

## AC Algebra/Geometry A- Agenda 3B

### Quadratics:

Students will analyze quadratic functions in the forms  $f(x) = ax^2 + bx + c$  and  $f(x) = a(x-h)^2 + k$ .

- Convert between standard and vertex form.
- Graph quadratic functions as transformations of the function  $f(x) = x^2$ .
- Investigate and explain characteristics of quadratic functions, including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, intervals of increase and decrease, and rates of change.

Students will solve quadratic equations and inequalities in one variable.

- Solve equations graphically using appropriate technology.

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### Friday, November 13

#### *Graphing Quadratics*

Notes: Graphing Quadratics Organizer

Powerpoint/notes

HW: Graphing Quadratics WS 1 and WS 2

Pages 1- 2c

### Monday, November 16

#### *Graphing Quadratics*

Review/Practice

HW: Graphing vertex, standard and intercept forms (3 worksheets)

Pages 3- 10 (teacher will pick questions in class from each page)

### Tuesday, November 17

#### *Graphing Quadratics*

Review/Practice

HW: Graphing vertex, standard and intercept forms

Pages 11-12

### Wednesday, November 18

Help Session

10:30-11:25

### Thursday, November 19

#### *Converting Quadratic Equations*

Notes: Converting Equations Organizer

OR PowerPoint Outline

HW: Converting Quadratic Equations WS

Pages 15-16

### Friday, November 20

#### *Graphing & Converting Quadratics*

HW - Q&A

HW: Graphing & Converting WS

Pages 17-18

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### Thanksgiving Break!!! Nov 21-Nov 29

Be safe and make good choices!

### Monday, November 30

#### *Graphing & Converting Quadratics*

Go over HW

Graphing & Converting - Classwork Grade

HW: Converting, Graphing, &

Characterizing Quadratics WS

Pages 19-22

### Tuesday, December 1

#### *Characteristics of Quadratics*

Note sheet/powerpoint

HW: Transformations and Characteristics of Quadratic Functions

Pages 23-26

### Wednesday, December 2

Help Session

10:30 - 11:25 am

### Thursday, December 3

More with Characteristics of Functions

CW: Characteristics of Quadratics WS

HW: Converting, Graphing and

Characterizing Quadratics Grid WS

Pages 27-28

### Friday, December 4

#### *Quadratic Inequalities*

Notes: Graphing & Solving Quadratic Inequalities

HW: Quadratic Inequalities WS 1

Pages 29-31

## AC Algebra/Geometry A- Agenda 3B

### Monday, December 7

Quadratic Inequalities

More practice

CW/HW: Quadratics Inequalities WS 2

Page 32

### Tuesday, December 8

Applications of Quadratics

Pages 33-34

### Wednesday, December 9

Help Session

10:30 - 11:25 am

HW: Mixed Review WS

Page 35-37

### Thursday, December 10

Unit 3B Test

### Friday, December 11

*Final Exam Review*

### Monday, December 14

Final exam review

### Tuesday, December 15

Virtual Day

7<sup>th</sup> period exam

### Wednesday, December 16

Virtual Day

1<sup>st</sup> and 6<sup>th</sup> exam

### Thursday, December 17

Virtual Day

2<sup>nd</sup> and 4<sup>th</sup>

### Friday, December 18

Virtual Day

3<sup>rd</sup> and 5<sup>th</sup> exams

## Unit 5 - The Great Quadratic - Graphing Quadratic Equations

The graph of a quadratic equation is called a \_\_\_\_\_.

A parabola has a maximum or minimum point called a \_\_\_\_\_.

There are three forms of a quadratic equation:

I. Intercept Form \_\_\_\_\_

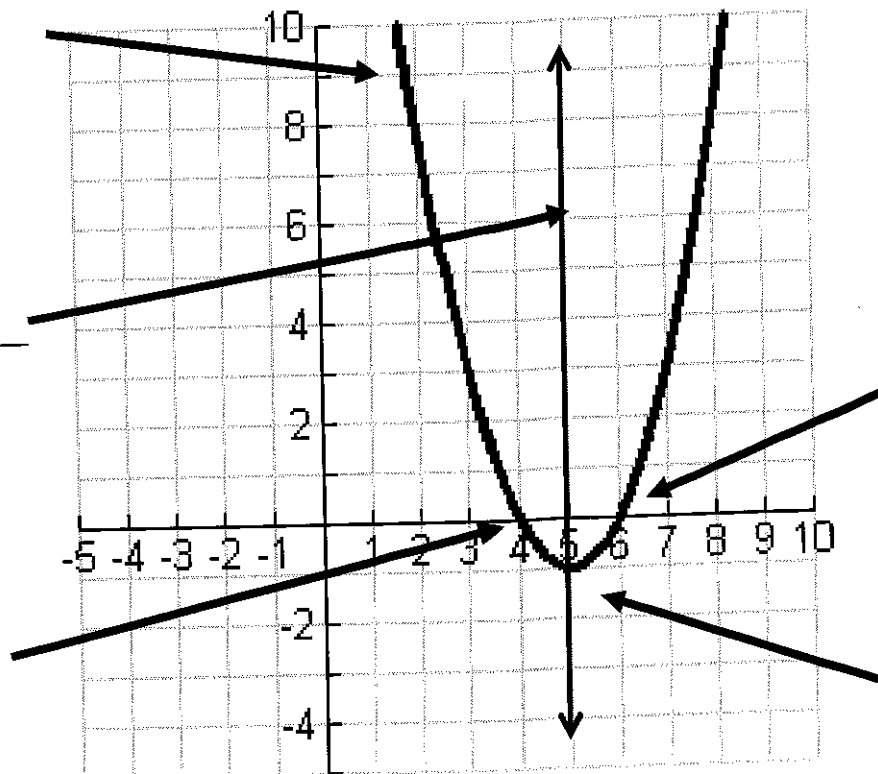
II. Vertex Form \_\_\_\_\_

III. Standard Form \_\_\_\_\_

The equation  $x = \frac{-b}{2a}$  gives the equation of the \_\_\_\_\_.

This is a \_\_\_\_\_ line.

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**Graphing:**

**Steps:**

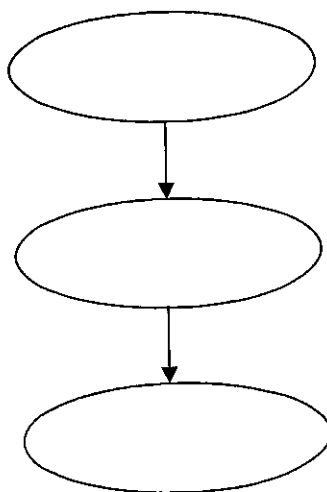
**Example:**

**I. Intercept Form**

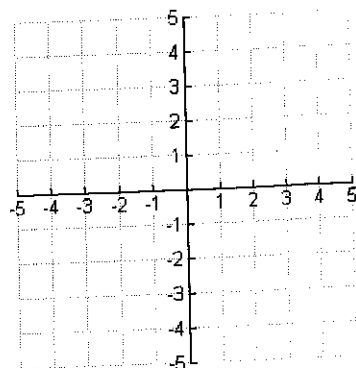
$$f(x) = a(x - p)(x - q)$$

$p$  and  $q$  are the \_\_\_\_\_.

$a$  determines \_\_\_\_\_ and \_\_\_\_\_.



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

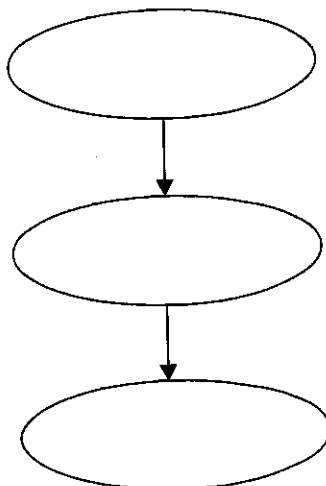


**II. Vertex Form**

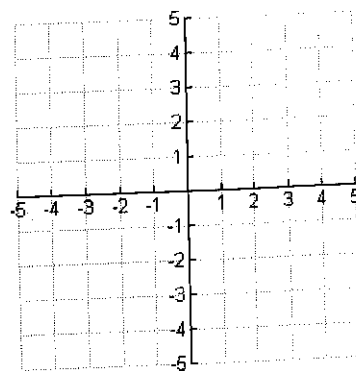
$$f(x) = a(x - h)^2 + k$$

$(h, k)$  is the \_\_\_\_\_.

$a$  determines the \_\_\_\_\_ and \_\_\_\_\_.



