

Geometry

Unit 2C – Graphing and Converting Quadratic Equations and Inequalities

Thursday, October 15

Quadratics Intro to Graphing

HW: Intro to Graphing Quadratics –
"From Linear to Quadratic" WS

Friday, October 16

Character Ed

-started graphing in vertex form

Monday, October 19

Graphing Quadratics

Graphing Quadratic Equations Vertex Notes

Graphing In-Class Practice Questions

Foldable

HW: Writing Equations in Vertex Form (pages 4-5)

Tuesday, October 20

Graphing Quadratics

Graphing Quadratic Equations in Vertex Form

Hallway Group Activity

HW: Vertex Form of a Quadratic (pages 6-9)

Wednesday, October 21

Graphing Standard Form Notes (page 10)

Foldable

HW: Graphing Standard form WS (pages 11-12)

Thursday, October 22

Graphing Standard Form Practice

Classwork/Homework (pages 13-15)

Friday, October 23

Graphing Intercept Form Notes (page 16)

Foldable

HW: Graphing Intercept Form (page 17)

Monday, October 26

Graphing Quadratic Equations in Intercept Form

Classwork/Homework (pages 18-19)

Tuesday, October 27

Characteristics of Functions Notes (pages 20-21)

HW: (page 22)

Wednesday, October 28

More practice with characteristics_(page 23)

HW: (page 24-25)

Thursday, October 29

Characteristics of Functions Stations

HW: (page 26)

Friday, October 30

Quiz review (page 27)

QUIZ (graphing and characteristics)

Word problems with quadratics (pages 28-29)

Monday, November 2

Converting Quadratics Notes (pages 30-31)

HW: (page 32-33 evens)

Tuesday, November 3

Converting Quadratics practice (pages 32-33 odds)

HW: (pages 34-35 evens)

Wednesday, November 4

More converting practice (pages 34-35 odds)

HW: (page 36)

Thursday, November 5

Quadratic word problems (pages 37-40)

HW: finish classwork

Friday, November 6

Graphing and Solving Inequalities Notes (pages 41-44)

HW: (page 45)

Monday, November 9

More inequalities practice (pages 46-49)

HW: finish above work

Tuesday, November 10

QUIZ on Converting forms of quadratics and inequalities

**Bring graphing calculator tomorrow if you have one!!

Wednesday, November 11

Calculator Graphing Inequalities STATIONS

HW: Review (pages 50-54)

Thursday, November 12

Test

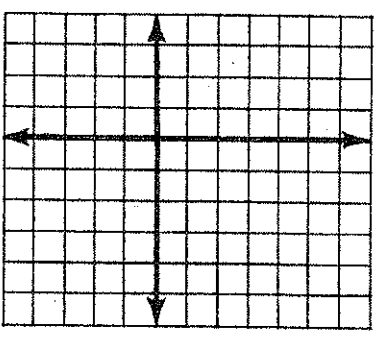
FROM LINEAR TO QUADRATIC

Complete each table and graph the function.



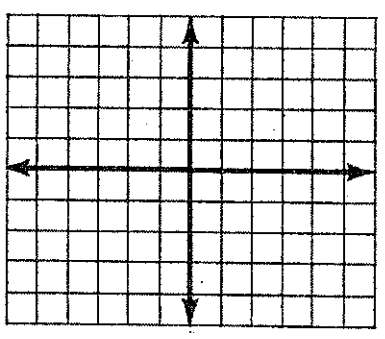
1 $y = 2x - 3$

x	y
5	
2	
0	
-1	



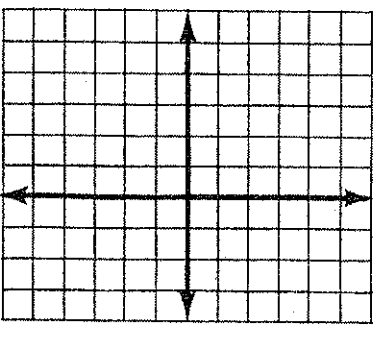
2 $y = x^2 - 5$

x	y
3	
2	
1	
0	
-1	
-2	
-3	



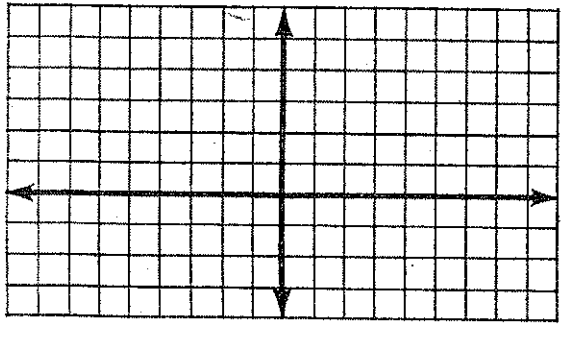
3 $y = x^2 + 4x$

x	y
1	
0	
-1	
-2	
-3	
-4	
-5	



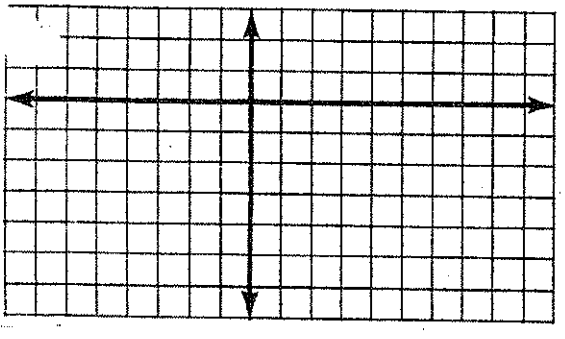
4 $y = x^2 + 2x - 7$

x	y
-5	
-4	
-3	
-2	
-1	
0	
1	
2	
3	



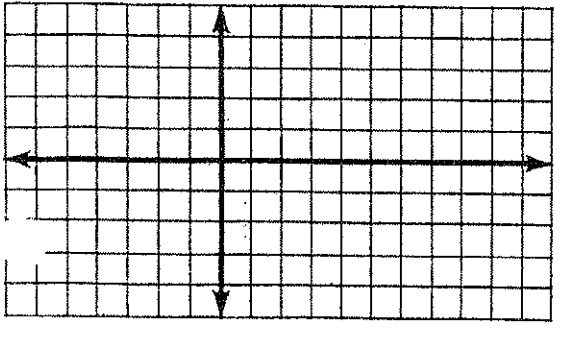
5 $y = -x^2 + 6x + 1$

x	y
7	
6	
5	
4	
3	
2	
1	
0	
-1	



6 $y = 2x^2 - 4x - 5$

x	y
4	
3	
2	
1	
0	
-1	
-2	

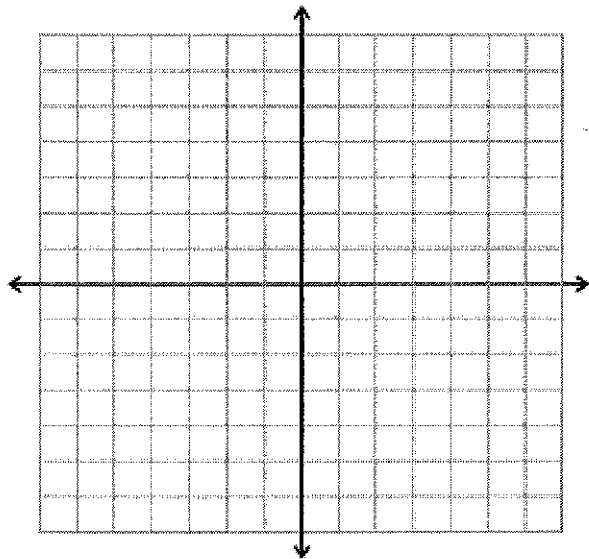


OBJECTIVE 1-e: To graph quadratic functions and compare them to a linear function.

GRAPHING QUADRATICS IN VERTEX FORM

EXAMPLE 1:

$$y = (x - 3)^2 - 2 \quad y = (x - 3)^2 - 2$$



STEPS:

- 1) find the vertex by doing (opposite, same): _____
- 2) Axis of Symmetry $x = x$ -value of vertex _____
- 3) make a table of values, pick two values larger than the x -value of your vertex and pick two values smaller than the x -value of your vertex, find the y -values
- 4) plot all the points you found

Name: _____ Date: _____

Quadratics – Vertex Form

$$f(x) = a(x-h)^2 + k$$

This is the easiest form to use to find the vertex.

Vertex: (h, k)

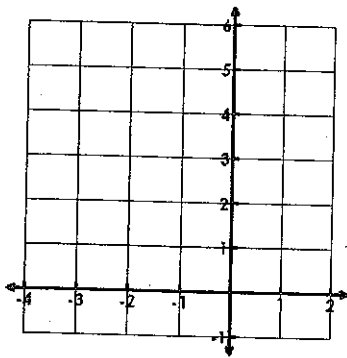
Axis of Symmetry: $x = h$

Steps to Graphing in VERTEX form:

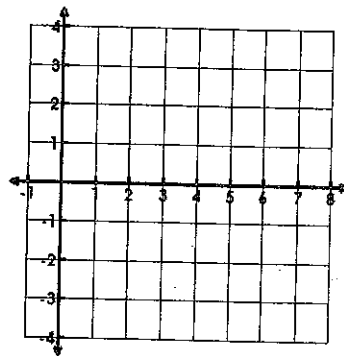
1. Find the vertex. Change the sign of h . Plot it.
2. Find the axis of symmetry. Graph this lightly as a dashed vertical line.
3. On your calculator: TABLE, EDIT FUCTION, ENTER, START = <enter your h -value>, CALC, ENTER. Scroll up and down to get other ordered pairs.
4. Connect in a u-shape with arrows at each end.

Graph & identify the vertex and axis of symmetry.

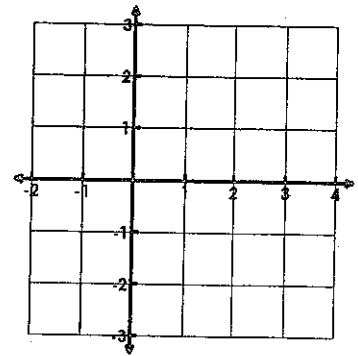
1. $f(x) = (x+2)^2 + 1$



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

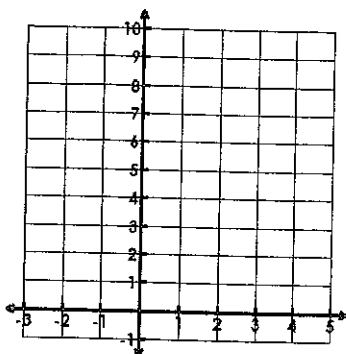


3. $f(x) = -(x-1)^2 + 2$

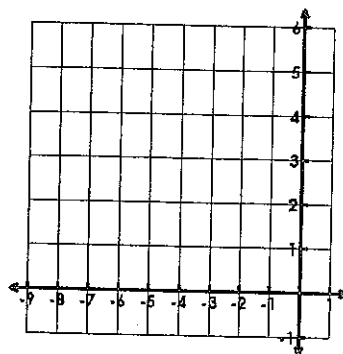


Graph & identify the vertex and axis of symmetry.

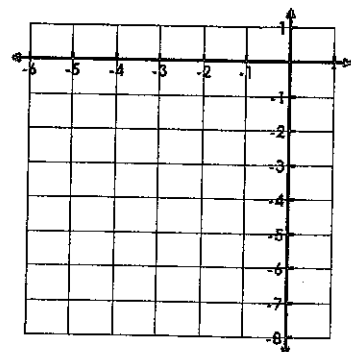
4. $f(x) = (x-2)^2 + 3$



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

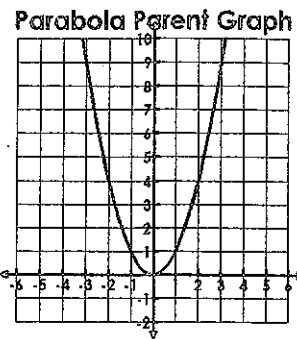


6. $f(x) = -(x+3)^2 - 3$



Transformations of Vertex Form

$$f(x) = a(x - h)^2 + k$$



What does a do to the parent graph?

- _____
- _____
- _____

What does h do to the parent graph?

- _____
- _____

What does k do to the parent graph?

- _____
- _____

Determine what transformations are applied in the following functions.

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

- _____
- _____

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

- _____
- _____
- _____

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

- _____
- _____
- _____

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

- _____
- _____
- _____

Unit 2c Graphing Quadratics

Vertex Form for Quadratics

$$f(x) = a(x - h)^2 + k$$

NEGATIVE on the INSIDE, what does this cause the graph to do?

$$f(x) = a(-x - h)^2 + k$$

Reflect across the y
(h will be the same as if's sign)

"y" am I in here

Transformations of Quadratics in Vertex Form

$$f(x) = a(x - h)^2 + k$$

If $|a|$ is **NEGATIVE** then the graph reflects across the **x-axis**.

If $|a|$ is less than 1, the graph **SHRINKS**.

If $|a|$ is greater than 1 the graph **STRETCHES**.

h is **TRICKY!**
If h is **POSITIVE** then the graph moves **LEFT**.

If h is **NEGATIVE** then the graph moves **RIGHT**.

Axis of Symmetry: $x = h$

*Special Case *

If x is **NEGATIVE** inside then the graph reflects across the **y-axis**, and h takes the sign you see.

If k is **POSITIVE** then the graph moves **UP**.

If k is **NEGATIVE** then the graph moves **DOWN**.

Vertex: (h, k)

NEGATIVE on the OUTSIDE, what does this cause the graph to do?

$$f(x) = -a(x - h)^2 + k$$

Reflect across the x
X escaped

Number less than 1 outside, what does this cause the graph to do?

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

Shrink by 3/4

Add on the inside, what does this cause the graph to do?

$$f(x) = a(x+2)^2 - k$$

Move LEFT 2

Subtract on the outside, what does this cause the graph to do?

$$f(x) = a(x-h)^2 - 3$$

Move Down 3

Number greater than 1 outside, what does this cause the graph to do?

$$f(x) = 8(x-h)^2 + k$$

Stretch by 8

Subtract on the inside, what does this cause the graph to do?

$$f(x) = a(x-7)^2 - k$$

Move RIGHT 7

Add on the outside, what does this cause the graph to do?

$$f(x) = a(x-h)^2 + 5$$

Move Up 5

DESCRIBE THE TRANSFORMATION

$f(x) = -3(x + 7)^2 - 9$
 reflect across x-axis
 stretch by 3
 left 7
 down 9

$f(x) = x^2$ Parent Graph
 $f(x) = x^2 + 2$

$f(x) = \frac{1}{4}(x - 3)^2 + 5$
 Shrink $\frac{1}{4}$
 right 3
 up 5

Write the equation of the pink graph

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

$f(x) = x^2$ Parent Graph

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

$f(x) = x^2$ Parent Graph

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

Class Work/Homework
Vertex Form of a Quadratic WS

$f(x) = x^2$ Parent Graph

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

$f(x) = x^2$ Parent Graph

$f(x) = 3x^2$

Name: _____ Date: _____

Vertex Form of a Quadratic

UNIT QUESTION: How are real life scenarios represented by quadratic functions?

Today's Question: How do we graph quadratics in vertex form using transformations? MCC9-12.F.BF.3

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

Vertex: (h,k)

Describe the transformations of the parent graph for each equation.

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

- a: _____
- h: _____
- k: _____

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

- a: _____
- h: _____
- k: _____

3. $f(x) = \frac{1}{2}(x - 10)^2$

- a: _____
- h: _____
- k: _____

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

- a: _____
- h: _____
- k: _____

5. $f(x) = \frac{2}{3}(x - 8)^2$

- a: _____
- h: _____
- k: _____

6. $f(x) = (x + 1)^2 + 4$

- a: _____
- h: _____
- k: _____

Write the quadratic equation in vertex form that has been...

_____ 7. shifted to the right 4 and up 3

_____ 8. reflected over the x-axis and shifted left 11

_____ 9. moved down 17

_____ 10. reflected over the x-axis, shifted left 9 and down 8.

Describe the transformations and write an equation for each quadratic function.

