# Bell Ringer

**Wednesday 10/10**

1. Given the function $y = x^2 + 3x - 4$ Find the axis of symmetry and the vertex. Then use them to sketch a graph of the function.

a) Axis of Symmetry: $x = -1.5$

b) Vertex: $(-1.5, -6.25)$

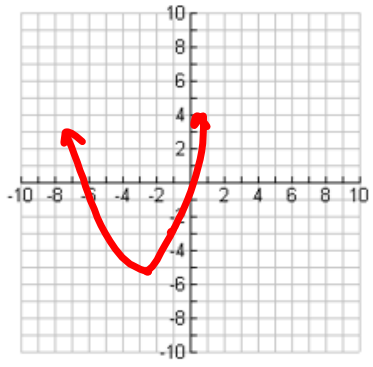
c) Sketch:

d) Y-Intercept: $(0, -4)$

e) X-Intercept(s): $x = -4, x = 1$

$\frac{-3}{2(1)} = -\frac{3}{2}$ $(-1.5)$

$(-1.5)^2 + 3(-1.5) - 4$



# Correct Vertex form ws A

## Vertex Form Worksheet A

Name:_____Hr:_____

Vertex form: $y = a(x - h)^2 + k$

Change the equation from standard form to vertex form. Identify the vertex and axis of symmetry.