Graph  $f(x) = 2(x - 1)^2 - 3$

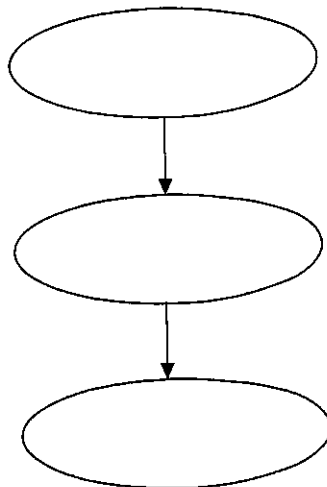


**III. Standard Form**

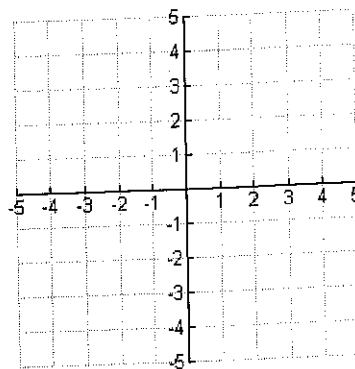
$$f(x) = ax^2 + bx + c$$

$x = \frac{-b}{2a}$  gives the \_\_\_\_\_.

$a$  determines the \_\_\_\_\_ and \_\_\_\_\_.



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



AC Math 1  
Graphing Quadratic Equations WS 1

Name \_\_\_\_\_

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

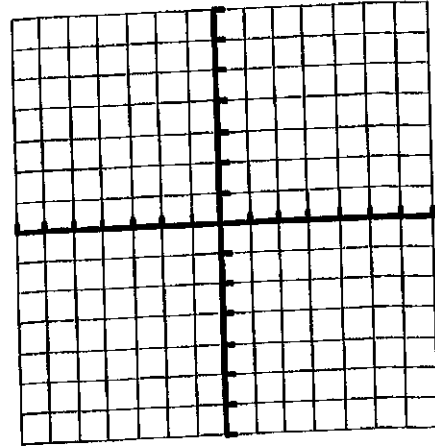
1.  $f(x) = 2(x+2)(x+4)$

x-Intercept(s): \_\_\_\_\_

Vertex: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

y-intercept: \_\_\_\_\_



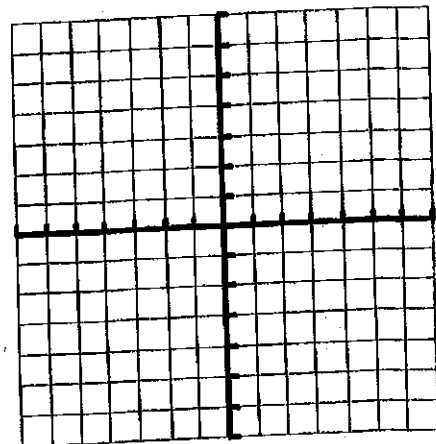
2.  $g(x) = -(x-3)^2 + 4$

x-Intercept(s): \_\_\_\_\_

Vertex: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

y-intercept: \_\_\_\_\_



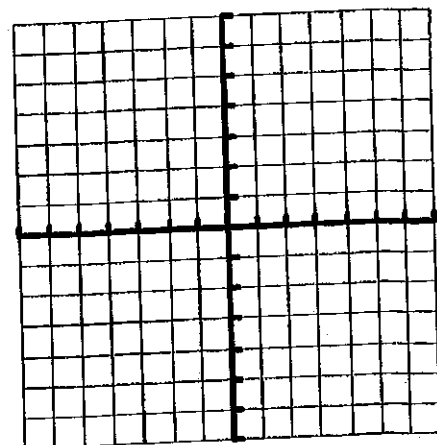
3.  $f(x) = 2x^2 - 12x + 18$

x-Intercept(s): \_\_\_\_\_

Vertex: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

y-intercept: \_\_\_\_\_



AC Math 1  
Graphing Quadratic Equations WS 2

Name \_\_\_\_\_

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

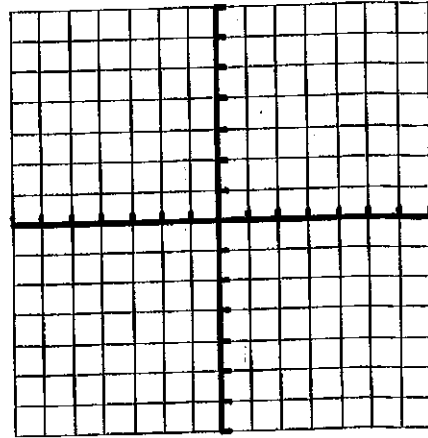
1.  $f(x) = 2(x-1)(x-3)$

x-Intercept(s): \_\_\_\_\_

Vertex: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

y-intercept: \_\_\_\_\_



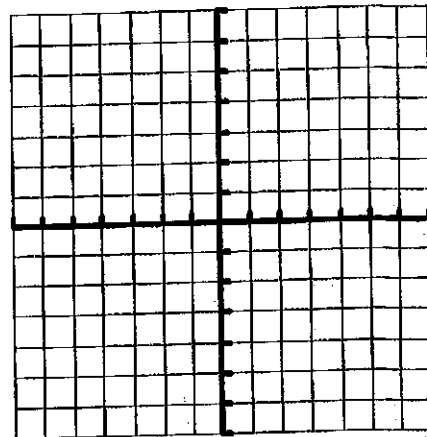
2.  $g(x) = \frac{1}{2}(x-1)^2 + 2$

x-Intercept(s): \_\_\_\_\_

Vertex: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

y-intercept: \_\_\_\_\_



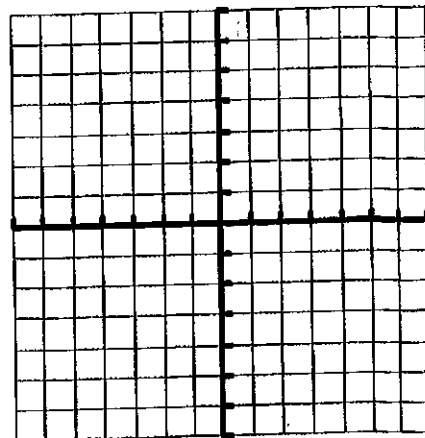
3.  $f(x) = -x^2 + 4x - 3$

x-Intercept(s): \_\_\_\_\_

Vertex: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

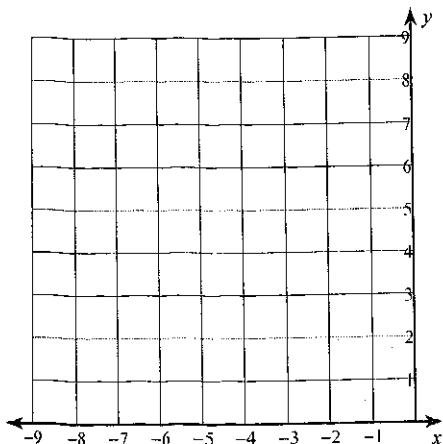
y-intercept: \_\_\_\_\_



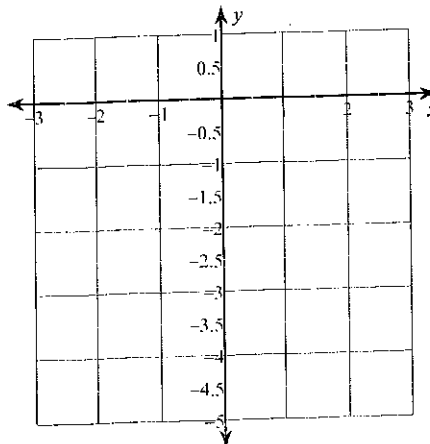
### Graphing Quadratics in Vertex Form

Sketch the graph of each function. Make sure to label the vertex, sketch the Axis of Symmetry using a dashed line, find and sketch the y-intercept and create a table of values.