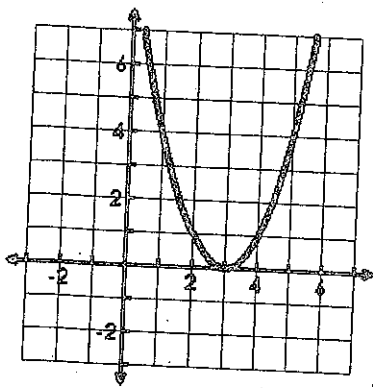
11. Vertex: _____

• a: _____

• h: _____

• k: _____

f(x) = _____



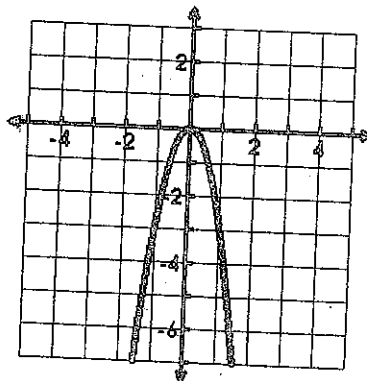
12. Vertex: _____

• a: _____

• h: _____

• k: _____

f(x) = _____



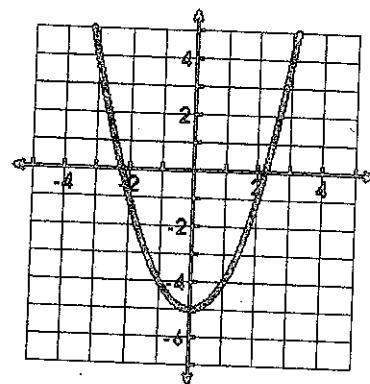
13. Vertex: _____

• a: _____

• h: _____

• k: _____

f(x) = _____

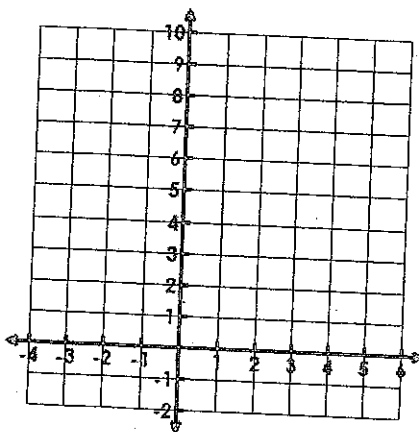


Graph the following equations Identify the vertex and the axis of symmetry.

14. $f(x) = 2(x-1)^2$

Vertex: _____

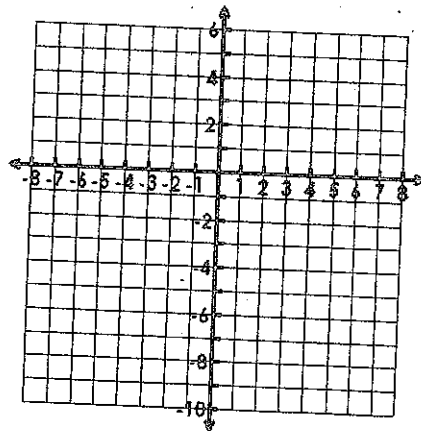
Axis of Symmetry: $x =$ _____



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

Vertex: _____

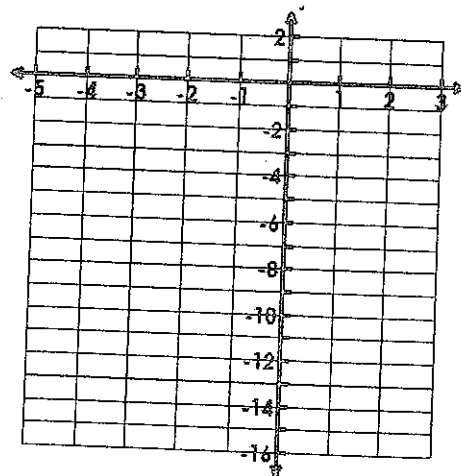
Axis of Symmetry: $x =$ _____



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

Vertex: _____

Axis of Symmetry: $x =$ _____



5

Name:

Date:

Period:

Practice Worksheet: Graphing Quadratic Functions in Vertex Form

For #1-6, label the axis of symmetry, vertex, y-intercept, and at least three more points on the graph.

1] $y = (x - 3)^2$

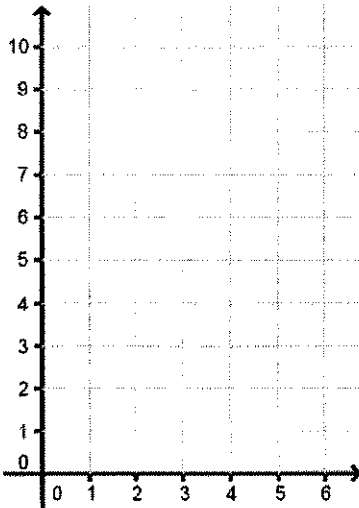
Axis of Symmetry is $x =$ _____

Vertex: (____, ____)

Opens up or down?

Slope to point one unit from the vertex is _____.

y-intercept: (0, _____)



2] $y = -(x + 3)^2 + 5$

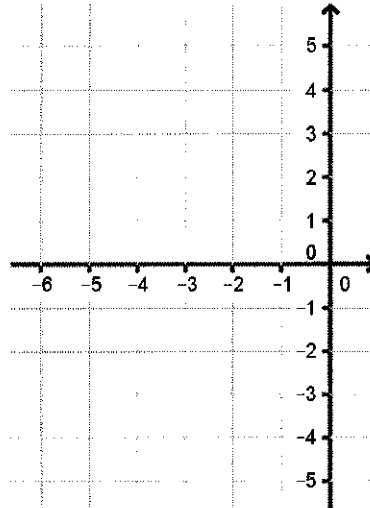
Axis of Symmetry is $x =$ _____

Vertex: (____, ____)

Opens up or down?

Slope to point one unit from the vertex is _____.

y-intercept: (0, _____)



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

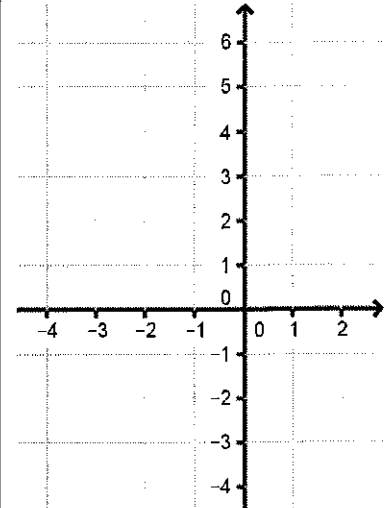
Axis of Symmetry is $x =$ _____

Vertex: (____, ____)

Opens up or down?

Slope to point one unit from the vertex is _____.

y-intercept: (0, _____)



4] $y = -2(x - 2)^2 - 1$

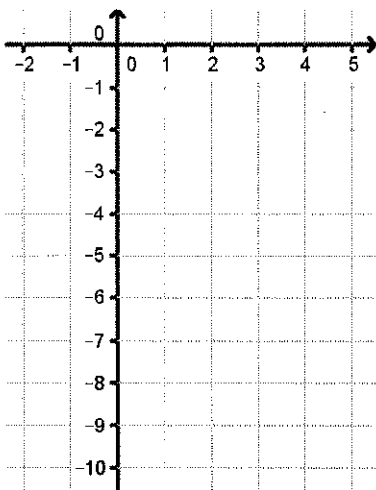
Axis of Symmetry is $x =$ _____

Vertex: (____, ____)

Opens up or down?

Slope to point one unit from the vertex is _____.

y-intercept: (0, _____)



5] $y = \frac{1}{2}(x - 3)^2 + 2$

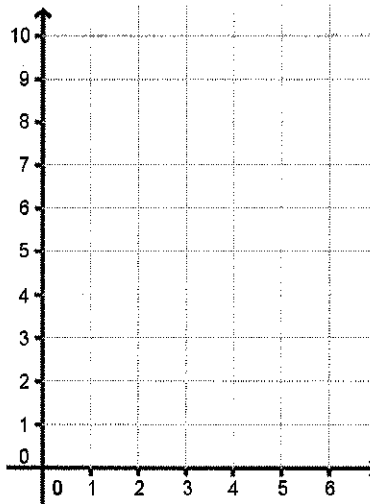
Axis of Symmetry is $x =$ _____

Vertex: (____, ____)

Opens up or down?

Slope to point one unit from the vertex is _____.

y-intercept: (0, _____)



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

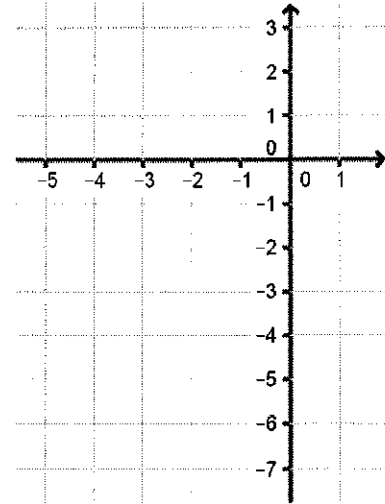
Axis of Symmetry is $x =$ _____

Vertex: (____, ____)

Opens up or down?

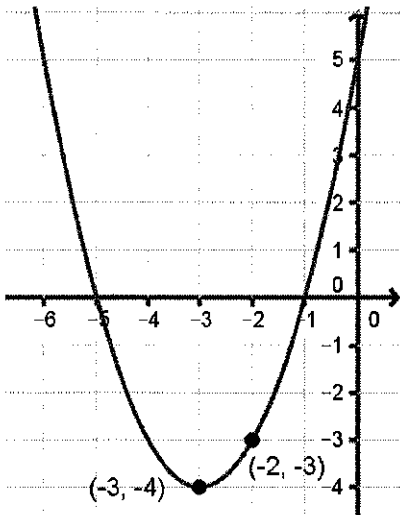
Slope to point one unit from the vertex is _____.

y-intercept: (0, _____)

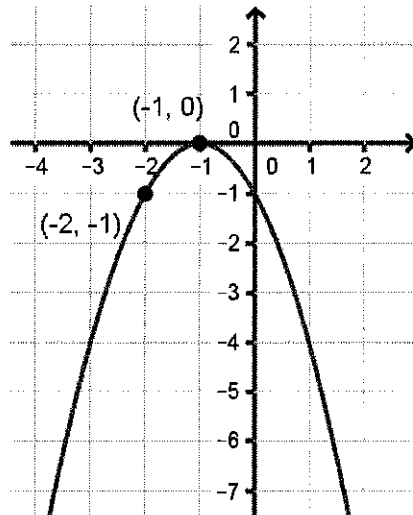


Write the equation of the parabola in vertex form.

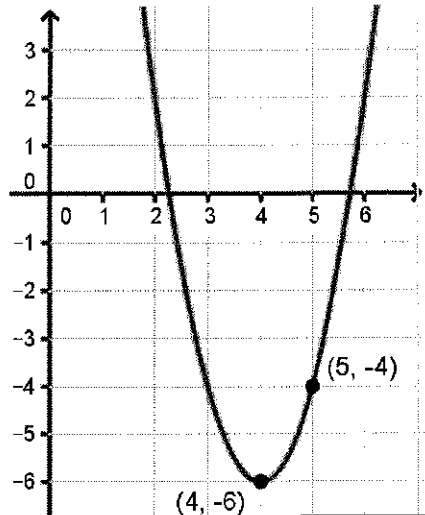
7]



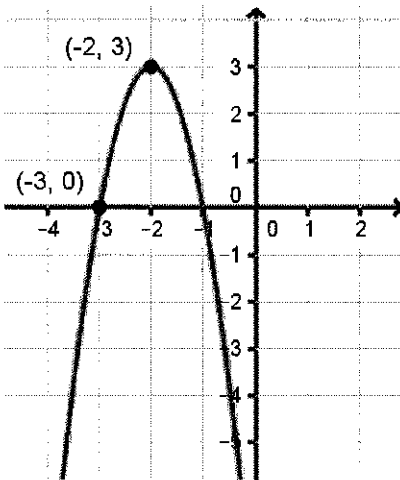
8]



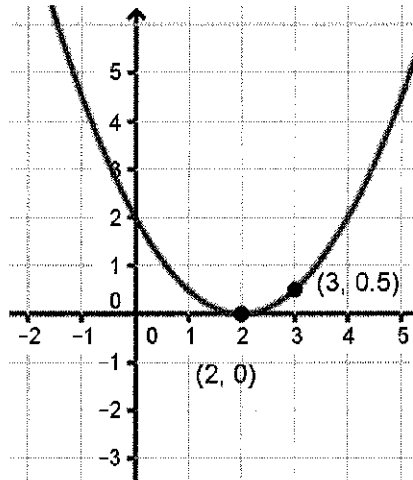
9]



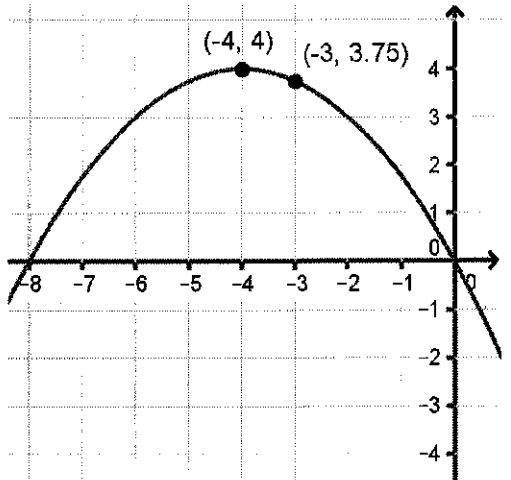
10]



11]



12]



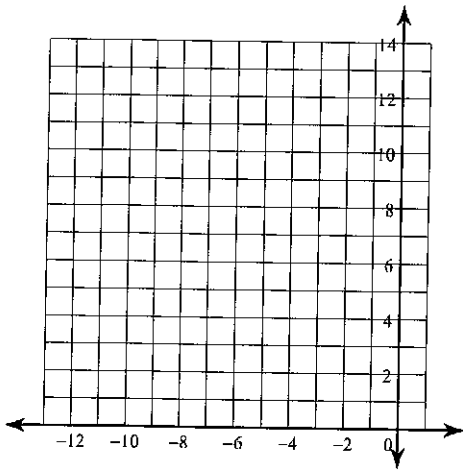
Write the quadratic function in standard form. *Oh can you figure out???*

13] $y = -(x + 2)^2$

14] $y = (x - 2)^2 + 4$

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

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

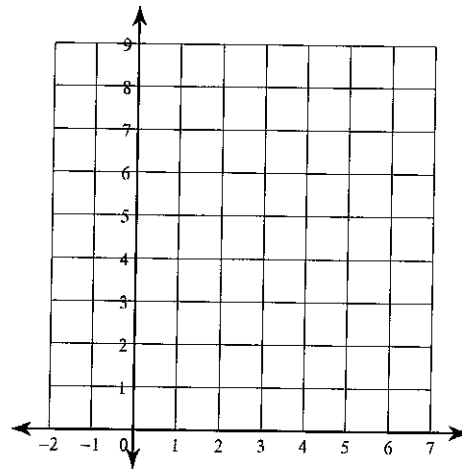


x	y
---	---

Vertex: _____

AOS: _____

$$6) f(x) = (x-4)^2 + 4$$

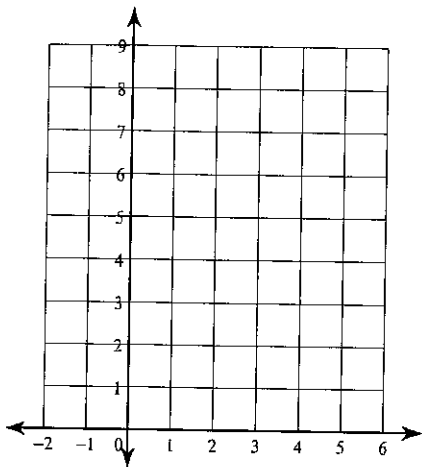


x	y
---	---

Vertex: _____

AOS: _____

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

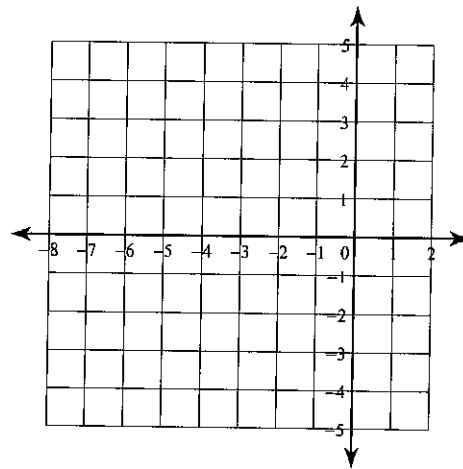


x	y
---	---

Vertex: _____

AOS: _____

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



x	y
---	---

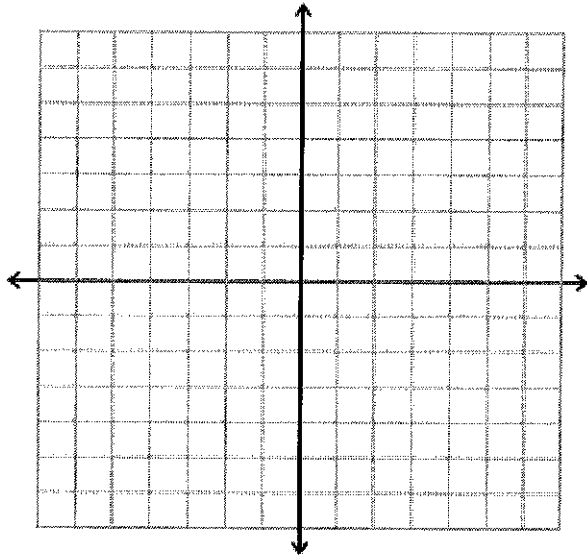
Vertex: _____

AOS: _____

GRAPHING QUADRATICS IN STANDARD FORM

EXAMPLE 1:

$$y = x^2 + 4x + 8$$



STEPS:

- 1) find the x-value of the vertex by: _____
- 2) Find the y-value of the vertex by substituting the x-value into equation and simplifying
- 3) Axis of Symmetry $x =$ x-value of vertex _____
- 4) make a table of values, pick two values larger than the x-value of your vertex and pick two values smaller than the x-value of your vertex, find the y-values

x	y

- 5) plot all the points you found

Graphing Quadratics in Standard Form

Steps to Graphing in Standard Form

1. Identify a, b, and c.
2. Find the Axis of Symmetry. $x = \frac{-b}{2a}$
3. Table, Edit Function, Start = A.O.S. This value is your VERTEX. Plot it.
4. Scroll up and down to get other ordered pairs.
5. Connect in a U-shape with arrows at each end.