1. $y = x^2 + 4x - 12$

2. $y = x^2 - 6x + 21$

3. $y = x^2 - 8x + 4$

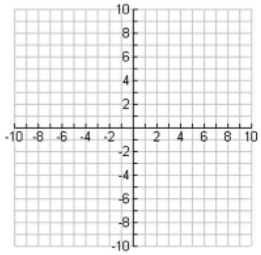
4. $y = x^2 + 3x - 5$

5. $y = 2x^2 + 4x - 12$

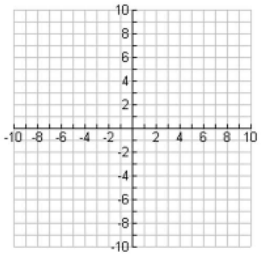
6. $y = -x^2 - 3x + 18$

Sketch the graph

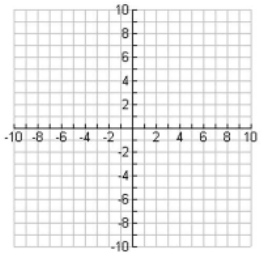
7. $y = (x-6)^2 + 3$



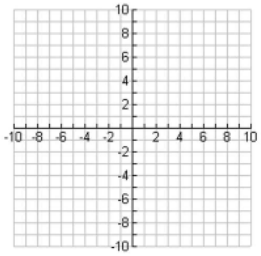
8. $y = x^2 - 2x - 5$



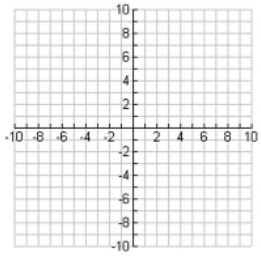
9. $y = x^2 + 4x$



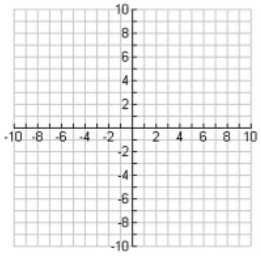
10. $y = 2(x+1)^2 - 4$



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

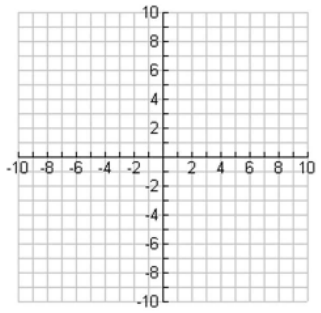


12. $y = 3x^2 + 6x + 9$



**Given the quadratic equations in standard form, find the following and graph:**

13. $y = x^2 + 4x + 5$



**A) Vertex Form** _____

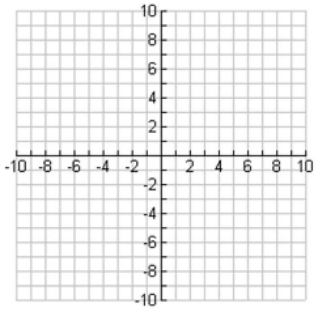
**B) Vertex** _____

**C) Axis of Symmetry** _____

**D) Max/Min** _____

**E) y-intercept** _____

14. $y = x^2 - 8x + 7$



**A) Vertex Form** _____

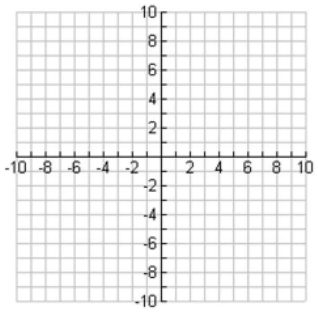
**B) Vertex** _____

**C) Axis of Symmetry** _____

**D) Max/Min** _____

**E) y-intercept** _____

15. $y = -2x^2 + 6x + 8$



**A) Vertex Form** _____

**B) Vertex** _____

**C) Axis of Symmetry** _____

**D) Max/Min** _____

**E) y-intercept** _____

## Vertex Form Worksheet A

Name: Key Hr:_____

Vertex form: $y = a(x-h)^2 + k$

Change the equation from standard form to vertex form. Identify the vertex and axis of symmetry.

1. $y = x^2 + 4x - 12$

$y = x^2+4x+4-12-4$

$y = (x+2)^2 - 16$

V: $(-2, -16)$

AOS: $x = -2$

2. $y = x^2 - 6x + 21$

$y = x^2-6x+9+21-9$

$y = (x-3)^2 + 12$

V: $(3, 12)$

AOS: $x = 3$

3. $y = x^2 - 8x + 4$

$x^2-8x+16+4-16$

$y = (x-4)^2 - 12$

V: $(4, -12)$

AOS: $x = 4$

4. $y = x^2 + 3x - 5$

$x^2+3x+\frac{9}{4}-5+\frac{9}{4}$

$y = (x+\frac{3}{2})^2 - \frac{11}{4}$

or

$y = (x+1.5) - 2.75$

V: $(-\frac{3}{2}, -\frac{11}{4})$ or $(-1.5, -1.75)$

AOS: $x = -1.5$ or $-\frac{3}{2}$

5. $y = 2x^2 + 4x - 12$

$y = 2(x^2+2x+4) - 12 - 8$

$y = 2(x+2)^2 - 20$

V: $(-2, -20)$

AOS: $x = -2$

6. $y = -x^2 - 3x + 18$

$y = -1(x^2+3x+2.25) + 18 + 2.25$

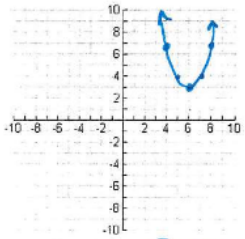
$y = -1(x+1.5) + 20.25$

V: $(-1.5, 20.25)$ or $(-\frac{3}{2}, \frac{81}{4})$

AOS: $x = -1.5$ or $x = -\frac{3}{2}$

Sketch the graph

7. $y = (x-6)^2 + 3$ (6,3)