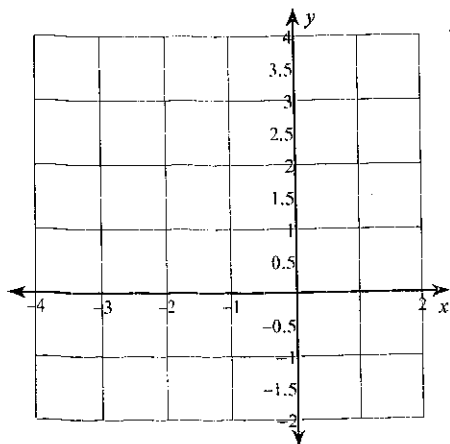
1)  $y = (x + 4)^2 + 4$



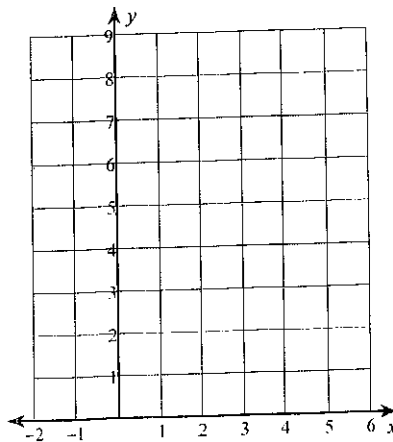
2)  $y = (x + 1)^2 - 4$



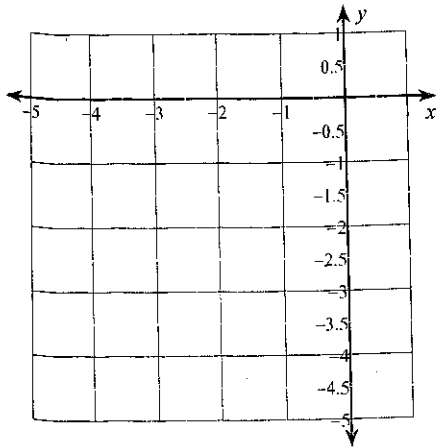
3)  $y = (x + 1)^2 - 1$



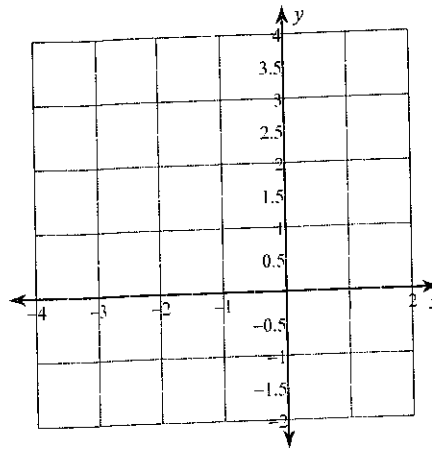
4)  $y = (x - 2)^2 + 4$



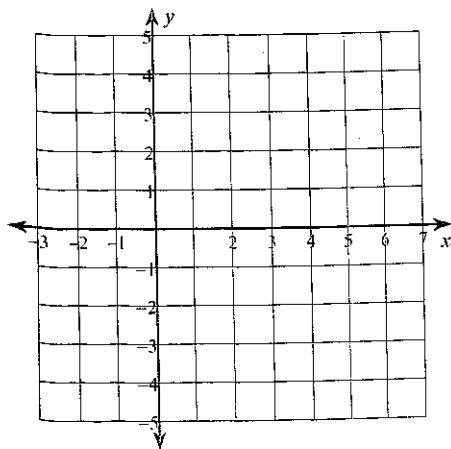
$$5) y = (x + 3)^2 - 4$$



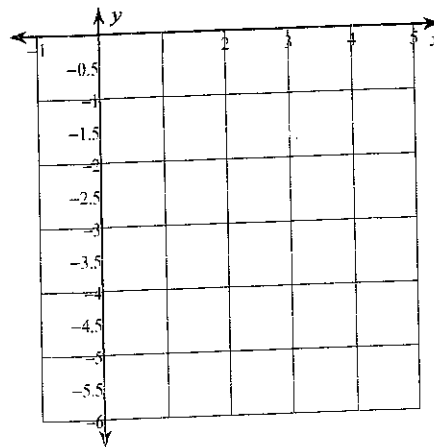
$$6) y = -(x + 2)^2 + 3$$



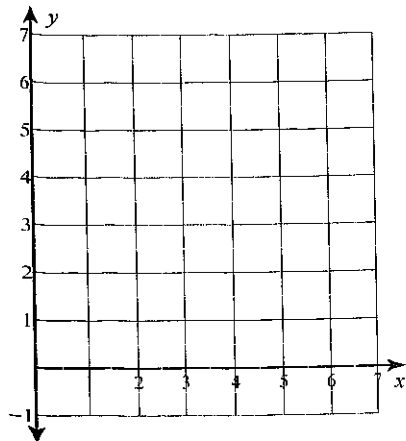
$$7) y = 2(x - 1)^2 - 4$$



$$8) y = -(x - 2)^2 - 1$$

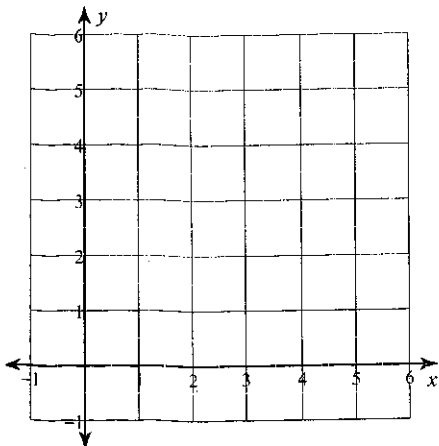


$$9) y = (x - 4)^2 + 1$$

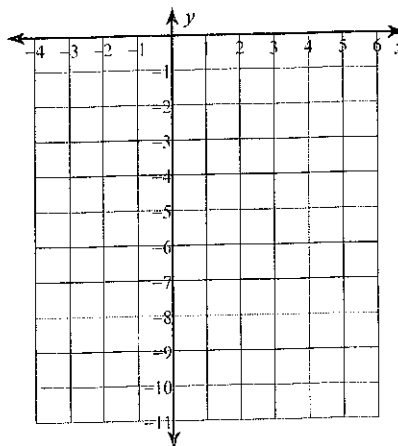




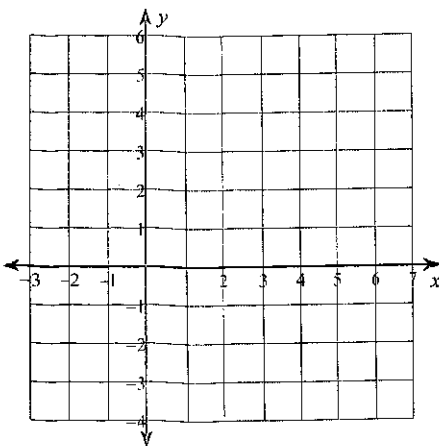
$$10) y = -\frac{1}{2}(x-4)^2 + 4$$



$$11) y = -2(x-1)^2 - 2$$



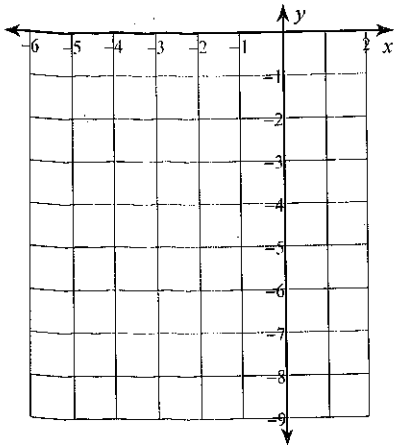
$$12) y = 2(x-2)^2 - 3$$



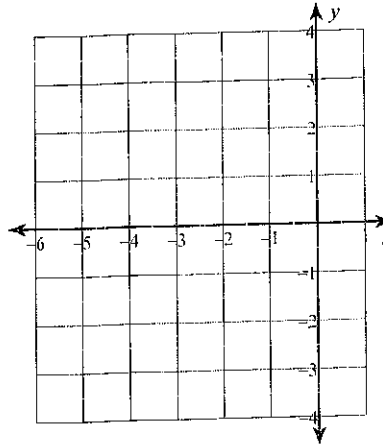
Graphing Quadratics in Standard Form

Sketch the graph of each function. Make sure to label the vertex, sketch the Axis of Symmetry using a dashed line, find and sketch the y-intercept and create a table of values.