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

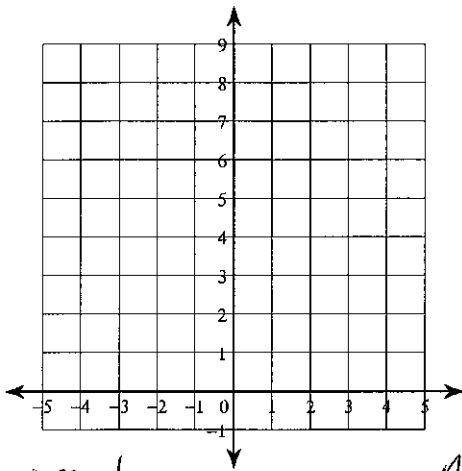
$$f(x) = x^2 - 6x + 5$$

Assignment

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Sketch the graph of each function. Be sure to show your table of values and your work either next to the graph or on a separate sheet of paper.

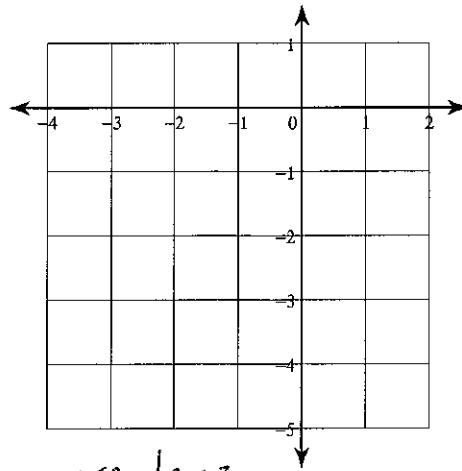
1) $y = 2x^2$



x	y
---	---

vertex: _____ AOS: _____

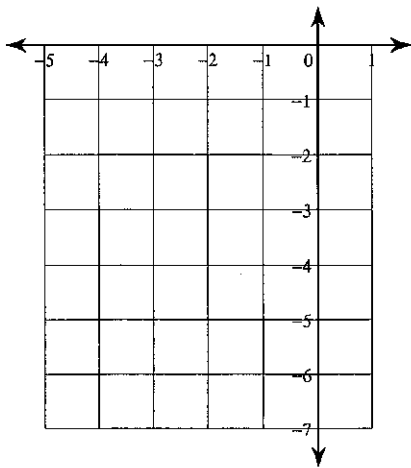
2) $y = -x^2$



x	y
---	---

vertex: _____ AOS: _____

3) $y = -x^2 - 6x - 11$

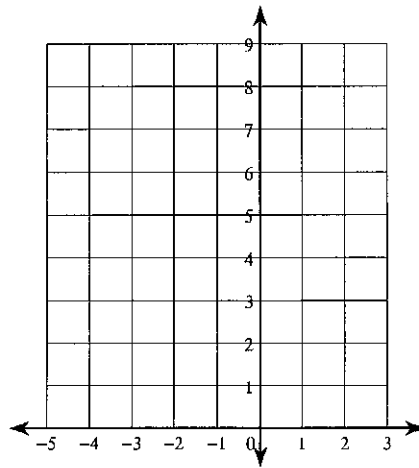


x	y
---	---

vertex: _____

AOS: _____

4) $y = x^2 + 4x + 8$

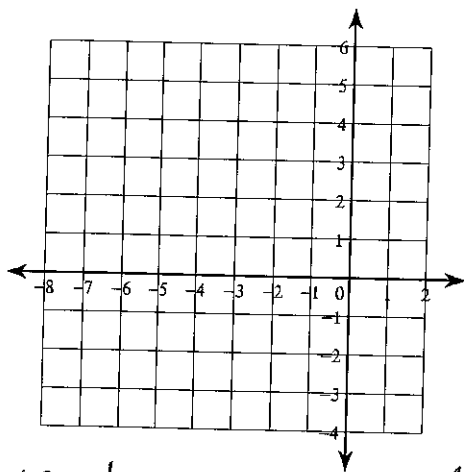


x	y
---	---

vertex: _____

AOS: _____

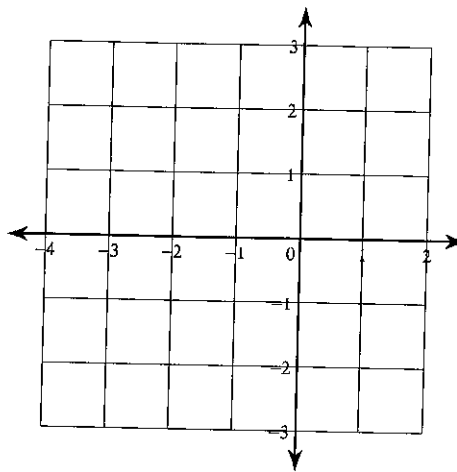
5) $y = 2x^2 + 4x - 1$



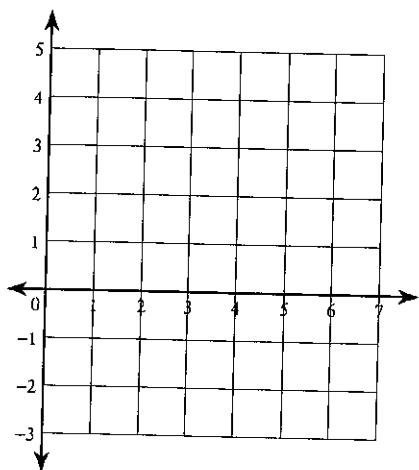
$x | y$

vertex: _____ AOS: _____

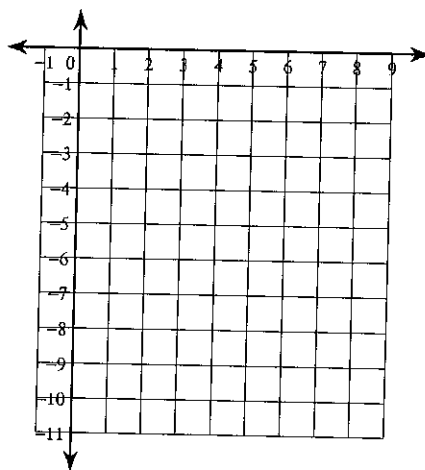
6) $y = -x^2 - 2x + 1$



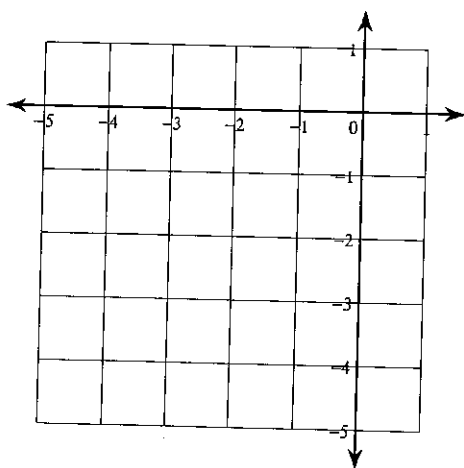
7) $y = x^2 - 8x + 15$



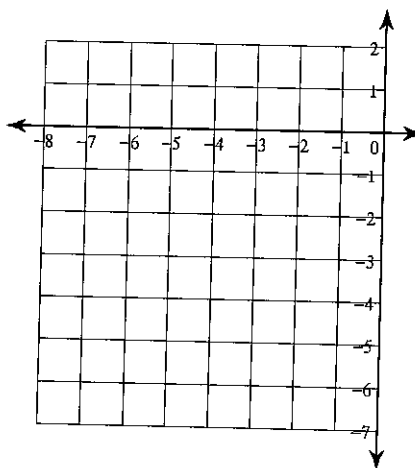
8) $y = -2x^2 + 8x - 10$



9) $y = x^2 + 5x + 2$



10) $y = -2x^2 - 14x - 23$



HW Graphing Quadratics (standard form)

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Find the discriminant of each quadratic equation then state the number and type of solutions.

1) $9x^2 + 4x + 7 = 0$

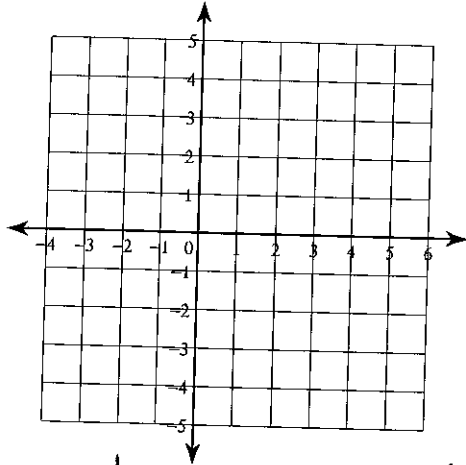
2) $3n^2 + 4n - 4 = 0$

3) $-8x^2 - 3x - 9 = 0$

4) $6a^2 - a - 1 = 0$

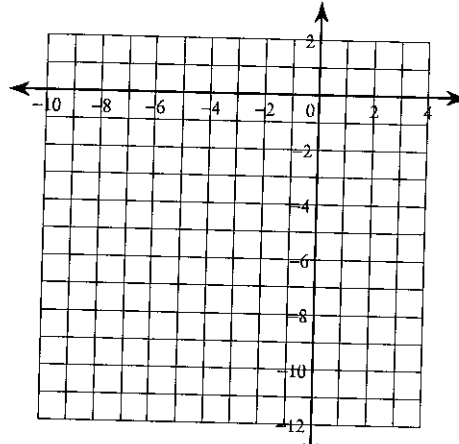
Sketch the graph of each function.