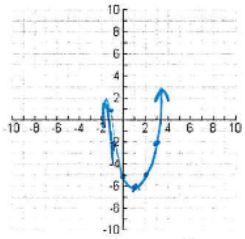


8. $y = x^2 - 2x - 5$

$x^2-2x+1-5-1$

$(x-1)^2 - 6$

$(1, -6)$

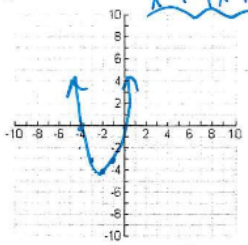


9. $y = x^2 + 4x$

$x^2+4x+4-4$

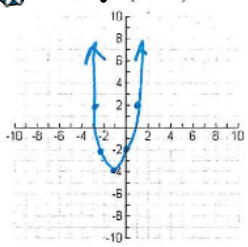
$(x+2)^2 - 4$

$(-2, -4)$



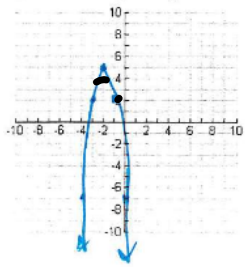
10. $y = 2(x+1)^2 - 4$

$(-1, -4)$



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

$(-2, 5)$

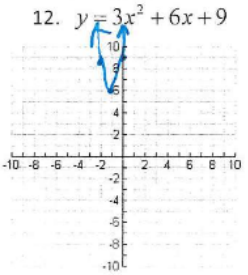


12. $y = 3x^2 + 6x + 9$

$y = 3(x^2+2x+1) + 9 - 3$

$= 3(x+1)^2 + 6$

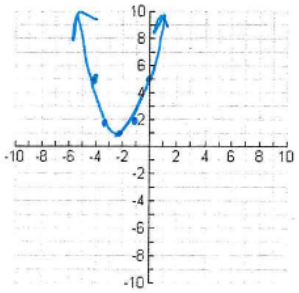
V: $(-1, 6)$



Given the quadratic equations in standard form, find the following and graph:

13. $y = x^2 + 4x + 5$ $x^2+4x+4 \quad +5 \quad -4$

$(x+2)^2+1$



A) Vertex Form $y=(x+2)^2+1$

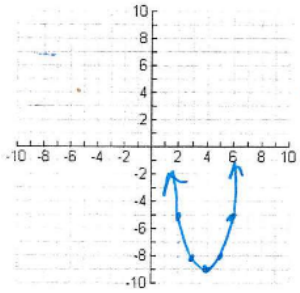
B) Vertex $(-2,1)$

C) Axis of Symmetry $x=-2$

D) Max/Min min

E) y-intercept $(0,5)$

14. $y = x^2 - 8x + 7$ $x^2-8x+16 \quad +7 \quad -16$



A) Vertex Form $y=(x-4)^2-9$ } +1

B) Vertex $(4,-9)$

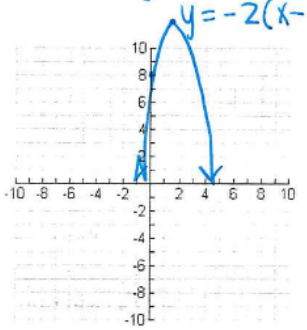
C) Axis of Symmetry $x=4$

D) Max/Min min } +1

E) y-intercept $(0,7)$

15. $y = -2x^2 + 6x + 8$ $y=-2(x^2-3x+2.25)+8 \quad +4.5$

$y=-2(x-1.5)^2+13.5$



A) Vertex Form $y=-2(x-1.5)^2+13.5$

B) Vertex $(1.5, 13.5)$

C) Axis of Symmetry $x=1.5$

D) Max/Min max

E) y-intercept $(0,8)$

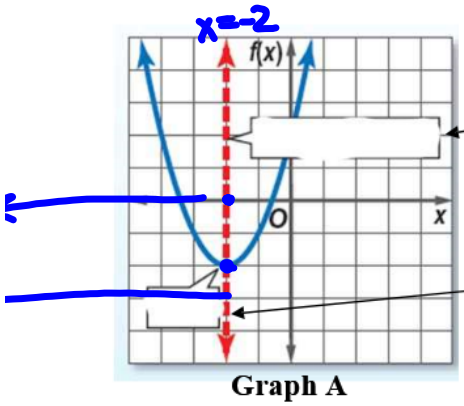
Vertex Ws form B due tomorrow

# Quadratic Graphs/Parabolas and Their Properties
## In Class Notes-Practice

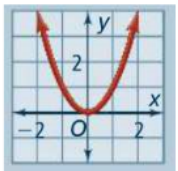
**Vocabulary Section:**
**For questions 1-11:** Fill in each blank using the word bank. See how many you can fill in without help.