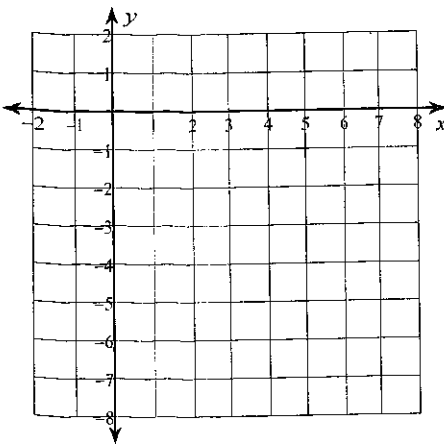
1)  $y = -x^2 - 4x - 8$



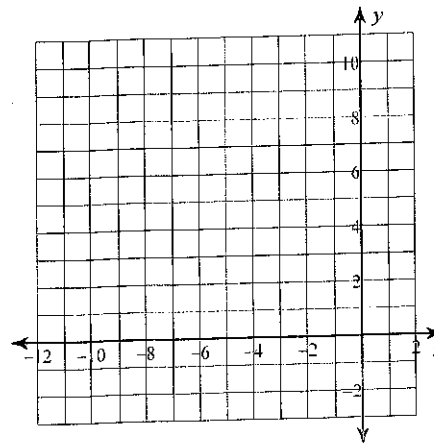
2)  $y = x^2 + 8x + 14$



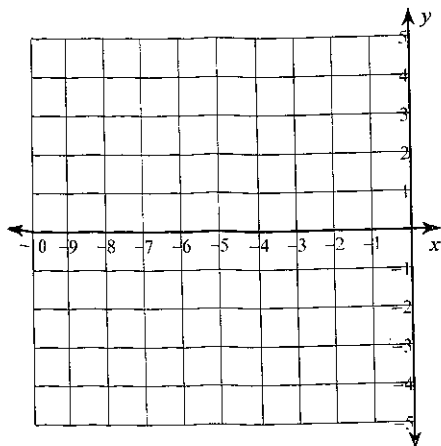
3)  $y = -2x^2 + 8x - 7$



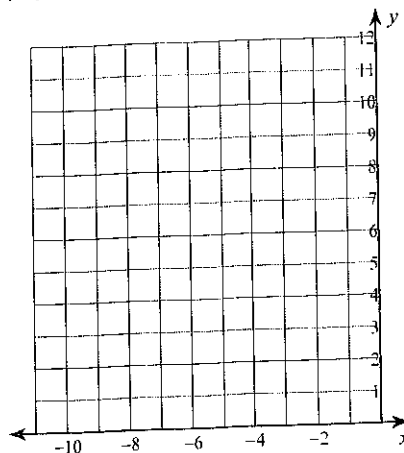
4)  $y = 3x^2 + 18x + 25$



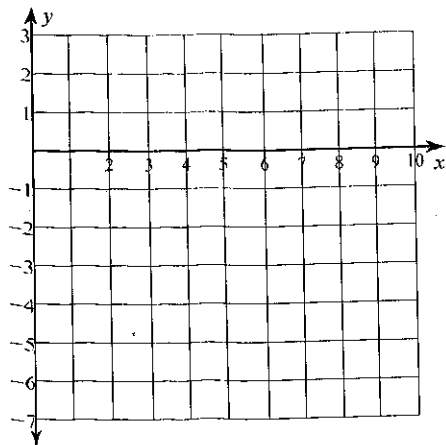
5)  $y = 2x^2 + 12x + 14$



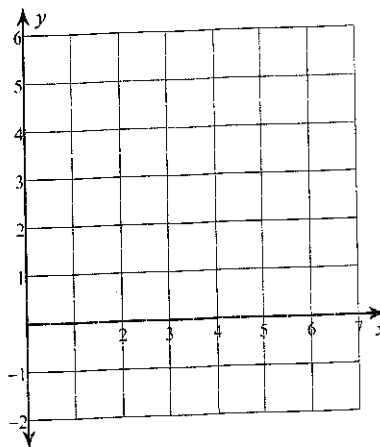
6)  $y = 2x^2 + 16x + 35$



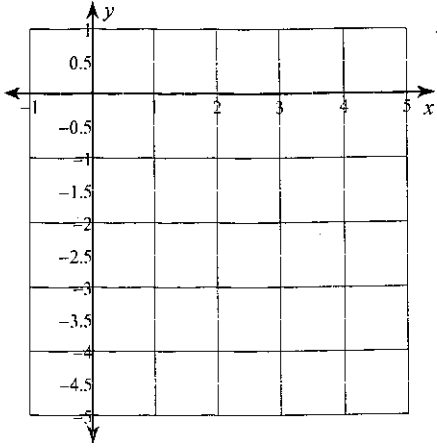
7)  $y = -2x^2 + 12x - 16$



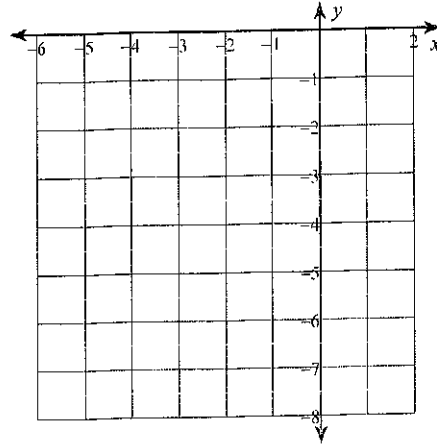
8)  $y = -x^2 + 8x - 12$



9)  $y = x^2 - 4x$



10)  $y = -x^2 - 4x - 7$



Name:

Date:

Period:

### Practice Worksheet: Graphing Quadratic Functions in Intercept Form

For #1-6, label the x-intercepts, axis of symmetry, vertex, y-int., and at least one more point on the graph.

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

a =      p =      q =

x-intercepts: (\_\_\_\_, 0) (\_\_\_\_, 0)

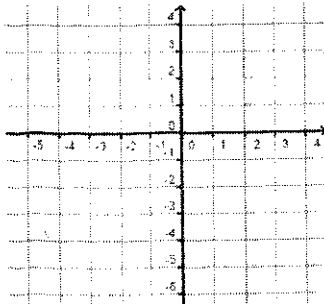
Axis of Symmetry is x = \_\_\_\_\_

Vertex: (\_\_\_\_, \_\_\_\_)

Opens up or down?

Slope to pt one unit from vertex:

y-intercept: (0, \_\_\_\_)



2]  $y = -\frac{1}{2}x(x - 8)$

a =      p =      q =

x-intercepts: (\_\_\_\_, 0) (\_\_\_\_, 0)

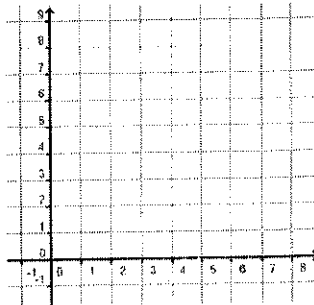
Axis of Symmetry is x = \_\_\_\_\_

Vertex: (\_\_\_\_, \_\_\_\_)

Opens up or down?

Slope to pt one unit from vertex:

y-intercept: (0, \_\_\_\_)



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

a =      p =      q =

x-intercepts: (\_\_\_\_, 0) (\_\_\_\_, 0)

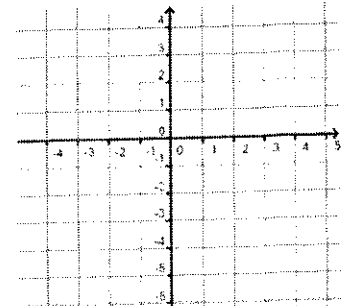
Axis of Symmetry is x = \_\_\_\_\_

Vertex: (\_\_\_\_, \_\_\_\_)

Opens up or down?

Slope to pt one unit from vertex:

y-intercept: (0, \_\_\_\_)



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

a =      p =      q =

x-intercepts: (\_\_\_\_, 0) (\_\_\_\_, 0)

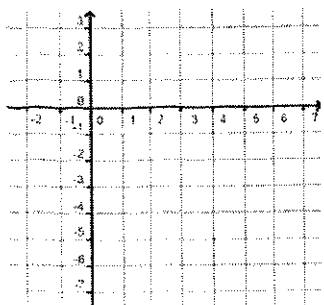
Axis of Symmetry is x = \_\_\_\_\_

Vertex: (\_\_\_\_, \_\_\_\_)

Opens up or down?

Slope to pt one unit from vertex:

y-intercept: (0, \_\_\_\_)



5]  $y = 4(x + 2)(x + 1)$

a =      p =      q =

x-intercepts: (\_\_\_\_, 0) (\_\_\_\_, 0)

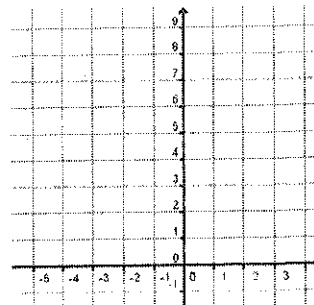
Axis of Symmetry is x = \_\_\_\_\_

Vertex: (\_\_\_\_, \_\_\_\_)

Opens up or down?

Slope to pt one unit from vertex:

y-intercept: (0, \_\_\_\_)



6]  $y = -(x - 3)(x - 3)$

a =      p =      q =

x-intercepts: (\_\_\_\_, 0) (\_\_\_\_, 0)

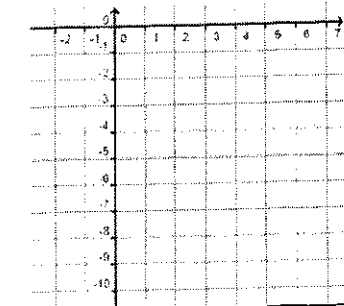
Axis of Symmetry is x = \_\_\_\_\_

Vertex: (\_\_\_\_, \_\_\_\_)

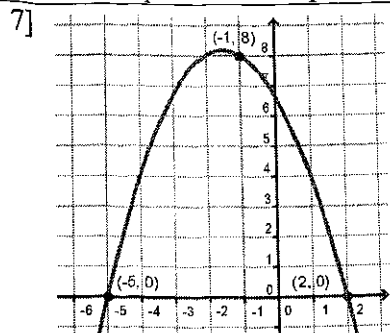
Opens up or down?