5) $y = 2x^2 + 4x - 2$



X | y

6) $y = -3x^2 + 12x - 11$

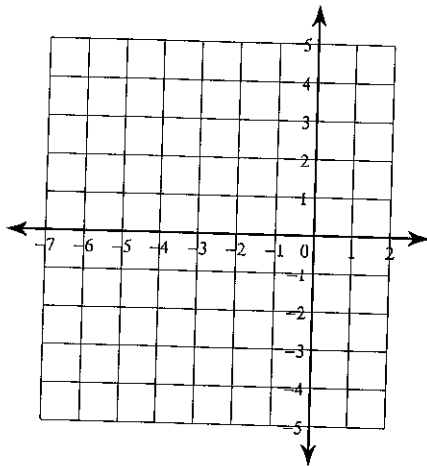


X | y

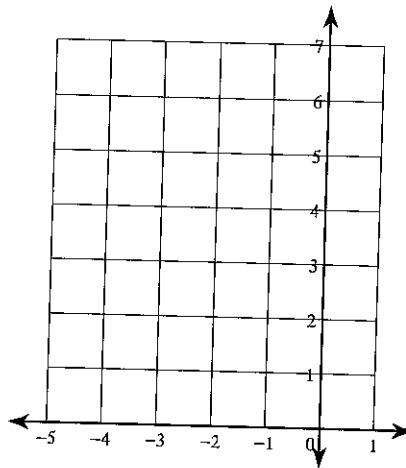
vertex: _____ AOS: _____

vertex: _____ AOS: _____

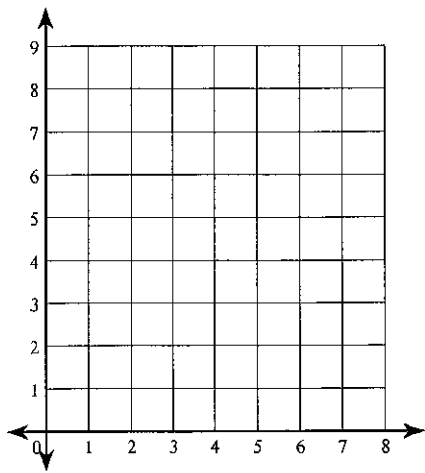
7) $y = -2x^2 - 16x - 28$



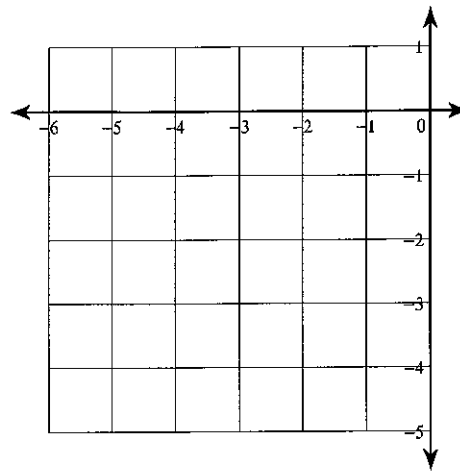
8) $y = x^2 + 4x + 6$



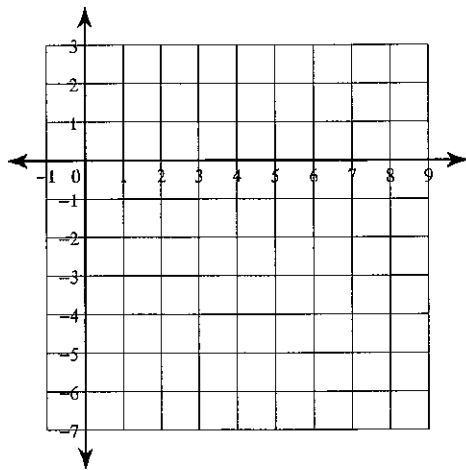
9) $y = x^2 - 6x + 13$



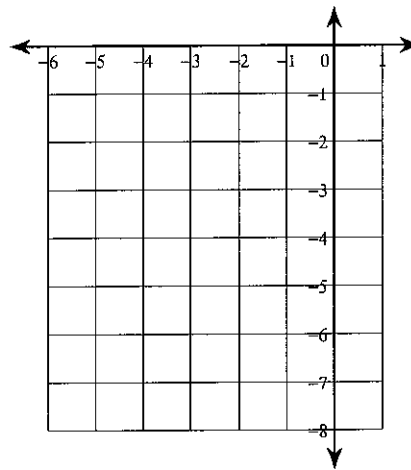
10) $y = x^2 + 4x$



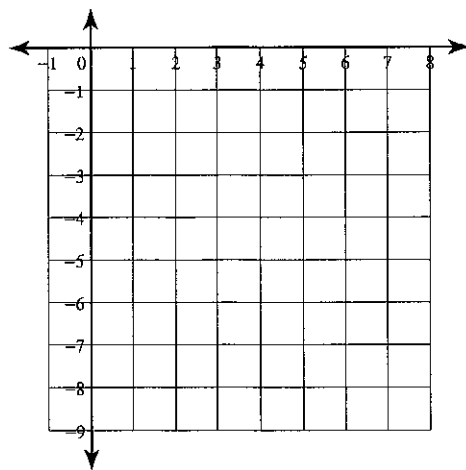
11) $y = -2x^2 + 8x - 6$



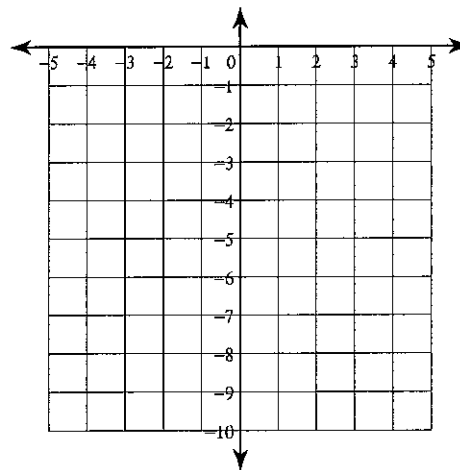
12) $y = -x^2 - 8x - 19$



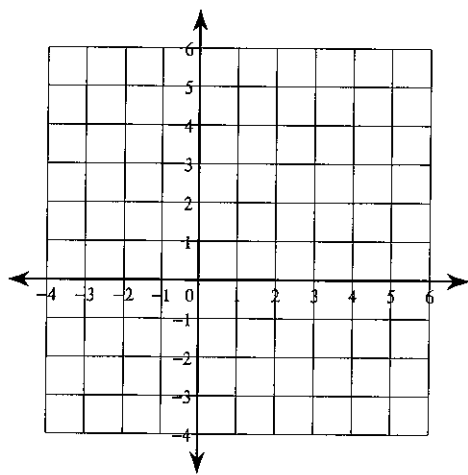
13) $y = -x^2 + 8x - 20$



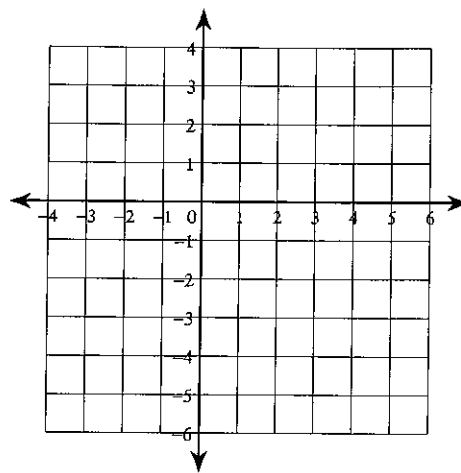
14) $y = -2x^2 + 8x - 9$



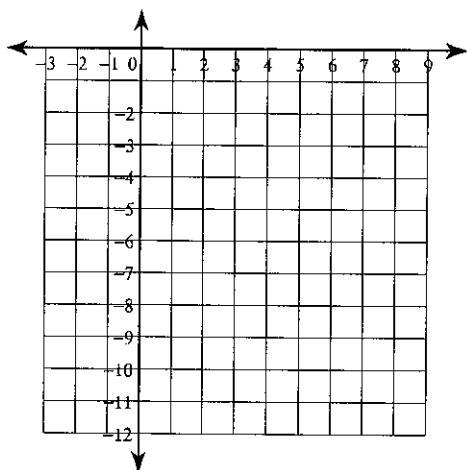
15) $y = 2x^2 - 4x - 1$



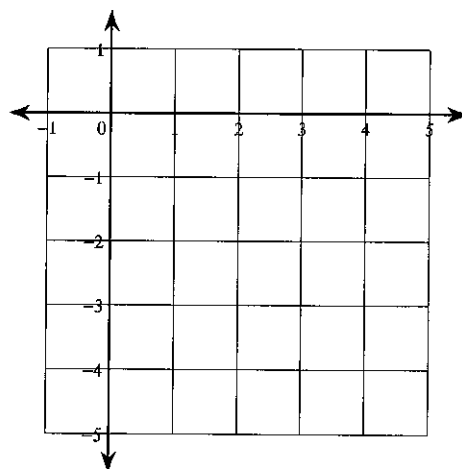
16) $y = -2x^2 + 12x - 15$



17) $y = -2x^2 + 12x - 21$



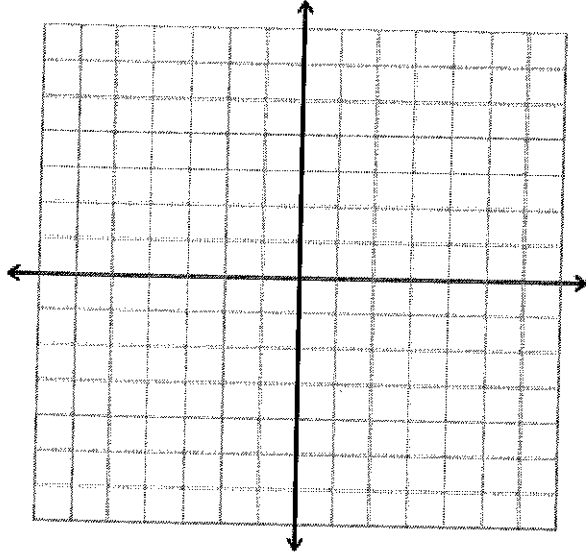
18) $y = x^2 - 6x + 5$



GRAPHING QUADRATICS IN INTERCEPT FORM

EXAMPLE 1:

$$f(x) = (x - 7)(x - 3)$$



STEPS:

1) Identify the x-intercepts (set each factor equal to zero and solve for x) and plot them ($y=0$)

• x-intercepts are _____

2) Find the vertex and axis of symmetry

• $x = \frac{p+q}{2}$

3) Find the y-value of the vertex by plugging x-value of vertex back into equation and simplify

4) plot the x-intercepts and vertex, sketch graph

WS Quadratic Intercept Graphing
 Sketch the parabolas using the intercepts method.

a) $f(x) = (x + 2)(x - 4)$

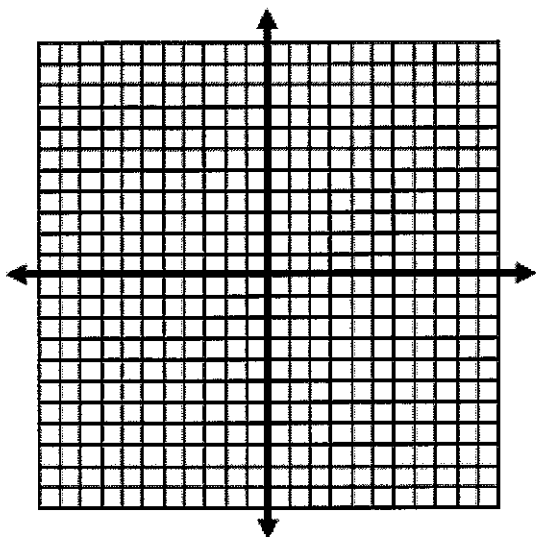
x-intercepts: _____

vertex: _____

axis of symmetry: _____

y-intercept: _____

other points: _____



b) $f(x) = 2(x + 3)(x - 1)$

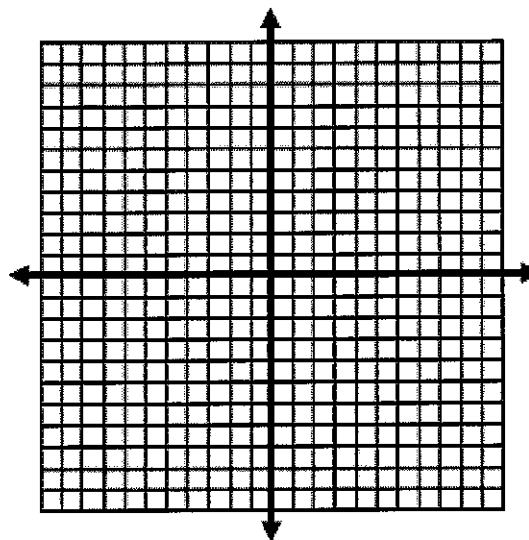
x-intercepts: _____

vertex: _____

axis of symmetry: _____

y-intercept: _____

other points: _____



c) $f(x) = -(x - 2)(x + 4)$

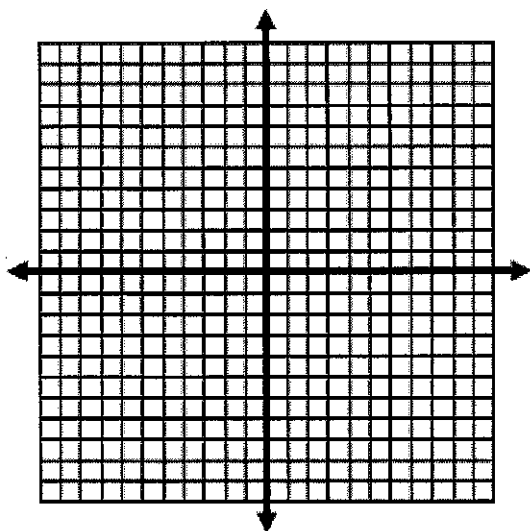
x-intercepts: _____

vertex: _____

axis of symmetry: _____

y-intercept: _____

other points: _____



d) $f(x) = -\frac{1}{2}(x + 2)(x - 4)$

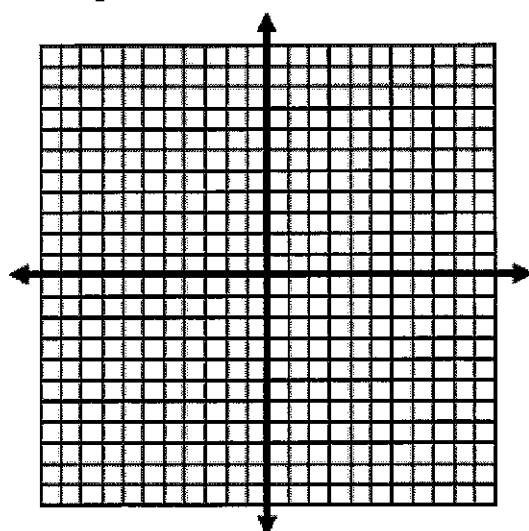
x-intercepts: _____

vertex: _____

axis of symmetry: _____

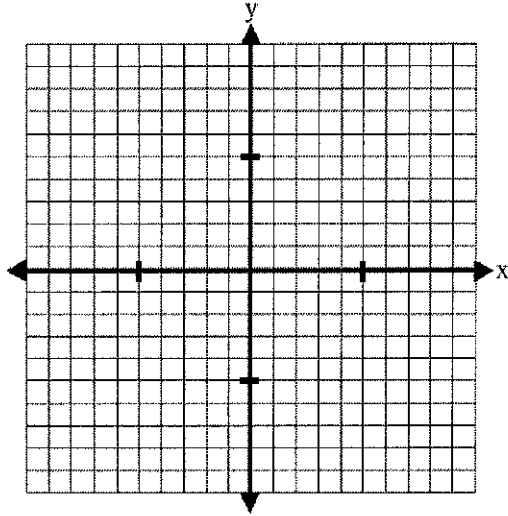
y-intercept: _____

other points: _____



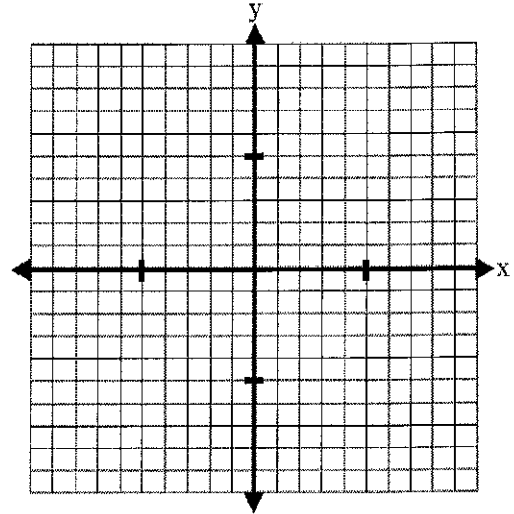
I CAN GRAPH QUADRATIC FUNCTIONS IN INTERCEPT FORM.**Directions: Show all necessary work to graph the following quadratics in the most efficient way.**

1. $f(x) = (x+1)(x+5)$

x-intercepts _____*vertex:* _____

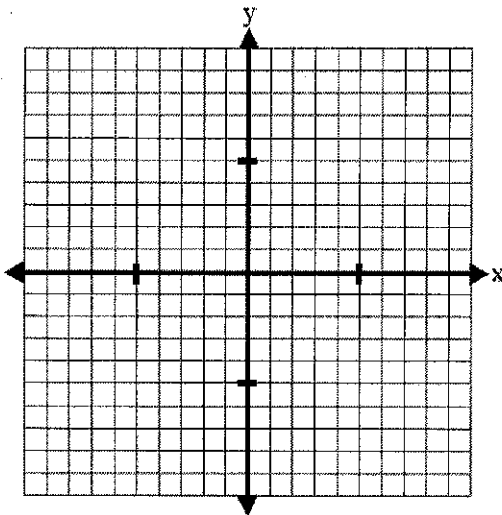
2.

$g(x) = -(x+1)(x-5)$



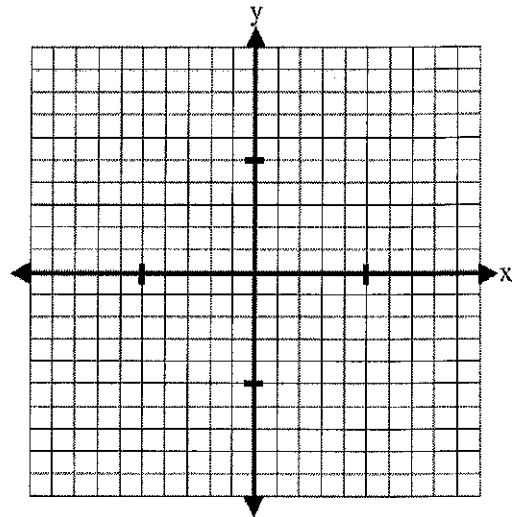
3.

$h(x) = 2(x-1)(x-3)$



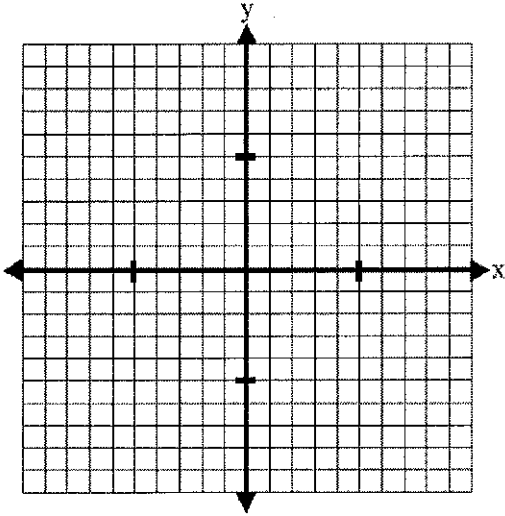
4.

$y = -3(x-1)(x+4)$



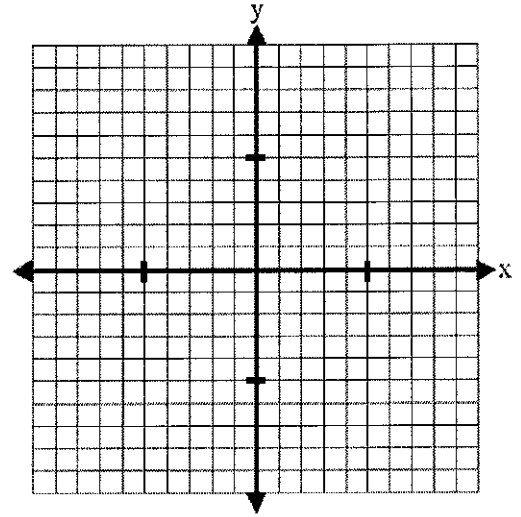
5.