| | | | | | |
|---|---|---|---|---|---|
| Vertex | Quadratic Function | minimum | axis of symmetry | x-intercepts | $(-\infty, -2]$ |
| $[-2, \infty)$ | parabola | Quadratic Parent Function | maximum | zeros/roots/solutions | $y = ax^2 + bx + c$ |

1. Standard form of a quadratic function is $y = ax^2 + bx + c$
2. The shape of a quadratic equation is called a parabola

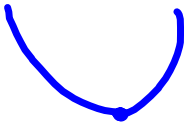



Graph A

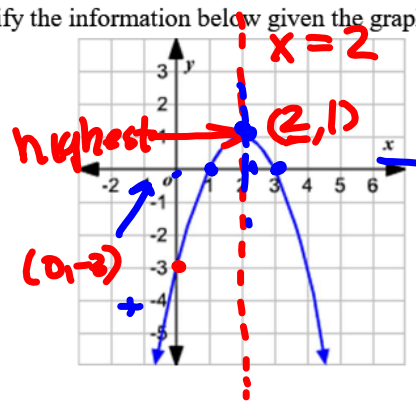
3. Axis of symmetry
4. Vertex
5. When the vertex is the highest point on the graph, we call that a max.
6. A Function that can be written in the form $y = ax^2 + bx + c$ where $a \neq 0$ Quadratic Function
7. Our solutions are the x-intercepts.
8. Solutions to quadratic equations are called zeroes / roots / solutions / x-int
9. When the vertex is the lowest point on the graph, we call that a min.
10. $y = x^2$  Quad. Parent Function.



11. Using an interval in terms of x state where **Graph A** is: increasing: $(-2, \infty)$ decreasing: $(-\infty, -2)$



12. Identify the information below given the graph and the equation: $y = -x^2 + 4x - 3$




AOS: $x = 2$

Min or Max: max

Vertex: (2,1)

y intercept (in standard form it's c): (0, -3)

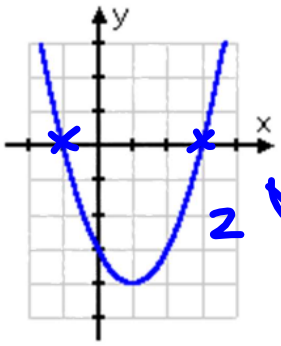
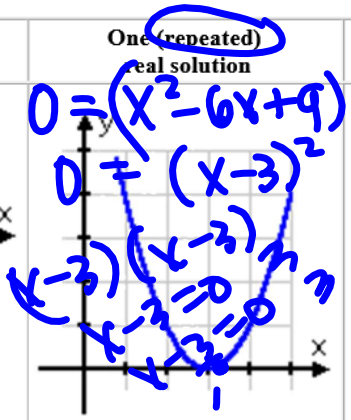
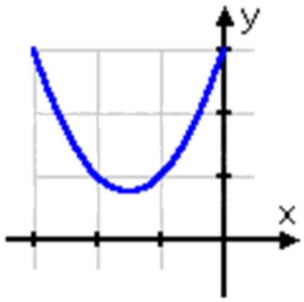
Solutions: $x = 1, 3$

Increasing: $(-\infty, 2)$

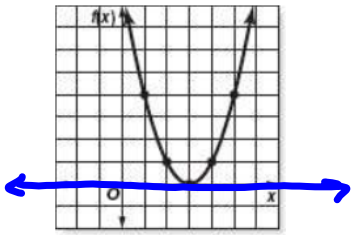
Decreasing: $(2, \infty)$

Direction of opening: down

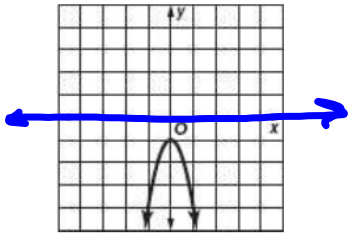
- When solving quadratic equations, you found there could different types of solutions.
  - Two real solutions (rational or irrational) – a positive number inside the square root.
  - One (repeated) real solution – zero inside the square root.
  - Two complex solutions - a negative number inside the square root.