Slope to pt one unit from vertex:

y-intercept: (0, \_\_\_\_)



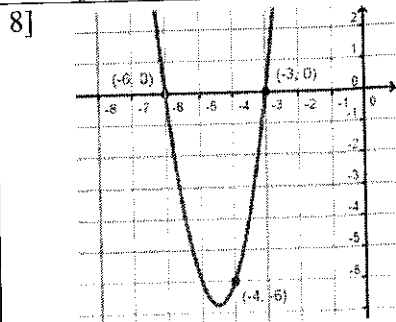
Write the equation of the parabola in intercept form.



$p =$     $q =$     $x =$     $y =$

Find a.

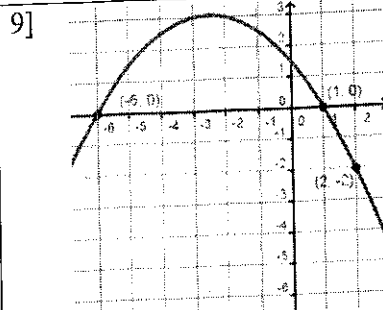
Write the equation.



$p =$     $q =$     $x =$     $y =$

Find a.

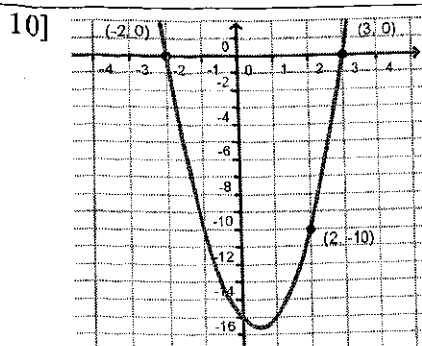
Write the equation.



$p =$     $q =$     $x =$     $y =$

Find a.

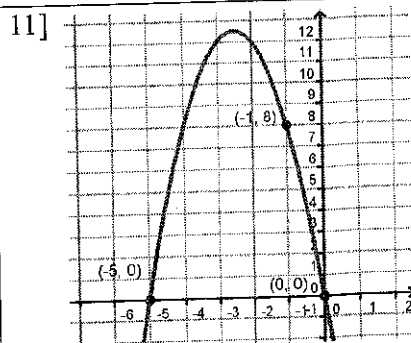
Write the equation.



$p =$     $q =$     $x =$     $y =$

Find a.

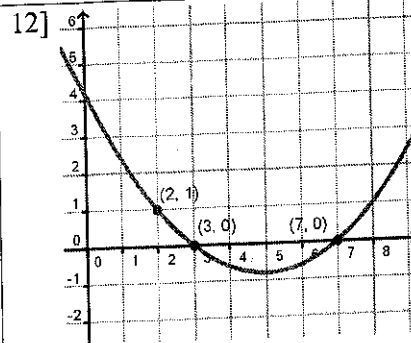
Write the equation.



$p =$     $q =$     $x =$     $y =$

Find a.

Write the equation.



$p =$     $q =$     $x =$     $y =$

Find a.

Write the equation.

Write the quadratic function in standard form.

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

14]  $y = -(x - 1)(x - 1)$

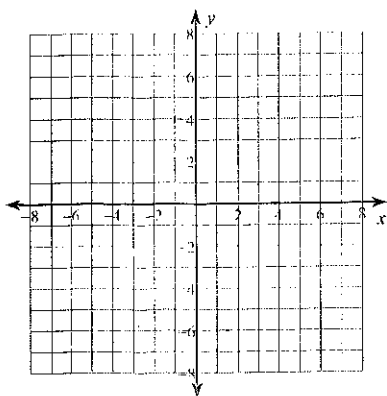
15]  $y = 3(x + 3)(x + 1)$

## Graphing Quadratics

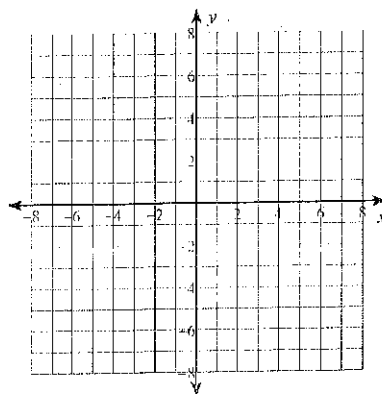
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Identify the vertex, axis of symmetry, direction of opening, min/max value, y-intercept, and x-intercepts of each. Then sketch the graph.

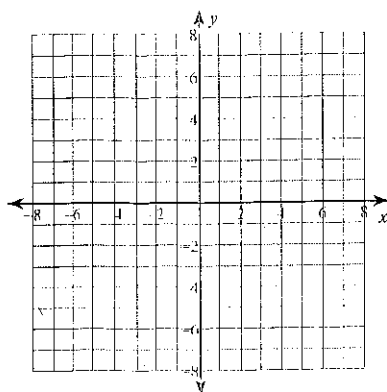
1)  $f(x) = -2x^2 - 20x - 50$



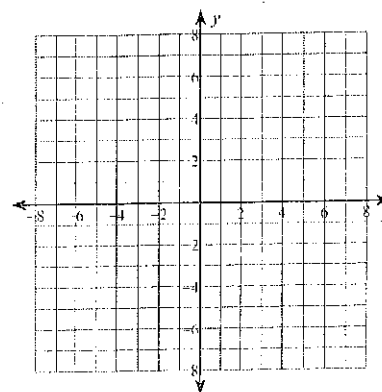
2)  $f(x) = x^2 - 6x + 10$



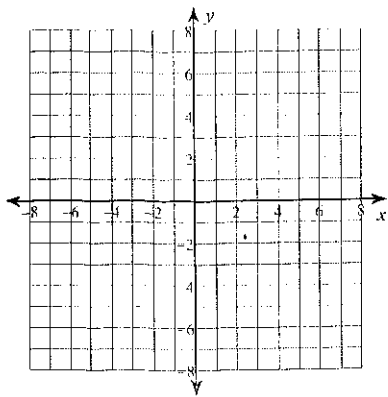
3)  $f(x) = -x^2 - 12x - 36$



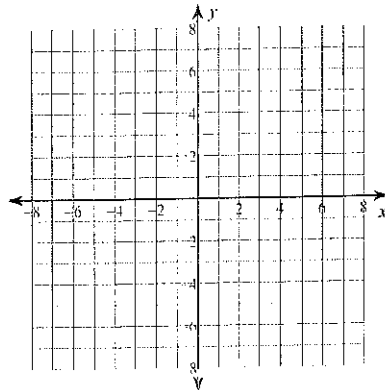
4)  $y = \frac{1}{2}(x - 3)^2 - 8$



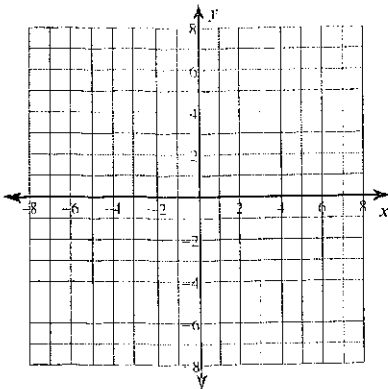
$$5) y = \frac{1}{2}(x+2)^2 + 2$$



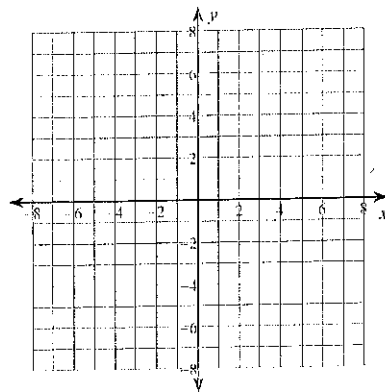
$$6) y = -2(x-3)^2 - 1$$



$$7) y = \frac{1}{4}(x+7)(x-3)$$



$$8) y = -(x+2)(x+6)$$





AC Math 1  
Converting Quadratic Equations WS

Name \_\_\_\_\_  
Period \_\_\_\_\_

**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**

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

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

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

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

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

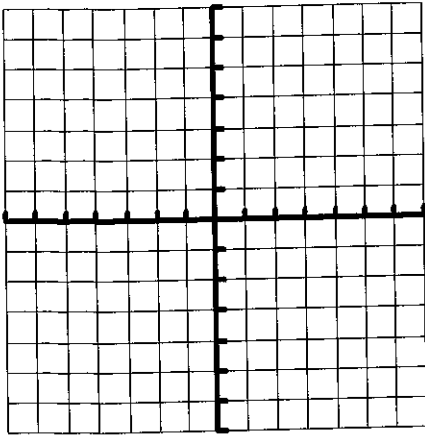
$$26. y = 2(x+5)(x+7)$$

AC Math 1  
 Graphing and Converting  
 Quadratic Equations WS

Name \_\_\_\_\_

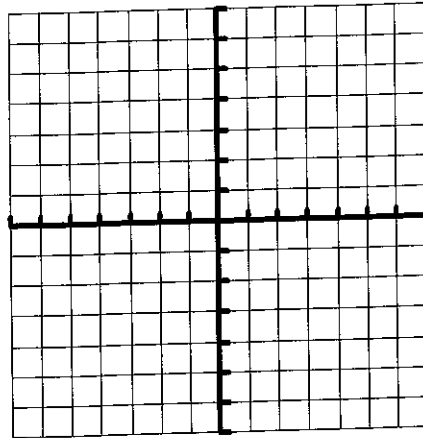
Graph each of the following quadratic functions. Identify the appropriate characteristics.

