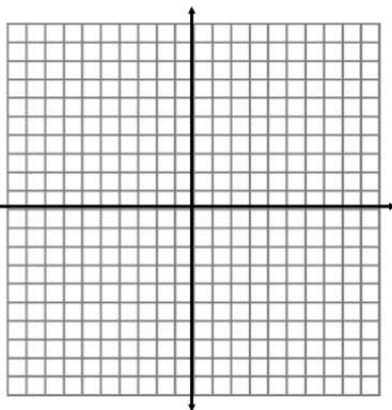
2)  $f(x) = -(x - 1)^2 + 4$



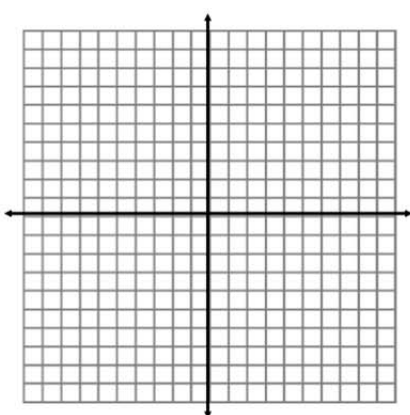
3)  $f(x) = 2(x + 2)^2$



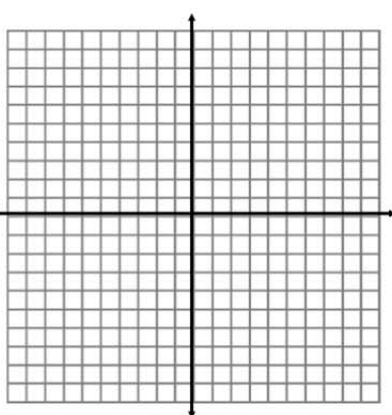
4)  $f(x) = 3(x + 1)^2 - 8$



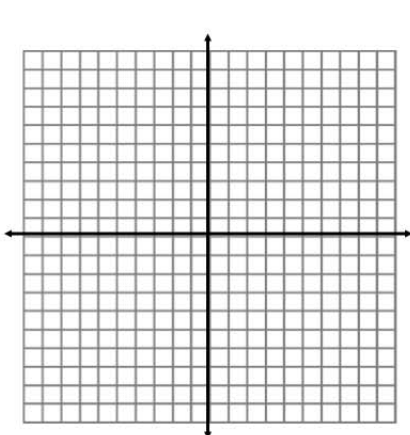
5)  $f(x) = -.7(x + 3)^2 + 1$



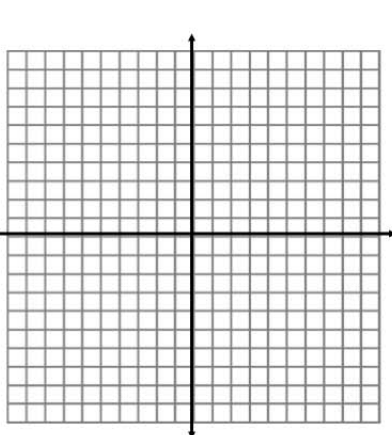
6)  $f(x) = -\frac{1}{2}(x - 4)^2 + 3$



7)  $f(x) = 2x^2 - 5$



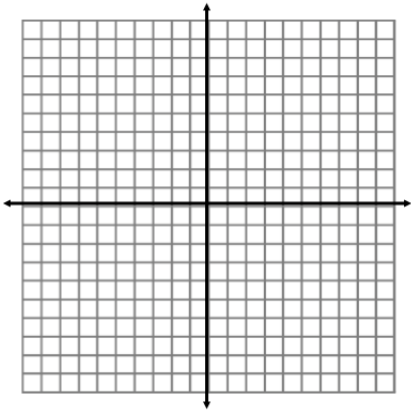
8)  $f(x) = -(x + 3)^2 - 5$



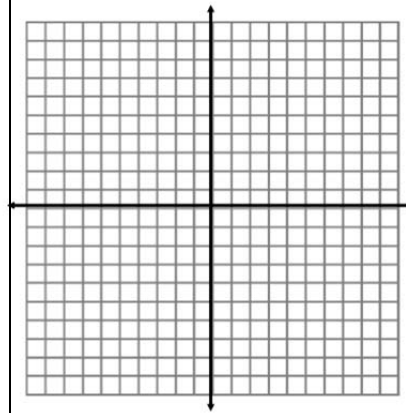
Plot as many points as possible, try for 5, but at least 3.

Plot as many points as possible, try for 5, but at least 3.

9)  $f(x) = -(x + 4)^2 + 9$



10)  $f(x) = 3(x + 1)^2 - 10$



Directions: Tell whether each function has a minimum value or a maximum value. Find the minimum or maximum value.

11)  $y = -2.5(x - 4.75)^2 - 5.25$

12)  $f(x) = -12(x + 17.6)^2 - 15.8$

13)  $y = 109(x - 345)^2 - 565$

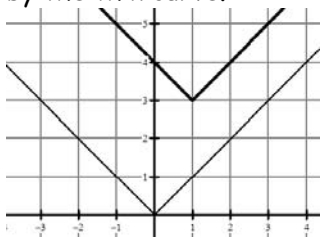
Directions: Describe and correct the error in analyzing the graph of  $f(x) = -4(x + 18)^2 - 15$

14) The graph will have a minimum value of 18.