| Two real solutions | One (repeated) real solution | Two complex solutions or no real solutions |
|---|---|---|
|  |  |  |
| two distinct $x$-intercepts | one (repeated) $x$-intercept | no $x$-intercepts |

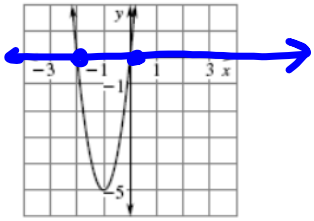
**Determine whether the quadratic functions have two real roots, one real root, or no real roots.**



12. Number of roots: 1



13. Number of roots: no real sol



14. Number of roots: 2

In your own words, Explain what the Domain and the Range of a graph are:

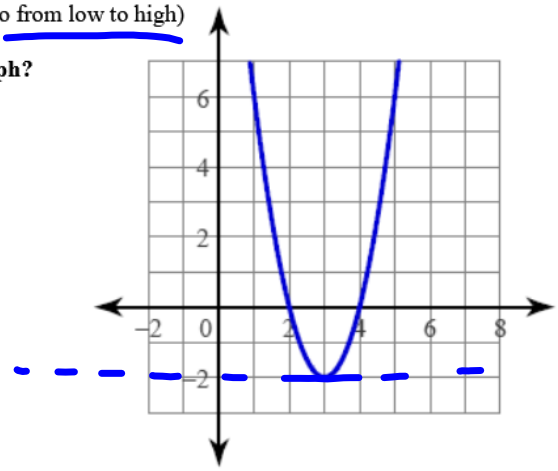
Domain: all possible inputs, x

Range: all possible outputs, y

**Set Builder Notation:** $\{x|x \leq 0\}$ or $\{y|y \leq 0\}$ etc. (You state where the values of the function are headed from x or y)

* **Interval Notation: [ , ] or ( , )** (you put your starting x value and your ending x value, use brackets if the number is included and parenthesis if it is not, always go from low to high)

**What are the Domain and Range for this quadratic graph?**



**15.** ***Interval Notation***:

Domain: $(-\infty, \infty)$

Range: $[-2, \infty)$

**16.** ***Set Builder Notation:***

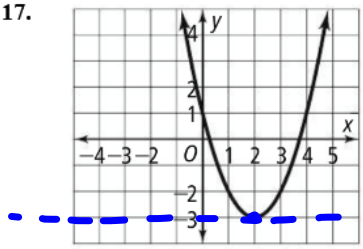
Domain: $\mathbb{R}$ all reals

Range: $\{y \mid y \geq -2\}$ such that

**Identify the Domain and Range of each:**

Use interval notation for number 17 and use set builder notation for number 18.

**17.**



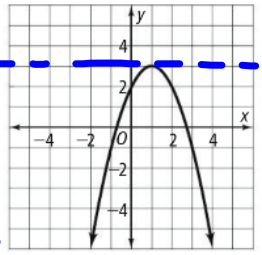
D: $(-\infty, \infty)$

R: $[-3, \infty)$

D: $\mathbb{R}$

R: $\{y \mid y \geq -3\}$

**18.**



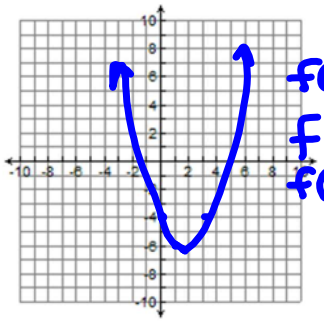
D: $(-\infty, \infty)$

R: $(-\infty, 3]$

D: $\mathbb{R}$

R: $\{y \mid y \leq 3\}$

**19.** Sketch a graph of the following function: $f(x) = x^2 - 3x - 4$ (use your calculator or chose points and fill in the table).