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



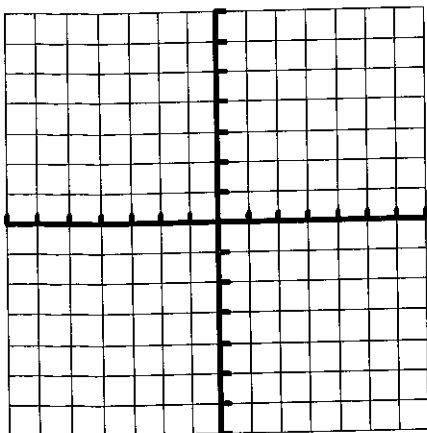
x-Intercept(s): \_\_\_\_\_  
 Vertex: \_\_\_\_\_  
 Axis of Symmetry: \_\_\_\_\_  
 y-intercept: \_\_\_\_\_

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



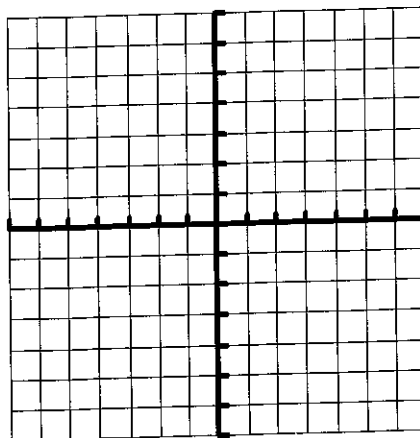
x-Intercept(s): \_\_\_\_\_  
 Vertex: \_\_\_\_\_  
 Axis of Symmetry: \_\_\_\_\_  
 y-intercept: \_\_\_\_\_

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



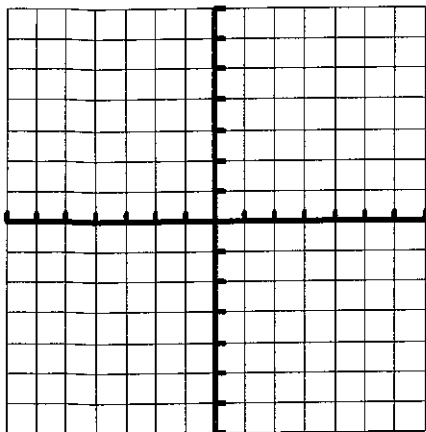
x-Intercept(s): \_\_\_\_\_  
 Vertex: \_\_\_\_\_  
 Axis of Symmetry: \_\_\_\_\_  
 y-intercept: \_\_\_\_\_

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



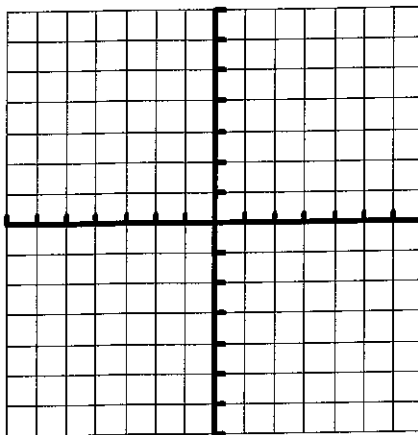
x-Intercept(s): \_\_\_\_\_  
 Vertex: \_\_\_\_\_  
 Axis of Symmetry: \_\_\_\_\_  
 y-intercept: \_\_\_\_\_

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



x-Intercept(s): \_\_\_\_\_  
 Vertex: \_\_\_\_\_  
 Axis of Symmetry: \_\_\_\_\_  
 y-intercept: \_\_\_\_\_

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



x-Intercept(s): \_\_\_\_\_  
 Vertex: \_\_\_\_\_  
 Axis of Symmetry: \_\_\_\_\_  
 y-intercept: \_\_\_\_\_

7. Convert the following equations to standard form.

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

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

8. Convert the following equations to intercept form.

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

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

9. Convert the following equations to vertex form.

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

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

# Quadratics

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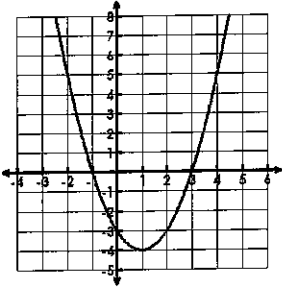
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## Characteristics

Domain:

Range:



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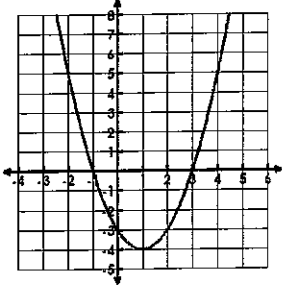
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## Characteristics

Zeros:

Y-intercept:



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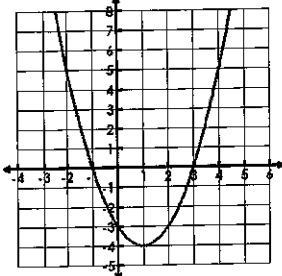
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### Characteristics

**Extreme Value:**



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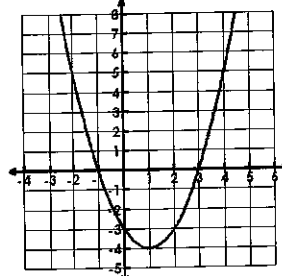
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### Characteristics

**Interval of Increase:**



**Interval of Decrease:**

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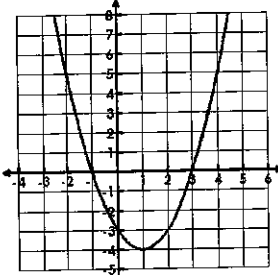
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### Characteristics

**Axis of Symmetry:**



**Vertex:**

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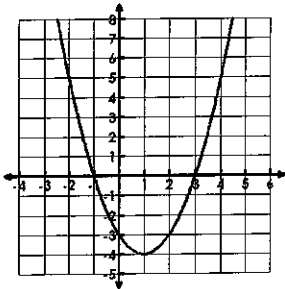
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# Characteristics

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



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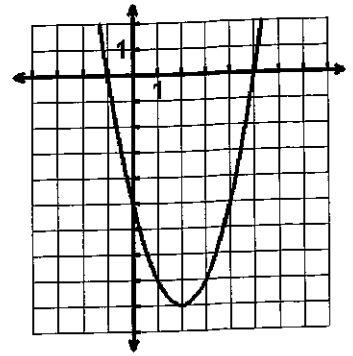
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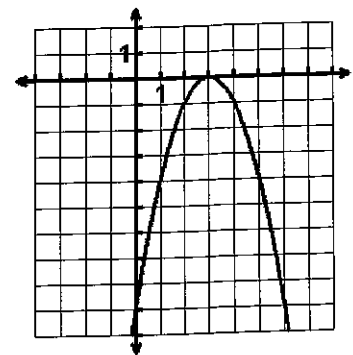
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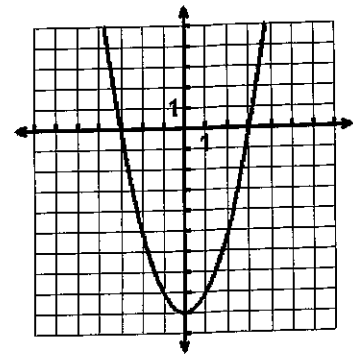
1. Domain: \_\_\_\_\_ Range: \_\_\_\_\_  
 Vertex: \_\_\_\_\_ Extrema: \_\_\_\_\_  
 X intercept(s): \_\_\_\_\_ Y Intercept: \_\_\_\_\_  
 Increasing: \_\_\_\_\_ Decreasing: \_\_\_\_\_  
 Axis of Symmetry: \_\_\_\_\_



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



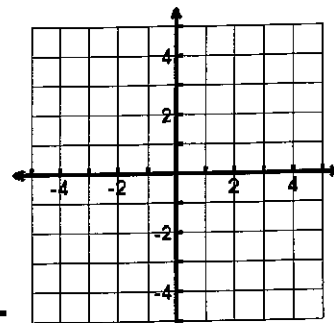
3. Domain: \_\_\_\_\_ Range: \_\_\_\_\_  
 Vertex: \_\_\_\_\_ Extrema: \_\_\_\_\_  
 X intercept(s): \_\_\_\_\_ Y Intercept: \_\_\_\_\_  
 Increasing: \_\_\_\_\_ Decreasing: \_\_\_\_\_  
 Axis of Symmetry: \_\_\_\_\_



Use the information to sketch a quadratic.