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



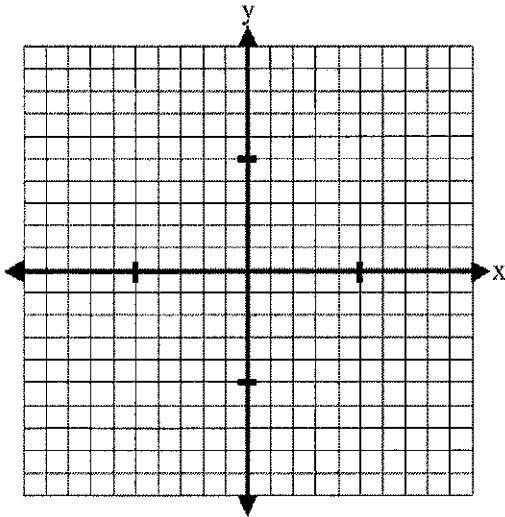
6.

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



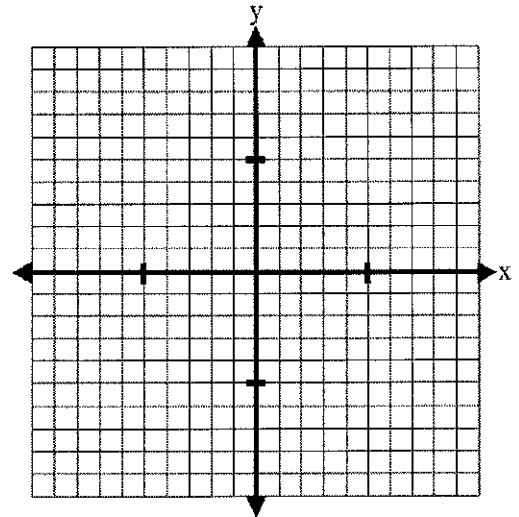
7.

$$y = 2(x-3)(x+4)$$



8.

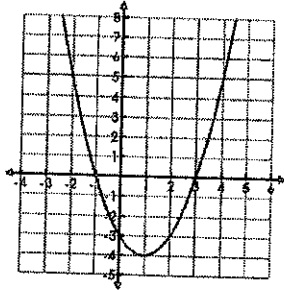
$$y = (x-3)(x+1)$$



Characteristics

Domain:

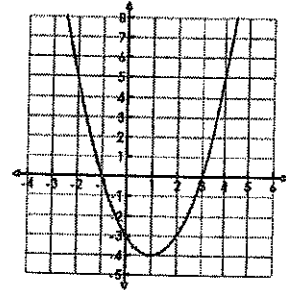
Range:



Characteristics

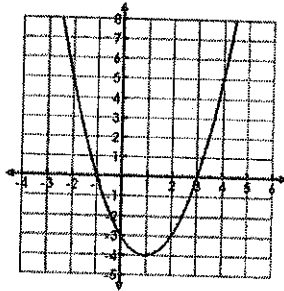
Zeros:

Y-intercept:



Characteristics

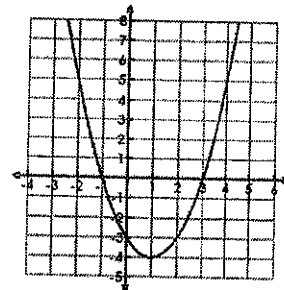
Extreme Value:



Characteristics

Interval of Increase:

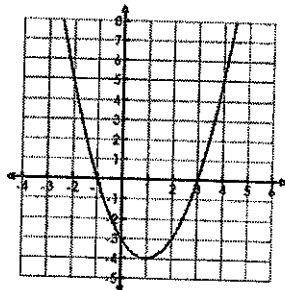
Interval of Decrease:



Characteristics

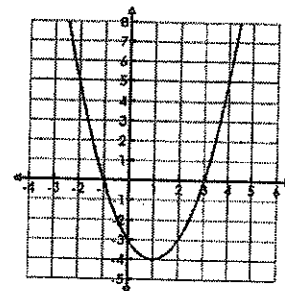
Axis of Symmetry:

Vertex:

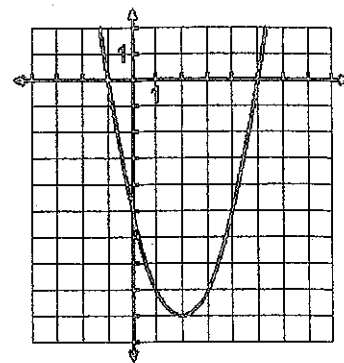


Characteristics

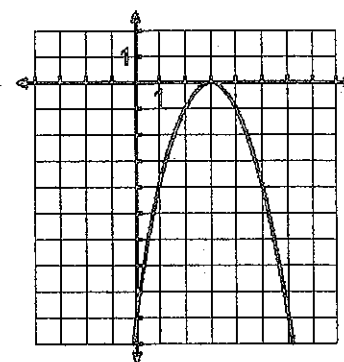
Rate of change
from $-2 \leq x \leq 0$



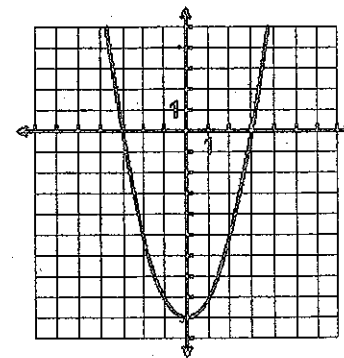
1. Domain: _____ Range: _____
 Vertex: _____ Extrema: _____
 X intercept(s): _____ Y Intercept: _____
 Increasing: _____ Decreasing: _____
 Axis of Symmetry: _____



2. Domain: _____ Range: _____
 Vertex: _____ Extrema: _____
 X intercept(s): _____ Y Intercept: _____
 Increasing: _____ Decreasing: _____
 Axis of Symmetry: _____



3. Domain: _____ Range: _____
 Vertex: _____ Extrema: _____
 X intercept(s): _____ Y Intercept: _____
 Increasing: _____ Decreasing: _____
 Axis of Symmetry: _____



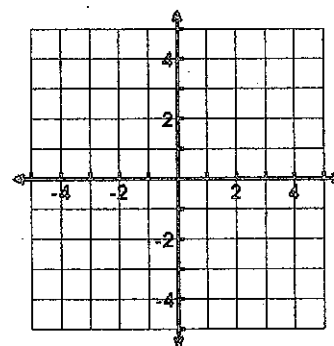
Use the information to sketch a quadratic.

4. Domain: all real numbers
 Range: $y \geq 1$

Increasing: $-2 < x < \infty$

Decreasing: $-\infty < x < -2$

There is no stretch or shrink ($a = 1$)

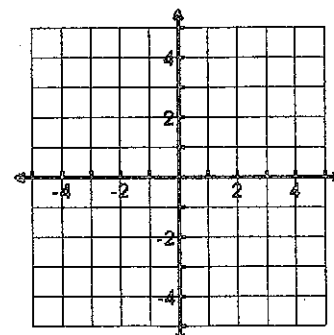


5. Domain: all real numbers
 Vertex: (1, 2)

Increasing: $-\infty < x < 1$

Decreasing: $1 < x < \infty$

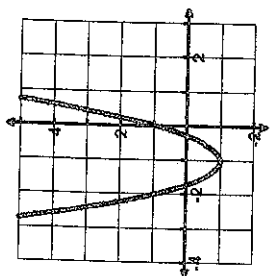
There is no stretch or shrink ($a = 1$)



Characteristics of Functions

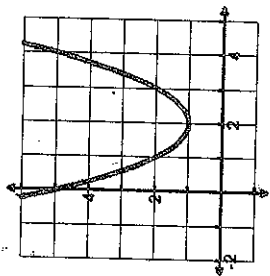
1. $f(x) = 2x^2 + 4x + 1$

- a. Domain: _____
- b. Range: _____
- c. Extrema: _____
- d. Axis of Sym: _____
- e. Increasing: _____
- f. Decreasing: _____
- g. End Behavior: $x \rightarrow \infty, y \rightarrow$ _____ & $x \rightarrow -\infty, y \rightarrow$ _____
- h. Average rate of change $0 \leq x \leq 2$



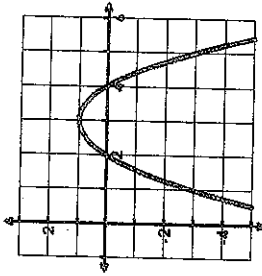
2. $f(x) = (x-2)^2 + 1$

- a. Domain: _____
- b. Range: _____
- c. Extrema: _____
- d. Axis of Sym: _____
- e. Increasing: _____
- f. Decreasing: _____
- g. End Behavior: $x \rightarrow \infty, y \rightarrow$ _____ & $x \rightarrow -\infty, y \rightarrow$ _____
- h. Average rate of change $0 \leq x \leq 2$



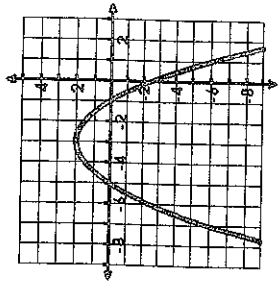
3. $f(x) = -(x-2)(x-4)$

- a. Domain: _____
- b. Range: _____
- c. Extrema: _____
- d. Axis of Sym: _____
- e. Increasing: _____
- f. Decreasing: _____
- g. End Behavior: $x \rightarrow \infty, y \rightarrow$ _____ & $x \rightarrow -\infty, y \rightarrow$ _____
- h. Average rate of change $0 \leq x \leq 2$



4. This graph represents a quadratic function.

- a. Extrema: _____
- b. Axis of Sym: _____
- c. Zeros: _____
- d. y-intercept: _____
- e. Domain: _____
- f. Range: _____
- g. Increasing: _____
- h. Decreasing: _____



- i. For the increasing interval, is the rate of change increasing or decreasing?
- j. For the decreasing interval, is the rate of change increasing or decreasing?

5. The quadratic function $f(x)$ has these characteristics:

- The vertex is located at $(8, -2)$.
- The range is $-2 \leq f(x) < \infty$.

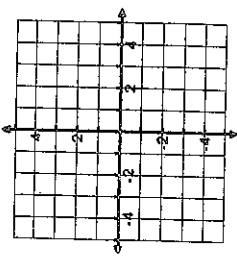
Which graph could be $f(x)$?

- a)
- b)
- c)
- d)

6. Use the information for a given quadratic function to sketch a picture of the function.

- Domain: $-\infty < x < \infty$
- Range: $y \geq -2$
- Increasing: $-1 < x < \infty$
- Decreasing: $-\infty < x < -1$

There is no stretch or shrink ($a = 1$)



Graph each function, then give the characteristics.

1. $f(x) = -(x-1)(x-5)$

Domain _____
 Range _____
 Vertex _____
 Maximum _____
 Minimum _____
 Zero(s) _____
 x-intercept(s) _____
 y-intercept _____
 End Behavior _____
 Interval of Increase _____
 Interval of Decrease _____

2. $h(x) = 2(x-2)^2$

Domain _____
 Range _____
 Vertex _____
 Maximum _____
 Minimum _____
 Zero(s) _____
 x-intercept(s) _____
 y-intercept _____
 End Behavior _____
 Interval of Increase _____
 Interval of Decrease _____

3. $g(x) = 2x^2 + 8x + 6$

Domain _____
 Range _____
 Vertex _____
 Maximum _____
 Minimum _____
 Zero(s) _____
 x-intercept(s) _____
 y-intercept _____
 End Behavior _____
 Interval of Increase _____
 Interval of Decrease _____

4. $h(x) = (x-3)^2 + 2$

Domain _____
 Range _____
 Vertex _____
 Maximum _____
 Minimum _____
 Zero(s) _____
 x-intercept(s) _____
 y-intercept _____
 End Behavior _____
 Interval of Increase _____
 Interval of Decrease _____

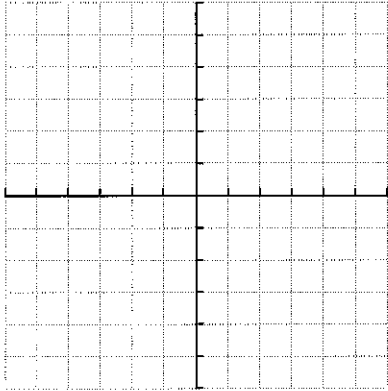
5. $f(x) = -\frac{1}{2}(x-1)(x+3)$

Domain _____
 Range _____
 Vertex _____
 Maximum _____
 Minimum _____
 Zero(s) _____
 x-intercept(s) _____
 y-intercept _____
 End Behavior _____
 Interval of Increase _____
 Interval of Decrease _____

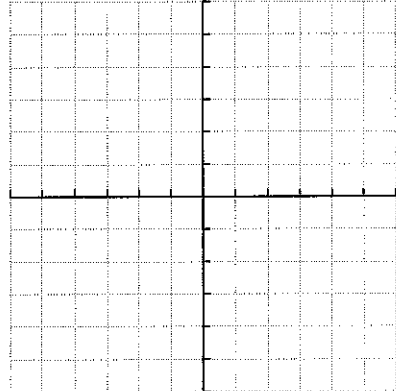
6. $g(x) = -x^2 + 10x - 24$

Domain _____
 Range _____
 Vertex _____
 Maximum _____
 Minimum _____
 Zero(s) _____
 x-intercept(s) _____
 y-intercept _____
 End Behavior _____
 Interval of Increase _____
 Interval of Decrease _____

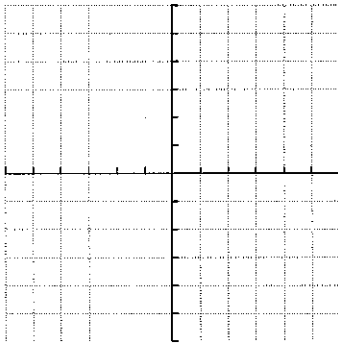
1) _____



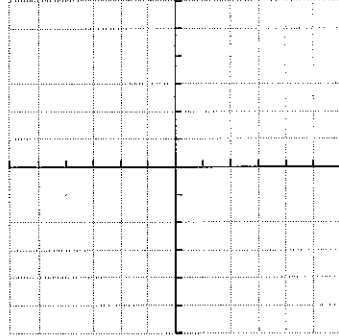
2) _____



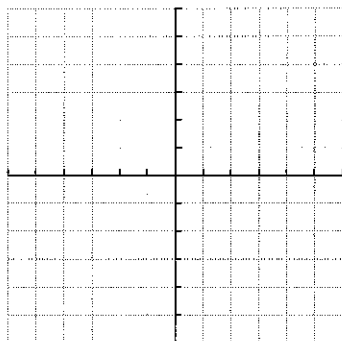
3) _____



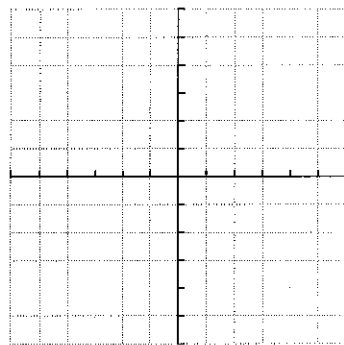
4) _____



5) _____



6) _____



Name: _____ Date: _____

Graphing Quadratics – Standard Form

$$f(x) = ax^2 + bx + c$$

Most common way to see a quadratic written.

Axis of Symmetry: $x = \frac{-b}{2a}$

Vertex: $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$

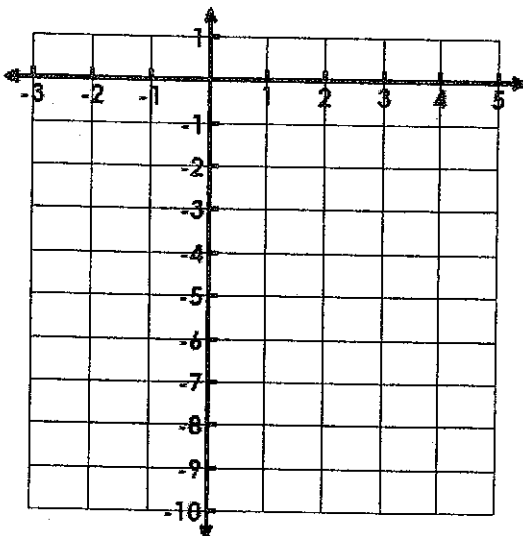
Plug your axis of symmetry in to the function to find the y-value

Steps to Graphing in STANDARD form:

1. Identify a, b, and c.
2. Find the axis of symmetry. $x = \frac{-b}{2a}$ Graph this lightly as a dashed vertical line.
3. Table, Edit Function, start = A.O.S. This is your vertex. Plot it.
4. Scroll up and down to get other ordered pairs.
5. Connect in a u-shape with arrows at each end.