15) The graph will be wider in comparison to the parent function because  $|a| > 1$ .

### Algebra Skillz

Below, the graph of  $f(x) = |x - 1| + 3$  is sketched in bold. Its parent function  $f(x) = |x|$  is represented by the thin curve.



1) Describe the translation of the parent graph.

2) How does the translation relate to the equation?

3)  $2\sqrt{20} + 4\sqrt{45}$

4)  $4\sqrt{2}(2\sqrt{2} + \sqrt{8})$

5) Solve:

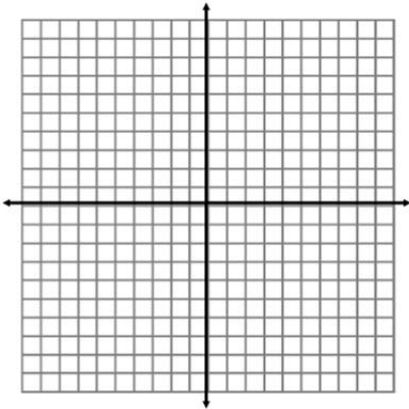
$$(2x - 7)(6x + 5) = 0$$

6) Factor and solve.

$$x^2 - 28 = -3x$$

### 5.1 Application and Extension

1) Graph the following:  $f(x) = -2(x - 3)^2 + 10$

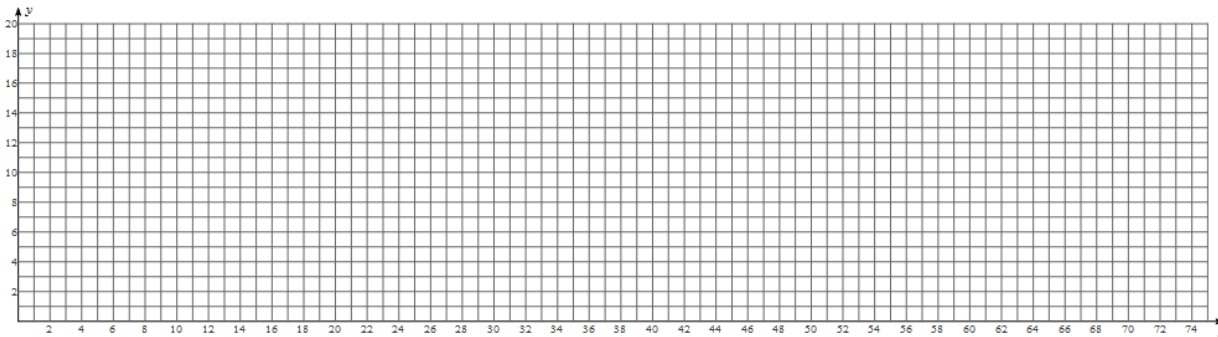


2) Tell whether there is a minimum value or maximum value. Then find the minimum or maximum value.

$$Y = .25(x + 7.4)^2 + 5.25$$

3) Bean Skywalker is practicing his new found Jedi skills by using the Force to move a football through the goal post. His Jedi-intellect tells him that the equation of the football's flight is  $y = -0.01(x - 35)^2 + 9$ , where  $x$  is horizontal distance traveled and  $y$  is vertical distance (both in feet).

a) Graph the path of the football. You may need to make a table.



b) What is the highest that Bean Skywalker can get the football off the ground?

c) How far in the air does the football travel when Bean Skywalker uses the force?

d) Darth Vader shows up for an EPIC duel. He claims that the equation of his line is  $y = -0.02(x - 43)^2 + 18$ . Graph the flight of his football on the same graph. You may need to make a table.

e) How high can Darth Vader get the football off the ground?

f) Who can get the football to travel farther down the field? How much farther?

4) Toys for Tots is a charity that is run by the U.S. Marine Corps Reserves that collects new, unwrapped toys each year and distributes those toys as Christmas gifts to less fortunate children. Toys for Tots also accept monetary donations throughout the year to help purchase gifts. They use the equation  $y = .25(x - 3)^2 + 1.2$  to model an estimate for how much money they raise throughout the year ( $x$  is the month ( $x = 1$  is January 1st) and  $y$  is the amount raised in millions of dollars).

a) What is the domain of the model in this situation?

b) What month would the U.S. Marine Corps Reserves expect the least amount of money to be donated? How much would they expect to be donated that month?

c) How much would the U.S. Marine Corps Reserves expect to be donated in August?

d) What month would the U.S. Marine Corps Reserves expect the most to be donated? About how much are they expecting that month?

**SAT PREP** Below are sample SAT questions. The SAT is the main standardized test that colleges look at for admission. One is multiple choices; the other is free response where you must grid in your answer. Blow it up.

**MULTIPLE CHOICE**

In the  $xy$  coordinate system, the graph of  $y=5(x-3)^2+1$  intersects  $y = -7(x-3)^2+1$  at what point?

- (A) (5, -7)
- (B) (-7, 5)
- (C) (-3, 1)
- (D) (3, 1)
- (E) (1, 3)

**GRID IN**

What is the maximum value of The graph of  $y = -2.5(x - 4.5)^2 + 15.5$

•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9