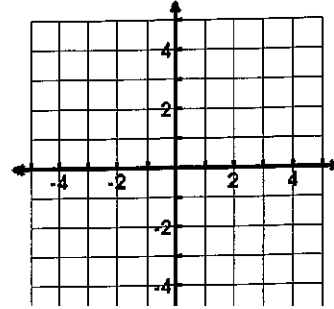
4. Domain: all real numbers  
 Range:  $y \geq 1$

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 ( $a = 1$ )



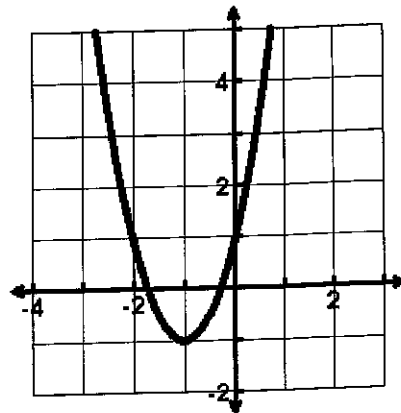


Name: \_\_\_\_\_ Date: \_\_\_\_\_

### Characteristics of Functions

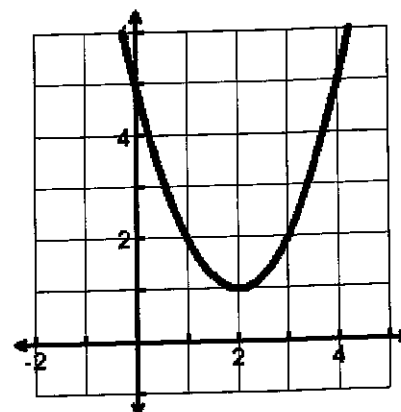
1.  $f(x) = 2x^2 + 4x + 1$

- a. Domain: \_\_\_\_\_ b. Range: \_\_\_\_\_
- c. Extrema: \_\_\_\_\_ d. Axis of Sym: \_\_\_\_\_
- e. Increasing: \_\_\_\_\_ f. Decreasing: \_\_\_\_\_
- g. End Behavior:  $x \rightarrow \infty, y \rightarrow \underline{\hspace{1cm}}$  &  $x \rightarrow -\infty, y \rightarrow \underline{\hspace{1cm}}$
- h. Average rate of change  $0 \leq x \leq 2$



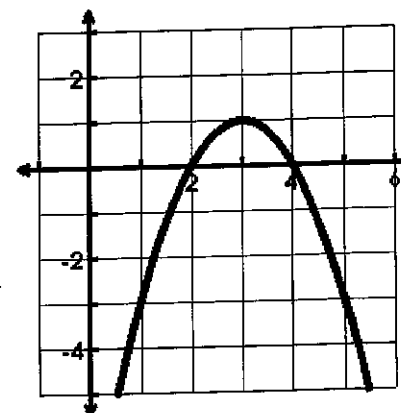
2.  $f(x) = (x - 2)^2 + 1$

- a. Domain: \_\_\_\_\_ b. Range: \_\_\_\_\_
- c. Extrema: \_\_\_\_\_ d. Axis of Sym: \_\_\_\_\_
- e. Increasing: \_\_\_\_\_ f. Decreasing: \_\_\_\_\_
- g. End Behavior:  $x \rightarrow \infty, y \rightarrow \underline{\hspace{1cm}}$  &  $x \rightarrow -\infty, y \rightarrow \underline{\hspace{1cm}}$
- 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:  $x \rightarrow \infty, y \rightarrow \underline{\hspace{1cm}}$  &  $x \rightarrow -\infty, y \rightarrow \underline{\hspace{1cm}}$
- h. Average rate of change  $0 \leq x \leq 2$



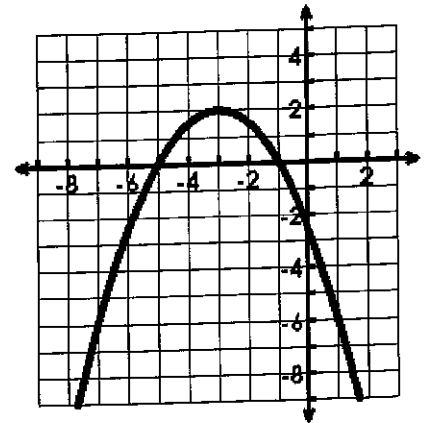
4. This graph represents a quadratic function.

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?

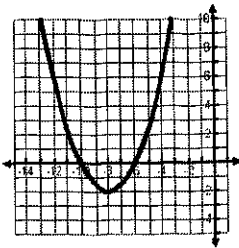
j. For the decreasing interval, is the rate of change increasing or decreasing?

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

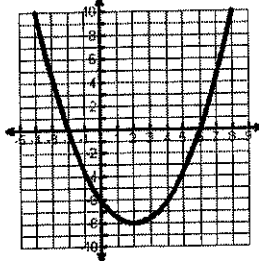
- The vertex is located at  $(8, -2)$ .
- The range is  $-2 \leq f(x) < \infty$ .

Which graph could be  $f(x)$ ?

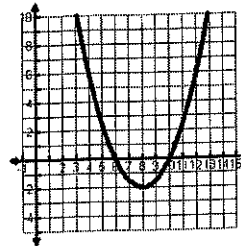
a)



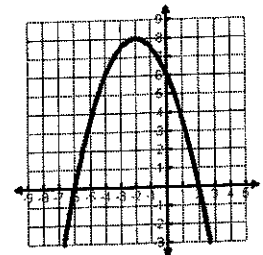
b)



c)



d)



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

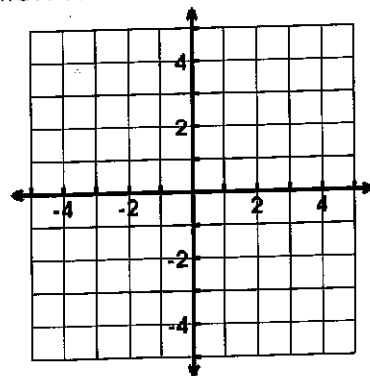
Domain:  $-\infty < x < \infty$

Range:  $y \geq -2$

Increasing:  $-1 < x < \infty$

Decreasing:  $-\infty < x < -1$

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



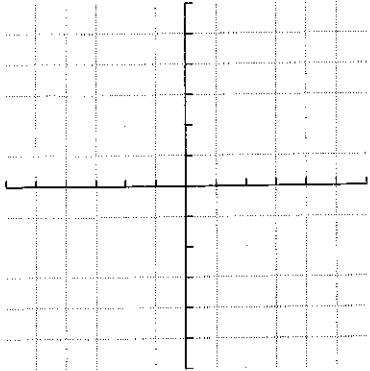
The Great Quadratic  
 Transformations & Characteristics  
 of Quadratic Functions

Name \_\_\_\_\_

Date \_\_\_/\_\_\_/\_\_\_ Period \_\_\_

Graph the quadratic parent function using an x/y table.

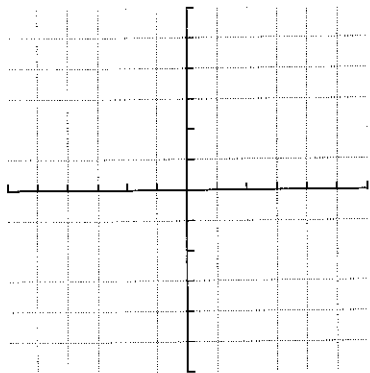
1.  $y = x^2$



x	y

Graph each transformation precisely! Identify the characteristics.

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



domain:

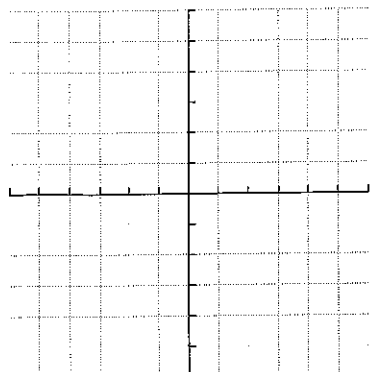
range:

interval of increase:

interval of decrease:

maximum or minimum? value?