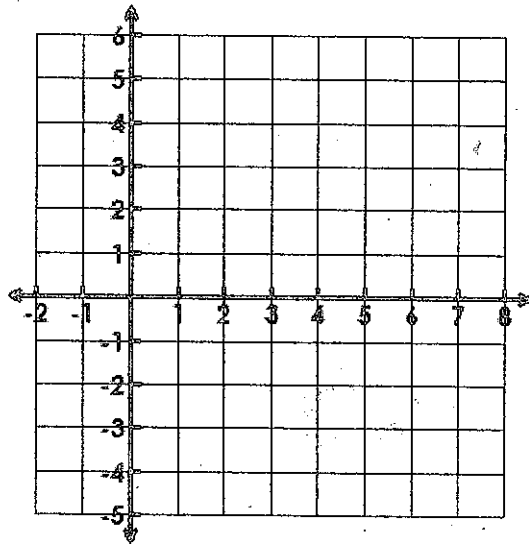
Graph.

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



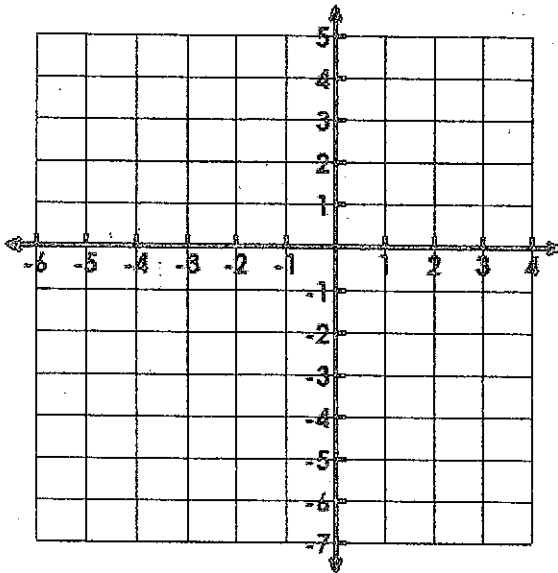
Characteristics	
A.O.S.	
Vertex:	
Domain:	
Range:	
x-intercept(s):	
y-intercept:	
Interval of Increase:	
Interval of Decrease:	
Rate of change from $0 \leq x \leq 2$:	
Rate of change from $1 \leq x \leq 3$:	

2. $f(x) = x^2 - 6x + 5$



Characteristics	
A.O.S.	
Vertex:	
Domain:	
Range:	
Zeros:	
y-intercept:	
Interval of Increase:	
Interval of Decrease:	
Rate of change from $0 \leq x \leq 2$:	
Rate of change from $4 \leq x \leq 5$:	

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



Characteristics	
A.O.S.	
Vertex:	
Domain:	
Range:	
Roots:	
y-intercept:	
Interval of Increase:	
Interval of Decrease:	
Rate of change from $0 \leq x \leq 2$:	
Rate of change from $-3 \leq x \leq 1$:	

Graphing Quadratic Equations WS 1

Name _____

Graph each of the following quadratic functions. Identify the appropriate characteristics.

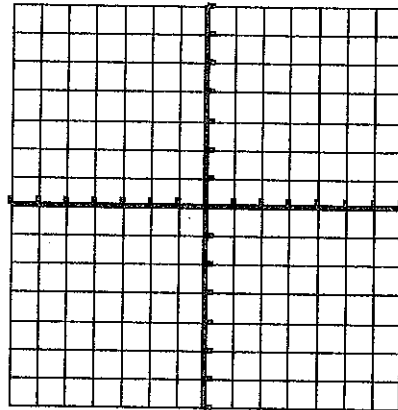
1. $f(x) = 2(x+2)(x+4)$

x-Intercept(s): _____

Vertex: _____

Axis of Symmetry: _____

y-intercept: _____



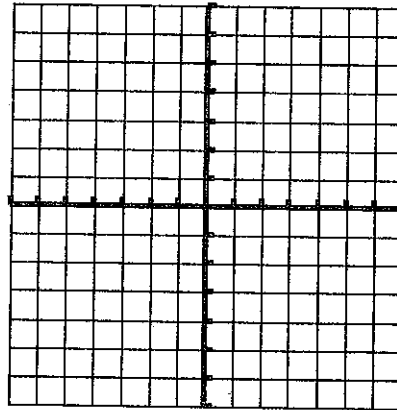
2. $g(x) = -(x-3)^2 + 4$

x-Intercept(s): _____

Vertex: _____

Axis of Symmetry: _____

y-intercept: _____



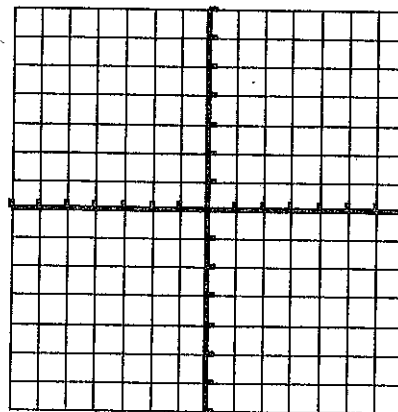
3. $f(x) = 2x^2 - 12x + 18$

x-Intercept(s): _____

Vertex: _____

Axis of Symmetry: _____

y-intercept: _____



Graph each of the following quadratic functions. Identify the appropriate characteristics.

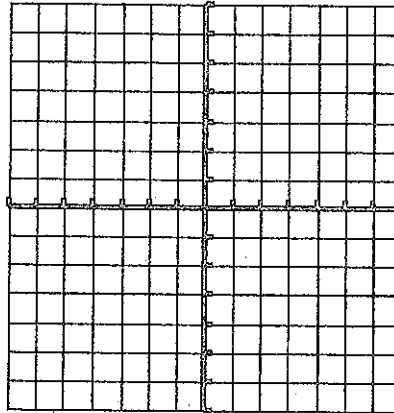
1. $f(x) = 2(x-1)(x-3)$

x-Intercept(s): _____

Vertex: _____

Axis of Symmetry: _____

y-intercept: _____



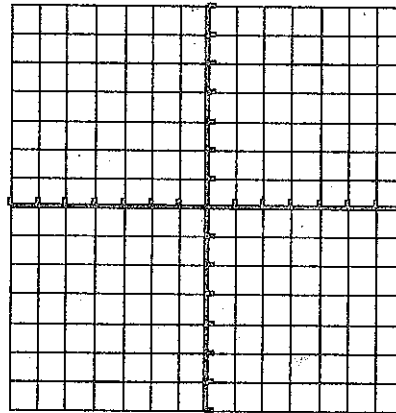
2. $g(x) = \frac{1}{2}(x-1)^2 + 2$

x-Intercept(s): _____

Vertex: _____

Axis of Symmetry: _____

y-intercept: _____



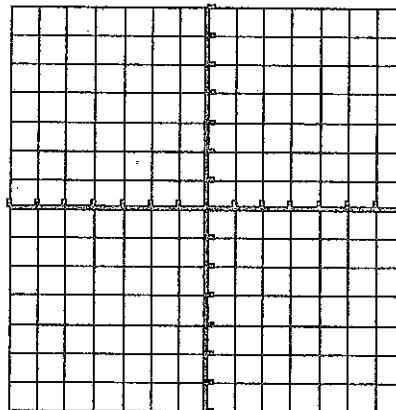
3. $f(x) = -x^2 + 4x - 3$

x-Intercept(s): _____

Vertex: _____

Axis of Symmetry: _____

y-intercept: _____

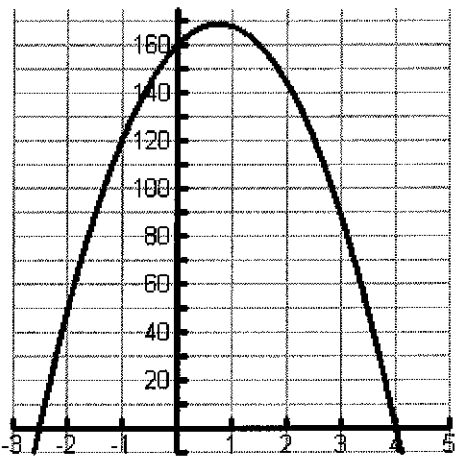


Name: _____ Date: _____

Characteristics of Quadratic Equations

Wil E. Coyote is catapulting a boulder off a cliff to hit the road runner. Let t represent the number of seconds that the boulder catapults off the cliff and $h(t)$ denote the height of the boulder, in feet, above the base of the cliff. Ignoring air resistance, we can use the following formula to express the path of the boulder: $h(t) = -16t^2 + 24t + 160$

1. What does the x axis represent? _____ The y axis? _____
2. What part of the graph is insignificant? Why?
3. What was the height of the boulder before it was launched? _____
 What special point on the graph is associated with this information? _____
4. If Wil E. Coyote simply pushed a boulder off the cliff, how would the graph look different?



5. How long will it take before the boulder reaches the bottom of the cliff? _____
 What special point on the graph is associated with this information? _____
6. After how many seconds does the boulder change direction? _____
 How high is the boulder when it changes direction? _____
 What is this significant point called on the graph? _____
7. How high above the starting point does the boulder begin to change direction?

8. If Wil E. Coyote changes his mind, how many seconds does he have to stop the boulder from going over the cliff? _____

3. A baker has modeled the monthly operating costs for making wedding cakes by the function $y = 0.5x^2 - 12x + 150$ where y is the total cost in dollars and x is the number of cakes prepared.
- A. Find the **vertex** and **axis of symmetry**. The vertex would represent (Cakes Prepared, \$Cost).
- B. What is the **minimum** monthly operating **cost**?
- C. How many **cakes** should be prepared each month to yield the minimum operating cost?
- D. What are the baker's costs if he/she makes **no cakes (zero)**?
-

4. The path of a soccer ball is modeled by the function $h(x) = -0.005x^2 + 0.25x$, where h is the height in meters and x is the horizontal distance that the ball travels in meters. What is the **maximum height** that the ball reaches? *Hint: start by finding the vertex.*
-

5. The function $A(x) = x(10 - x)$ describes the area A of a rectangular flower garden, where x is its width in yards. What is the maximum area of the garden? *Hint: get your equation in standard form 1st and then start finding the vertex.*
-

6. A record label uses the following function to model the sales of a new release.
 $a(t) = -90t^2 + 8100t$
The number of albums sold is a function of time, t , in days. On which **day** were the **most** albums sold? What is the **maximum** number of **albums** sold on that day?
-

CONVERTING QUADRATICS NOTES

INTERCEPT FORM TO STANDARD FORM

VERTEX FORM TO STANDARD FORM

STANDARD FORM TO INTERCEPT FORM

STANDARD FORM TO VERTEX FORM

VERTEX FORM TO INTERCEPT FORM

INTERCEPT FORM TO VERTEX FORM

Converting Quadratic Equations WS

Name _____

Write in intercept form

1. $y = x^2 - 3x + 2$

6. $y = 4x^2 + 4x + 1$

2. $y = x^2 - 100$

7. $y = 4x^2 + 5x - 6$

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

8. $y = 12x^2 + 17x + 6$

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

9. $y = 25x^2 - 9$

5. $y = x^2 - x - 132$

10. $y = 15x^2 + 8x - 16$

Write in Standard form

11. $y = (x-5)(x+2)$

12. $y = -\frac{1}{4}(4x-5)(x+3)$

$$13. y = 3(2x - 3)(x - 1)$$

$$16. y = 2(x + 5)^2 - 23$$

$$14. y = (3x - 2)^2 + 5$$

$$17. y = -2(x - 11)^2 + 17$$

$$15. y = (x - 8)^2 + 13$$

$$18. y = \left(\frac{1}{3}x + 4\right)(2x - 5)$$

Write in Vertex Form

$$21. y = x^2 - 8x + 2$$

$$24. y = 4x^2 - 4x + 15$$

$$22. y = x^2 + 12x + 2$$

$$25. y = (x + 3)(x - 9)$$

$$23. y = -2x^2 + 6x - 3$$

$$26. y = 2(x + 5)(x + 7)$$

Name: _____

Date: _____

Converting Forms of a Quadratic

Convert from vertex form to standard form.

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

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

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

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

5. $y = -2(x+1)^2 + 5$

6. $y = 4(x-2)^2 - 7$

7. $y = 4(x-3)^2 - 10$

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

Convert from standard form to vertex form. Then, give the axis of symmetry and vertex.

9. $f(x) = x^2 + 4x + 3$

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

11. $f(x) = 2x^2 - 8x + 17$

12. $f(x) = x^2 - 8x + 15$

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

14. $f(x) = 2x^2 + 12x + 7$

Find the axis of symmetry & vertex for the functions representing the trajectory of a ball.

15. $f(t) = -16t^2 + 64t + 10$ and $f(t) = -16t^2 + 64t + 30$

16. Which function will be higher at its peak?

17. How can you determine that by looking at the equation in standard form?

Name: _____ Date: _____

Converting from Vertex Form to Standard Form

Multiply out the binomial, distribute (if needed), & combine like terms.

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

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

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

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

Converting from Standard Form to Vertex Form

5. $f(x) = x^2 + 8x + 1$

6. $f(x) = x^2 + 10x + 20$

7. $f(x) = 3x^2 - 6x + 5$

8. $f(x) = -2x^2 - 16x - 32$

9. $f(x) = x^2 + 6x + 8$

10. $f(x) = x^2 - 4x + 3$

11. $f(x) = 3x^2 + 24x + 50$

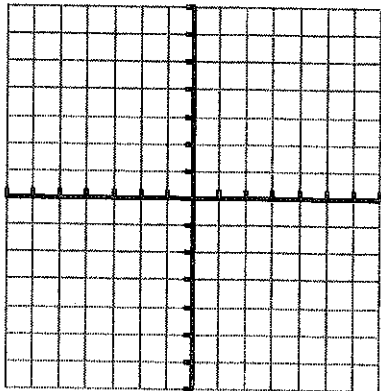
12. $f(x) = -x^2 - 2x + 3$

Converting, Graphing, and Characterizing Quadratics

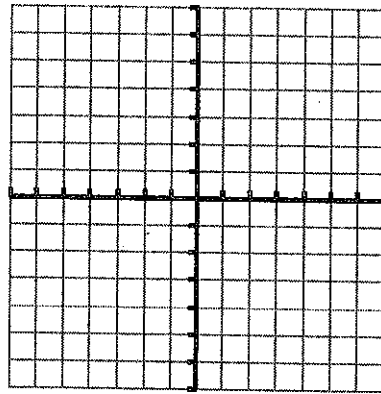
Name _____

Graph the following quadratic equations.

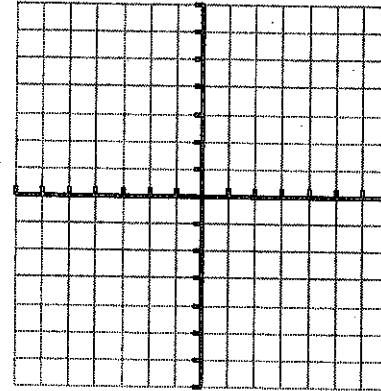
1. $y = x^2 + 8x + 15$



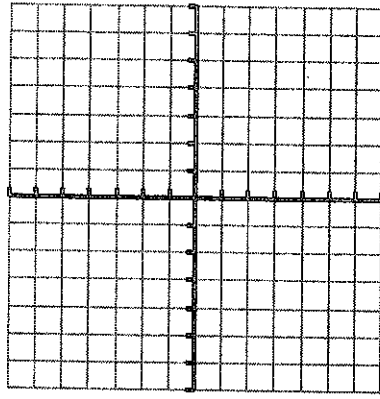
2. $y = (x - 3)(x + 1)$



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



4.