$f(0) = 0^2 - 3(0) - 4$

$f(1) = 1 - 3 - 4$

$f(3) = 9 - 9 - 4$

| x | y | Point (x, y) |
|---|---|---|
| 0 | -4 | (0, -4) |
| 1 | -6 | (1, -6) |
| 3 | -4 | (3, -4) |
| 4 | | |
| 5 | | |

1.5 -6.25 (1.5, -6.25)

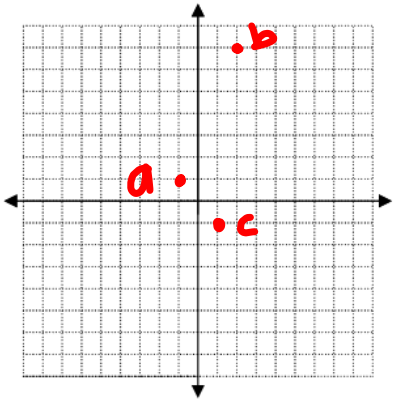
***Evaluating Functions Graphically and Algebraically:***

**20.** Translate the following statements into coordinate points, and then plot them.

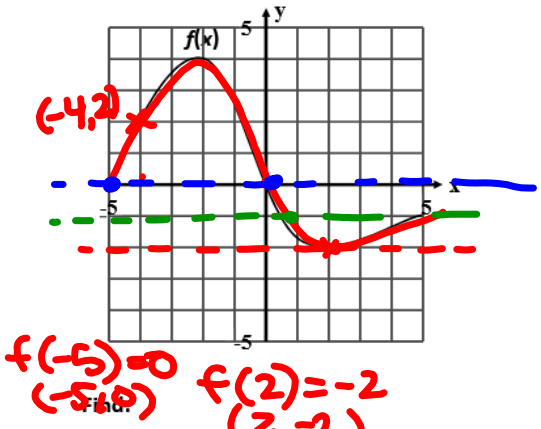
a. $f(-1) = 1$ (-1, 1)

b. $f(2) = 7$ (2, 7)

c. $f(1) = -1$ (1, -1)




**21.** Given this graph of the function f(x):




Find:

a. $f(-4) = 2$

b. $f(0) = 0$ (0,0)

c. $x$ when $f(x) = -2$ (2, -2) x=2

d. $x$ when $f(x) = 0$ f(x) = -1 $(\frac{1}{2}, -1)$ (-5, 0) (0, 0) x=-5, 0

**22.** $f(x) = -x^2 + 10x - 12$, find $f(-1)$

$-(-1)^2 + 10(-1) - 12$

$f(-1) = -23$

(-1, -23)

**23.** $g(x) = -2g^2 - 19g - 5$, find $g(0)$

$g(0) = -2(0) - 19(0) - 5$

$g(0) = -5$

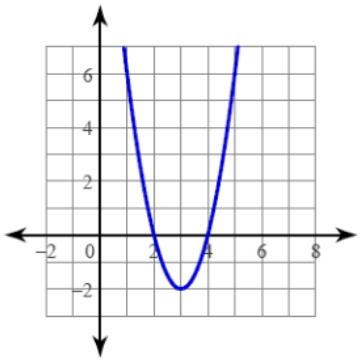
(0, -5),

due Friday

Name: _____Hr:_____

# Finding Parts of a Parabola

What are the Domain and Range for this quadratic graph?