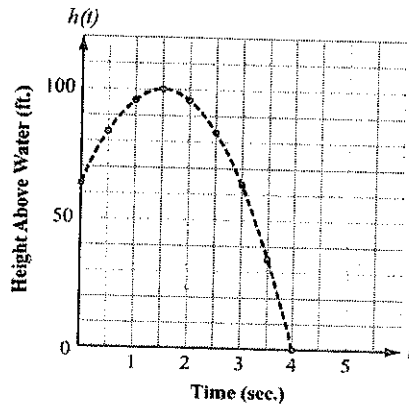
Complete the table. Show all algebraic work neatly on the bottom of the page.

	Standard Form	Intercept Form	Vertex Form	Axis of Symmetry	Vertex	x-Int(s)	y-Int.	Range	Interval of Increase	Interval of Decrease
1	$y = x^2 + 8x + 15$									
2		$y = (x - 3)(x + 1)$								
3			$y = -(x - 2)^2 + 1$							
4				$x = 3$	$(3, -1)$	$(2, 0)$ & $(4, 0)$				

Name: _____ Date: _____

Quadratics Modeled in the Real World

Philip is standing on a rock ledge 64 feet above a lake, and he tosses a rock with a velocity of 48 feet per second. This graph and table represent the height above the water, $h(t)$, as a function of time, t , in seconds after Philip releases the rock.



Time t	Height $h(t)$
0	64
1	96
2	96
3	64
4	0

1. What is the maximum height of the rock?
2. After how many seconds does the rock change direction in the air?
3. How can you estimate the maximum height from the table?
4. When does the rock hit the surface of the lake?
What is this point on the graph called?
How can you identify this from the table?
5. Identify the vertex and the axis of symmetry.
What do these represent in our story?
6. At 1 sec, what direction is the rock moving?
At 2 sec, what direction is the rock moving?
7. Using $h(t) = -16t^2 + v_0t + h_0$, write an equation in standard form for the path of the rock.
8. Will this graph open up or down?
Will the vertex be a maximum or a minimum? Why?

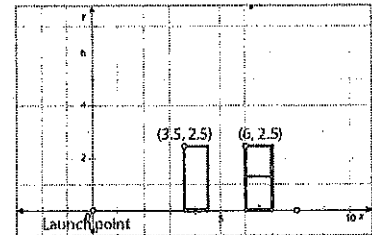
9. Using your standard form equation from #1, write the equation in vertex form (decimals are ok).

10. Using the equation from #9, what is the maximum height the rock reaches above the surface of the lake? How did you get this answer?

11. Using the equation from #9, after how many seconds did the rock change direction in the air? How did you get this answer?

12. At 1 sec, what direction is the rock moving?
At 2 sec, what direction is the rock moving?

The object of a popular video game is to launch a boulder to over boxes, buildings, and other items. The graph shows an obstacle on the left that the boulder must clear in order to knock over the stack of boxes on the right. The boulder will follow a parabolic path and will launch from (0, 0) and end at (8, 0).



13. What are the x-intercepts for the parabola formed by the path of the boulder?

14. What is the axis of symmetry for the parabola formed by the path of the boulder?

15. One possible path for the boulder is $y = -\frac{3}{8}x^2 + 3x$. What is the vertex of the parabola created?

16. Will the boulder clear the obstacle in the front? Will it knock down the boxes? How can you tell?

Name: _____ Date: _____

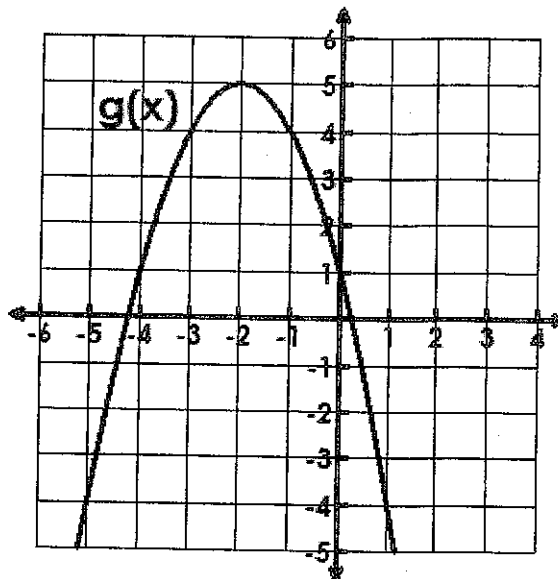
Comparing Quadratic Functions

1. Graph the equation $f(x) = -2x^2 - 8x - 2$ on the graph below. Then, answer the questions to compare the two functions.

2. Find the axis of symmetry for $f(x)$. How does it compare to the axis of symmetry for $g(x)$?

3. Find the vertex of $f(x)$. How does it compare to the vertex for $g(x)$?

4. How do the y-intercepts compare?



5. Find the rate of change for both functions from $x_1 = -2$ to $x_2 = 0$. How do the 2 compare? What part of the $f(x)$ equation tells you this should happen?

The function $f(t) = -16t^2 + 64t + 5$ models the height of a ball that was hit into the air, when t is measured in seconds and h is the height in feet. This table represents the height, $g(t)$, of a second ball that was thrown into the air.

6. Find the axis of symmetry and vertex for $f(t)$. How do they compare to $g(t)$?

Time, t (in seconds)	Height, $g(t)$ (in feet)
0	4
1	36
2	36
3	4

7. Which function has the highest start value?

8. Based on your answers to parts a and b, which function do you think will hit the ground first? Explain.

Comparing Quadratic Functions to Other Functions

Exponential functions have a fixed number as the base and a variable number as the exponent.

Let's fill out the table to compare linear, quadratic and exponential functions over time.

x	$y = 2x + 2$	$y = x^2 + 2$	$y = 2^x$
0			
1			
2			
3			
4			
5			

The value of an exponential function with a base greater than 1 will eventually exceed the value of a quadratic function. Similarly, the value of a quadratic function will eventually exceed the value of a linear function.

9. Calculate and compare the slopes for each function from $x_1 = 0$ to $x_2 = 1$.
10. Calculate and compare the slopes for each function from $x_1 = 2$ to $x_2 = 3$.
11. Calculate and compare the slopes for each function from $x_1 = 4$ to $x_2 = 5$.

This table shows that the value of $f(x) = 5x^2 + 4$ is greater than the value of $g(x) = 2^x$ over the interval $[0, 8]$.

x	$f(x)$	$g(x)$
0	$5(0)^2 + 4 = 4$	$2^0 = 1$
2	$5(2)^2 + 4 = 24$	$2^2 = 4$
4	$5(4)^2 + 4 = 84$	$2^4 = 16$
6	$5(6)^2 + 4 = 184$	$2^6 = 64$
8	$5(8)^2 + 4 = 324$	$2^8 = 256$

12. As x increases, will the value of $f(x)$ always be greater than the value of $g(x)$? Explain how you know?

13. Which statement BEST describes the comparison of the y -values for $f(x)$ and $g(x)$?

- A. The values of $f(x)$ will always exceed the values of $g(x)$.
- B. The values of $g(x)$ will always exceed the values of $f(x)$.
- C. The values of $f(x)$ exceed the values of $g(x)$ over the interval $[0, 5]$.
- D. The values of $g(x)$ begin to exceed the values of $f(x)$ within the interval $[4, 5]$.

x	$f(x)$	$g(x)$
0	0	-10
1	2	-9
2	4	-6
3	6	-1
4	8	6

Quadratic Inequalities

1. Determine whether the given ordered pair is a solution of each inequality.

a. $y \geq x^2$
(0, 4)

b. $y < -x^2 + 6x$
(6, -5)

c. $y \geq 2x^2 + 3x$
(-3, 4)

Sep 16-11:12 AM

Graphing Rules

Solid or Dotted?

1. \geq or \leq Solid Parabola

2. $>$ or $<$ Dotted Parabola

Shading?

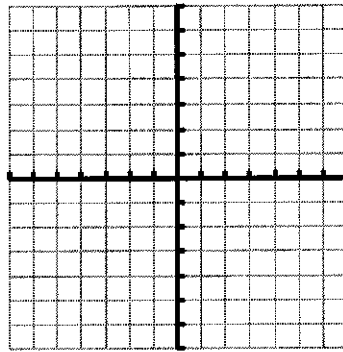
1. $>$ or \geq Up

2. $<$ or \leq Down

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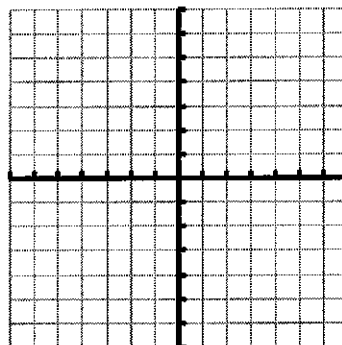
2. Graph each inequality.

a. $y \geq x^2 + 2x - 2$



Sep 16-11:18 AM

b. $y > -x^2 + 2x + 2$



Sep 16-11:15 AM

Pick a random ordered pair
to check your answers!



Sep 16-11:41 AM

Solving Rules

Open or Closed?

1. $>$ or $<$ Open Circle
2. \geq or \leq Closed Circle

less thAND
greatOR

Sep 16-11:43 AM

3. Solve each inequality algebraically. Show your answer graphically and in interval notation.

a. $x^2 + 2x \leq 3$

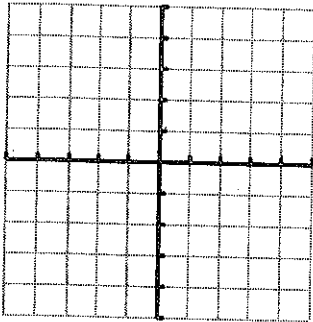
Oct 17-7:57 AM

b. $2x^2 + 3x > 5$

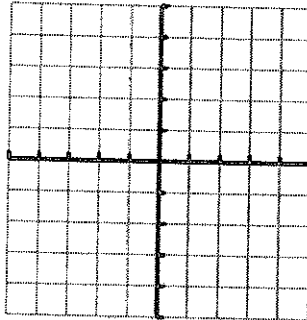
Sep 16-11:16 AM

Graph each quadratic inequality.

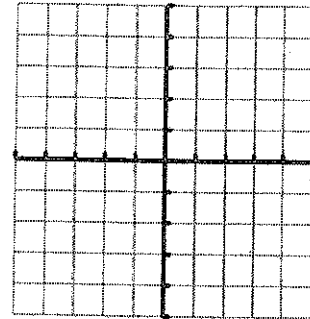
1. $y \geq -x^2 + 4$



2. $y \geq 2x^2$



3. $y < -x^2 + 2x$



Solve each quadratic inequality algebraically (using a number line). State the solution set in interval notation.

4. $3x^2 + 2x - 1 \geq 0$

5. $0 \geq 2x^2 + x - 3$

6. $0 \leq -x^2 + 2x + 8$

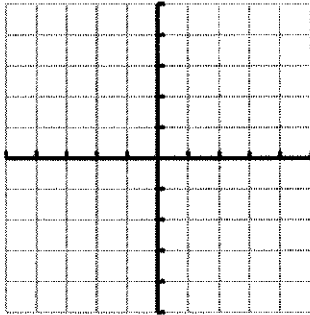
7. $x^2 < 3x + 10$

8. $2x^2 + 5x \leq 12$

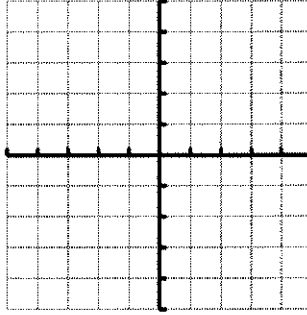
9. $x^2 + 3x > 18$

Graph each quadratic inequality.

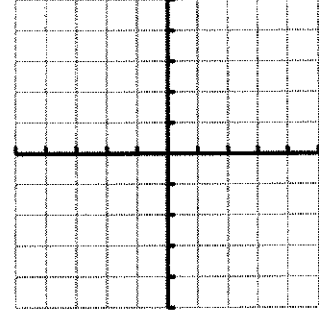
1. $y > 2(x-2)^2$



2. $y \geq 2(x-2)(x-2)$



3. $y < 2x^2 - 8x + 8$



4. What do graphs #1-3 have in common? _____

Solve each quadratic inequality algebraically (using a number line). State the solution set in interval notation.

5. $x^2 + 2x - 3 \geq 0$

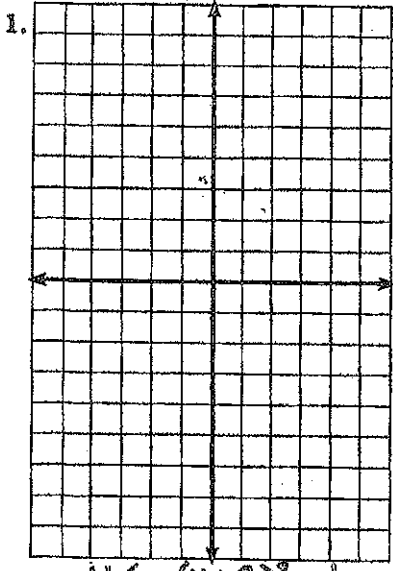
6. $9x^2 - 2 \leq -3x$

7. $2x^2 - 8x > -6$

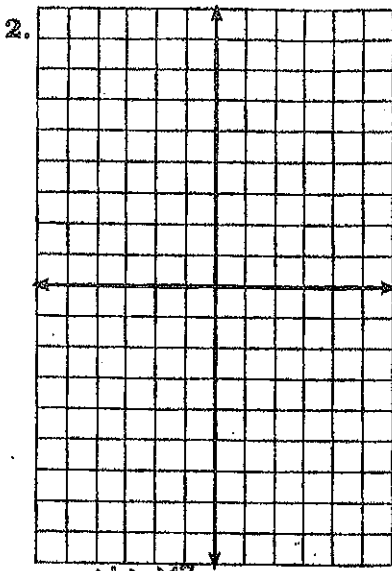
8. $\frac{1}{2}x^2 + 3x \leq -6$

9. $-2x^2 - 50 \geq -20x$

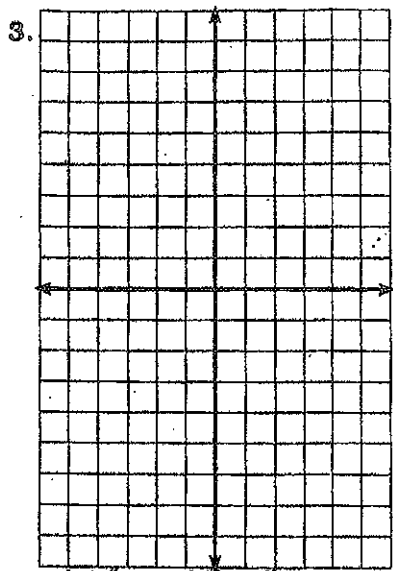
10. $7x^2 - 8x > 0$



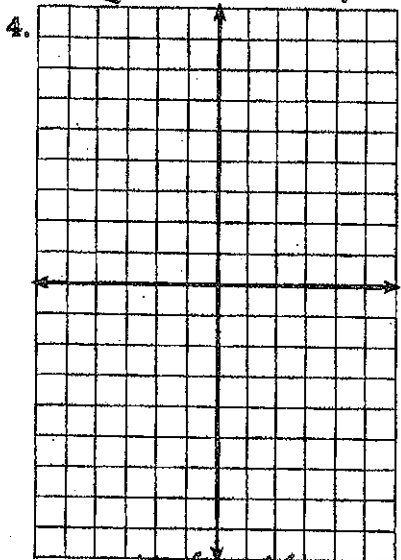
$$y \leq -(x+2)^2 + 1$$



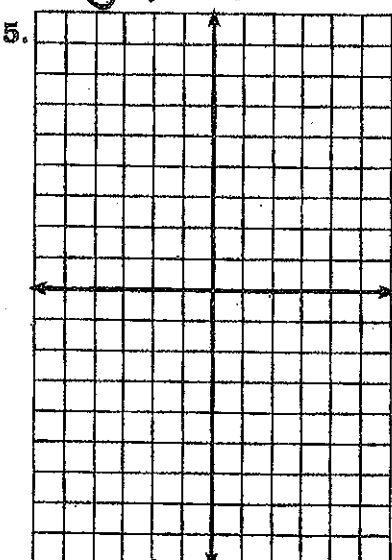
$$y > x^2 - 5$$



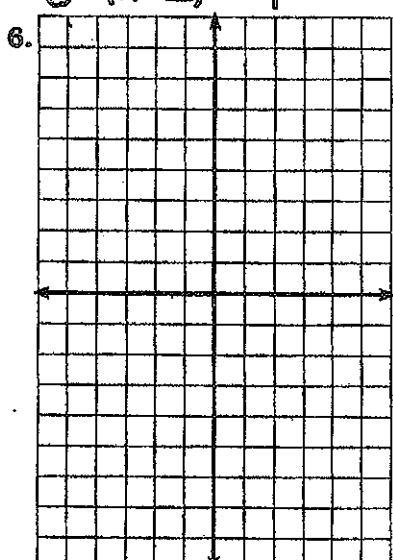
$$y < (x-2)^2 - 9$$



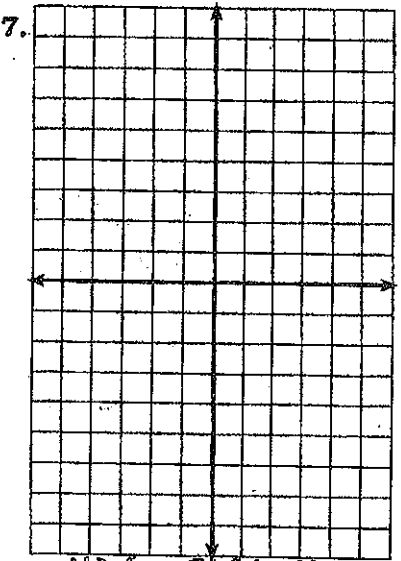
$$y \leq -\frac{1}{2}(x-1)(x-3)$$



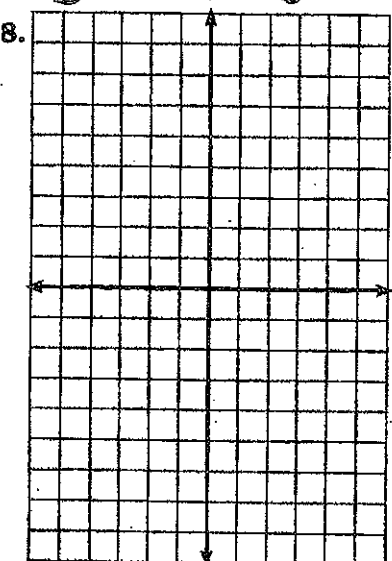
$$y \leq x^2 + 4x + 3$$



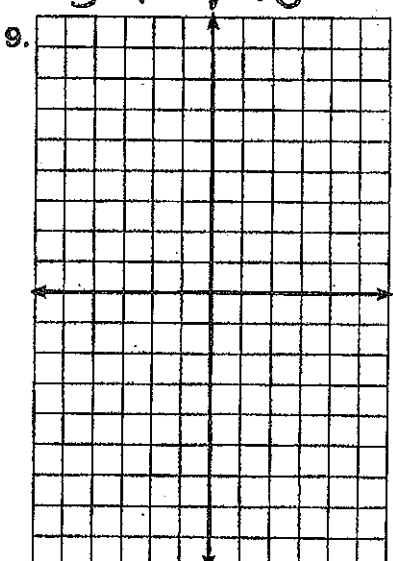
$$y \geq (x+1)^2 + 3$$



$$y > (x+3)(x-3)$$



$$y \geq x^2 - 4x - 5$$



$$y < x^2 - 2x - 3$$

Enrichment and Extras:
Coordinate Grids (9)

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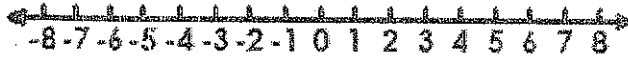
0
1
2
3
4
5
6
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8
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10
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12
13
14
15

Name: _____ Date: _____

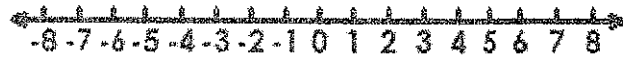
Solving Quadratic Inequalities

Find the solution set for each inequality:

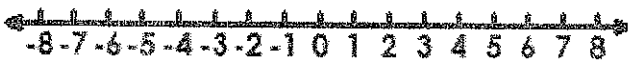
1. $x^2 - x - 12 < 0$



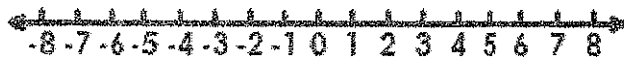
2. $3x^2 + 2x > 1$



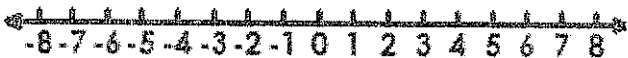
3. $x^2 - 16 \geq 0$



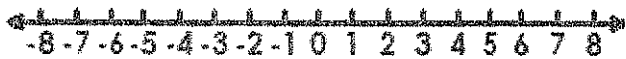
4. $5x^2 - 4x - 1 > 0$



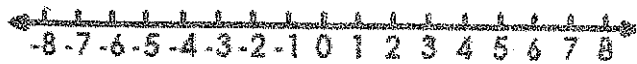
5. $x^2 - 2x - 35 \geq 0$



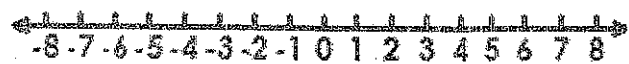
6. $x^2 - 5x + 6 < 0$



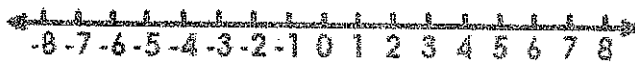
7. $2x^2 + 5x \geq 3$



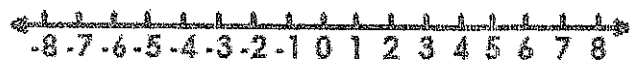
8. $3x^2 > -14x + 5$



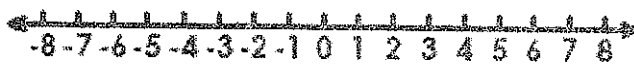
9. $x^2 < -4x + 21$



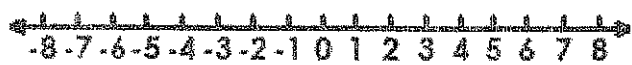
10. $6x^2 < -5x + 1$



11. $2x^2 > -x + 15$



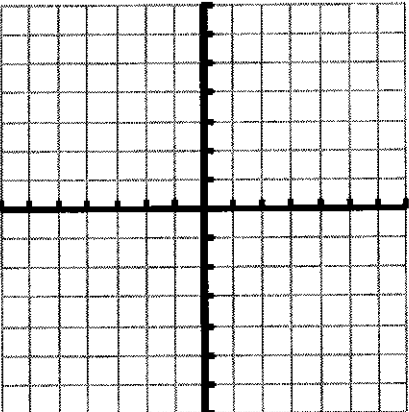
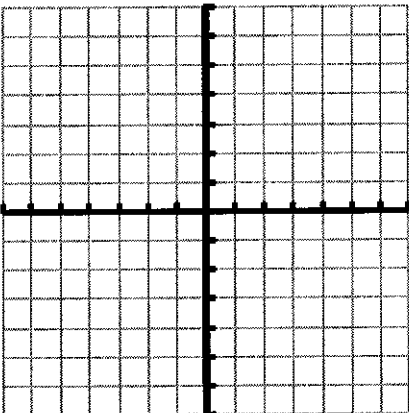
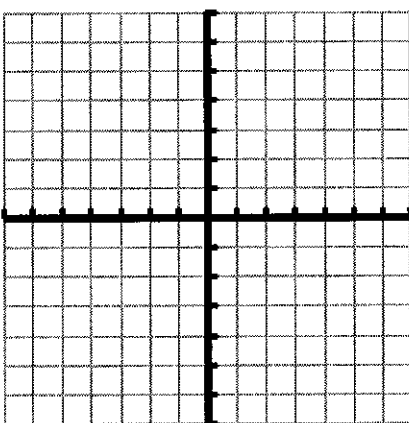
12. $2x^2 + 11x + 5 < 0$



Solving Quadratics

<p style="text-align: center;"><i>Factoring</i></p> <ol style="list-style-type: none"> 1. set the equation = 0: make sure all terms are on one side of the equal sign 2. factor out the GCF (if there is one) 3. see if you can factor any other way <ul style="list-style-type: none"> • easy trinomial • tough trinomial • difference of squares • grouping 4. set each factor equal to zero 5. solve for x 	$6x^2 - 5 = 7x$	$f(x) = 10x^2 - 15x$
<p style="text-align: center;"><i>Using Square Roots</i></p> <ol style="list-style-type: none"> 1. Do you have a ()²? Then you know you can solve by $\sqrt{\quad}$ 2. Are you missing the "x" term of the trinomial? Then you know you can solve by $\sqrt{\quad}$ 3. Isolate the x² or the ()² 4. Take the square root of each side once the term above is isolated 5. REMEMBER: when you take the square root, you will have TWO answers, \pm 6. isolate the x for your answer 	$f(x) = 8x^2 - 2$	$2(x + 1)^2 - 80 = 0$

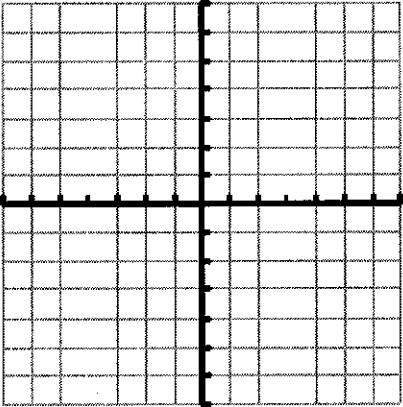
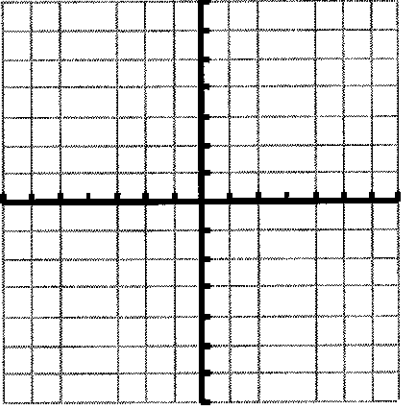
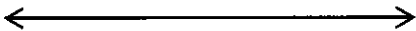

Graphing Quadratics

<p style="text-align: center;"><i>Vertex Form</i></p> <p><u>Steps:</u></p> <ol style="list-style-type: none"> 1. Vertex: ordered pair: (opposite, same) 2. Axis of Symmetry: equation: $x = x\text{-coordinate of the VERTEX}$ 3. x-intercepts: <ul style="list-style-type: none"> • x-intercept will either be your vertex • or graph your pattern from the vertex to find the x-intercepts • or there may not be any x-intercepts • or foil it out, add the constant and factor to solve 4. y-intercept: ordered pair: find $f(0)$ 	<p style="text-align: center;">$f(x) = -(x + 1)^2 + 4$</p> <p><u>Vertex:</u></p> <p><u>Axis:</u></p> <p><u>x-intercept(s):</u></p> <p><u>y-intercept:</u></p>	<p style="text-align: center;"><u>Graph</u></p> 
<p style="text-align: center;"><i>Standard Form</i></p> <p><u>Steps:</u></p> <ol style="list-style-type: none"> 1. Axis of Symmetry: $x = \frac{-b}{2a}$ 2. Vertex: evaluate the function at the axis (plug in your x-value from the axis) 3. x-intercepts: <ul style="list-style-type: none"> • graph your pattern to see the x-intercepts • or factor (if you can) and solve for x to get the x-intercepts 4. y-intercept: find $f(0)$ 	<p style="text-align: center;">$y = x^2 + 10x + 24$</p> <p><u>Axis:</u></p> <p><u>Vertex:</u></p> <p><u>x-intercept(s):</u></p> <p><u>y-intercept:</u></p>	<p style="text-align: center;"><u>Graph</u></p> 
<p style="text-align: center;"><i>Intercept Form</i></p> <p><u>Steps:</u></p> <ol style="list-style-type: none"> 1. x-intercepts: set each factor equal to zero and solve for x 2. Axis of Symmetry: find the midpoint between the x-intercepts and draw a vertical line 3. Vertex: evaluate the function at the axis (plug in your x-value from the axis) 4. y-intercept: find $f(0)$ 	<p style="text-align: center;">$y = 2(x - 5)(x - 1)$</p> <p><u>x-intercept(s):</u></p> <p><u>Axis:</u></p> <p><u>Vertex:</u></p> <p><u>y-intercept:</u></p>	

Converting Quadratics

<p style="text-align: center;"><i>Vertex to Standard</i></p> <ol style="list-style-type: none"> 1. square the binomial 2. distribute 3. combine like terms 	$y = -(x + 1)^2 + 3$
<p style="text-align: center;"><i>Intercept to Standard</i></p> <ol style="list-style-type: none"> 1. multiply the binomials first 2. distribute 	$y = 2(x - 1)(x - 5)$
<p style="text-align: center;"><i>Standard to Intercept</i></p> <ol style="list-style-type: none"> 1. Factor out the GCF 2. Factor any other way 	$y = 2x^2 + 20x + 48$
<p style="text-align: center;"><i>Standard to vertex</i></p> <ol style="list-style-type: none"> 1. group the x^2 and x terms in parentheses 2. factor out the leading coefficient (from x^2 and x) 3. complete the square: $\left(\frac{b}{2}\right)^2$ in the parenthesis + _____ 4. balance the equation: outside the parenthesis - _____ 5. Factor the trinomial, it should be $()^2$ 6. combine like terms at the end 	<p>ex 1: $y = x^2 + 10x + 24$</p> <p>ex 2: $y = 3x^2 + 12x + 14$</p>

Quadratic Inequalities

Graphing		
<p><u>Steps:</u></p> <p>1. Graph the Quadratic</p> <p>2. Solid or Dotted \geq or \leq Then the parabola is a SOLID curve $<$ or $>$ Then the parabola is a DASHED curve</p> <p>3. Shade If you have a $>$ or \geq symbol, shade where y is getting larger If you have a $<$ or \leq symbol, shade where y is getting smaller</p>	<p>1. $y \geq x^2 + 2x - 3$</p> 	<p>2. $y > -x^2 + 2x + 3$</p> 
Solving Algebraically		
<p><u>Steps:</u></p> <p>1. Equation change to an equation</p> <p>2. Set equation = 0</p> <p>3. Solve by factoring</p> <p>4. Graph solutions on a number line</p> <p>5. Test 3 numbers to determine which interval(s) are solution(s)</p> <p>6. Write answer in interval notation.</p>	<p>1. $x^2 + 2x \leq 3$</p> 	<p>2. $2x^2 + 3x > 5$</p> 

Modeling with Quadratics

<p>Evaluating a Function</p> <p>Hint: Evaluate the function by finding $h(1)$.</p>	<p>A ball is hit into the air from a height of 4 feet. The function $g(t) = -16t^2 + 120t + 4$ can be used to model the height of the ball where t is the time in seconds after the ball is hit.</p> <p>Find the height of the ball after 1 second.</p>
<p>Analyzing the Vertex</p> <p>Hint:</p> <ol style="list-style-type: none">1. Find the axis of symmetry. (This is the time at which the ball reaches maximum height.)2. Find the vertex by evaluating the function. The second coordinate in the vertex represents the maximum height.	<p>A ball is hit into the air from a height of 4 feet. The function $g(t) = -16t^2 + 120t + 4$ can be used to model the height of the ball where t is the time in seconds after the ball is hit.</p> <p>What is the maximum height the ball reaches?</p>
<p>Analyzing the Zeros</p> <p>Hint:</p> <ol style="list-style-type: none">1. Set the quadratic equal to zero and solve.2. Disregard solutions that are negative (since time does not go backwards!)3. The remaining zero indicates the time at which the ball hits the ground.	<p>A ball is hit into the air from a height of 4 feet. The function $g(t) = -16t^2 + 120t + 4$ can be used to model the height of the ball where t is the time in seconds after the ball is hit.</p> <p>How long is the ball in the air?</p>