***Interval Notation***:

Domain: _____

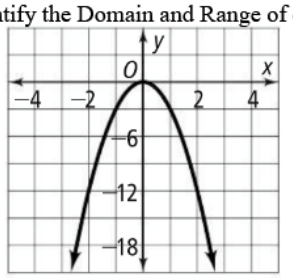
Range: _____

***Set Builder Notation:***

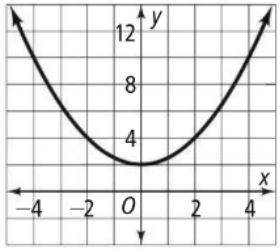
Domain: _____

Range: _____

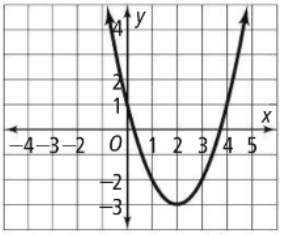
Identify the Domain and Range of each:



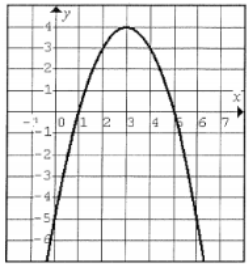
1. Domain: _____
   Range: _____



2. Domain: _____
   Range: _____



3. Domain: _____
   Range: _____



4. Domain: _____
   Range: _____

**5.** Given the graph of $f(x)$ at the right, find the following:

a. $f(-4) =$ _____

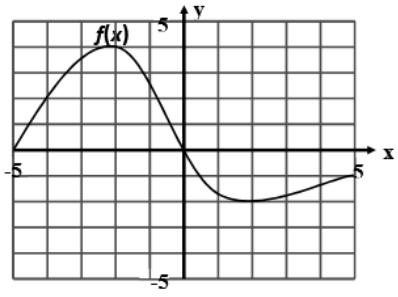
b. $f(0) =$ _____

c. $f(3) =$ _____

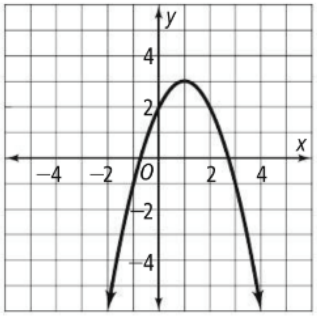
d. $f(-5) =$ _____

e. $x$ when $f(x) = -2$ _____

f. $x$ when $f(x) = 0$ _____

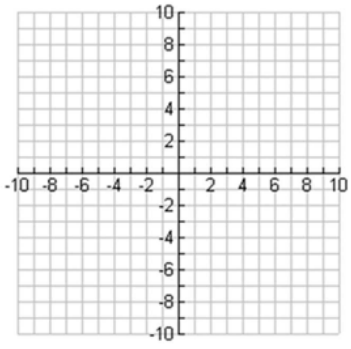


**6. Given the graph at the right, find the following:**



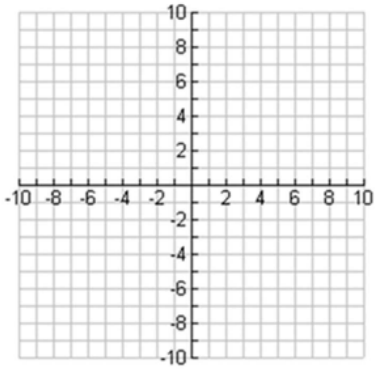

a. Vertex: _____
b. Axis of Symmetry: _____
c. x-intercepts: _____
d. y-intercept: _____
e. Max/Min: _____
f. Vertex Form of the Equation: _____
g. $f(4) =$ _____
h. $f(0) =$ _____
i. $f(6) =$ _____
j. Domain: _____
k. Range: _____
l. Direction of opening: _____

**7. Given the equation $f(x) = x^2 - 4x - 5$, find the following:**




a. Vertex: _____
b. Axis of Symmetry: _____
c. x-intercept(s): _____
d. y-intercept: _____
e. Max/Min: _____
f. Sketch a graph
g. $f(-2) =$ _____
h. Domain: _____
i. Range: _____
j. Direction of opening: _____

**8. Given the equation $f(x) = 2(x-4)^2 - 8$ , find the following:**




a. Vertex: _____
b. Axis of Symmetry: _____
c. x-intercept(s): _____
d. y-intercept: _____
e. Max/Min: _____
f. sketch a graph
g. $f(3) =$ _____
h. Direction of opening: _____
i. Domain: _____
j. Range: _____