3.  $y = \frac{1}{2}x^2 - 2$



domain:

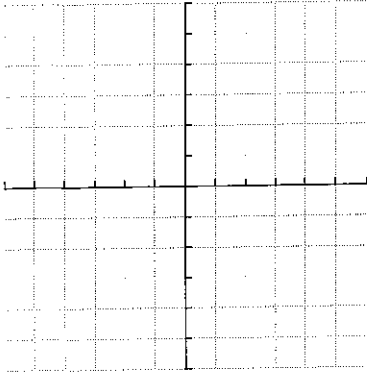
range:

interval of increase:

interval of decrease:

maximum or minimum? value?

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



domain:

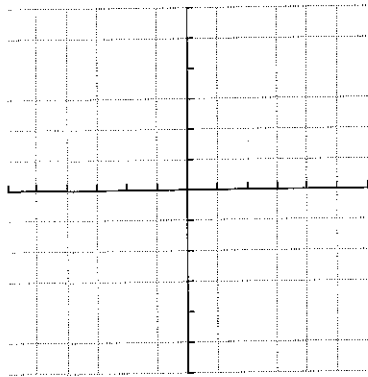
range:

interval of increase:

interval of decrease:

maximum or minimum? value?

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



domain:

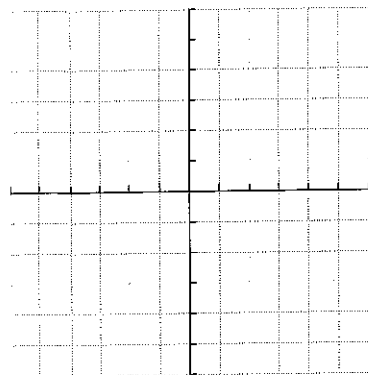
range:

interval of increase:

interval of decrease:

maximum or minimum? value?

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



domain:

range:

interval of increase:

interval of decrease:

maximum or minimum? value?

# Characteristics of Quadratics WS

Name \_\_\_\_\_

Refer to your graphs on the "Graphing and Converting Quadratic Equations WS" and identify the following characteristics for each.

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 \_\_\_\_\_

AC Math 1

Name \_\_\_\_\_

Converting, Graphing, and Characterizing Quadratics

Date \_\_\_\_ / \_\_\_\_ / \_\_\_\_ Period \_\_\_\_

Graph the following quadratic equations neatly on graph paper.

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

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

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

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			$y = -(x - 2)^2 + 1$							
*				$x = 3$	$(3, -1)$	$(2, 0)$ & $(4, 0)$				

## Quadratic Inequalities

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

Oct 17-7:48 AM

Graph each inequality.

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

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

Oct 17-7:56 AM

Solve each inequality algebraically.

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

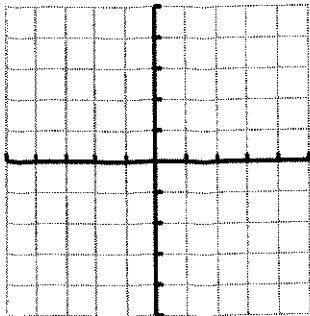
b.  $2x^2 + 3x > 5$

Oct 17-7:57 AM

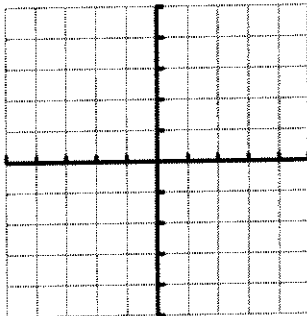


Graph each quadratic inequality.

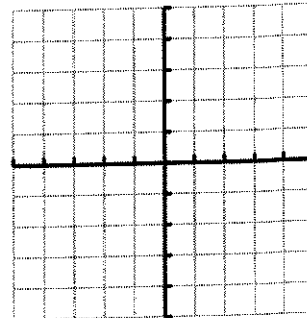
1.  $y \geq -x^2 + 4$



2.  $y \geq 2x^2$



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



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

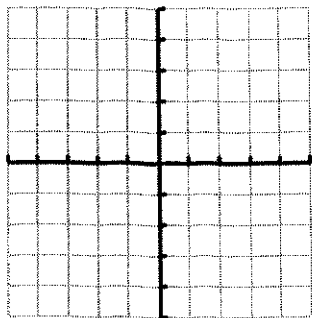
7.  $x^2 < 3x + 10$

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

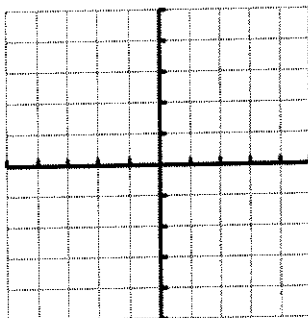
9.  $x^2 + 3x > 18$

Graph each quadratic inequality.

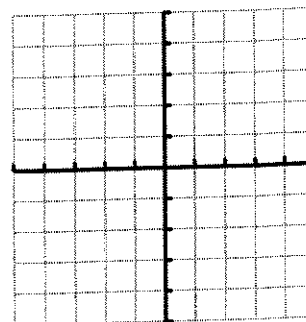
1.  $y > 2(x-2)^2$



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

Name: \_\_\_\_\_ Date: \_\_\_\_\_

### Characteristics of Quadratic Equations

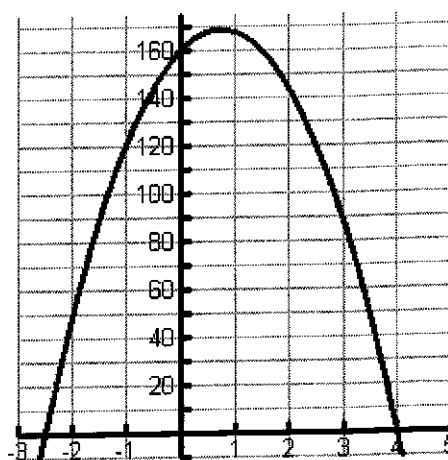
Wil E. Coyote is catapulting a boulder off a cliff to hit the road runner. Let  $t$  represent the number of seconds that the boulder catapults off the cliff and  $h(t)$  denote the height of the boulder, in feet, above the base of the cliff. Ignoring air resistance, we can use the following formula 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)**?

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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 1<sup>st</sup> and then start finding the vertex.*

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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?

## Quadratics Mixed Review WS 1

(Solving, Graphing, Converting, Inequalities)

Solve the following quadratic equations by factoring or using square roots.

1.  $6x^2 = 14x$

2.  $4(x-1)^2 - 100 = 0$

3.  $2x^2 = 5x + 3$

Find the zeros of the following quadratic functions.

4.  $f(x) = \frac{2}{3}x^2 - 12$

5.  $f(x) = 21x - 3x^2$

6.  $9x^2 - 16 = 0$

Graph each of the following quadratic functions on graph paper.  
Identify the appropriate characteristics.

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

x-Intercept(s): \_\_\_\_\_

Vertex: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

y-intercept: \_\_\_\_\_

8.  $h(x) = \frac{1}{2}(x-2)^2 - 2$

x-Intercept(s): \_\_\_\_\_

Vertex: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

y-intercept: \_\_\_\_\_

9.  $g(x) = x^2 - 8x + 15$

x-Intercept(s): \_\_\_\_\_

Vertex: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

y-intercept: \_\_\_\_\_

10.  $h(x) = 3(x+2)^2 + 2$

x-Intercept(s): \_\_\_\_\_

Vertex: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

y-intercept: \_\_\_\_\_

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

x-Intercept(s): \_\_\_\_\_

Vertex: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

y-intercept: \_\_\_\_\_

12.  $g(x) = 3x^2 + 12x + 9$

x-Intercept(s): \_\_\_\_\_

Vertex: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

y-intercept: \_\_\_\_\_

13. Convert the following equations to standard form.

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

b.  $h(x) = 3(x+2)^2 + 2$

14. Convert the following equations to intercept form.

a.  $g(x) = x^2 - 8x + 15$

b.  $g(x) = 3x^2 + 12x + 9$

15. Convert the following equations to vertex form.

a.  $g(x) = x^2 - 8x + 15$

b.  $g(x) = 3x^2 + 12x + 14$

Graph each quadratic inequality on graph paper.

16.  $y \leq x^2 + 4x - 3$

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

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

Solve each quadratic inequality algebraically.

19.  $x^2 + 2x \leq 0$

20.  $x^2 + 2x - 3 < 0$

21.  $2x^2 + 3x \geq 5$

Graphing Quadratic Equations

(8 points each)

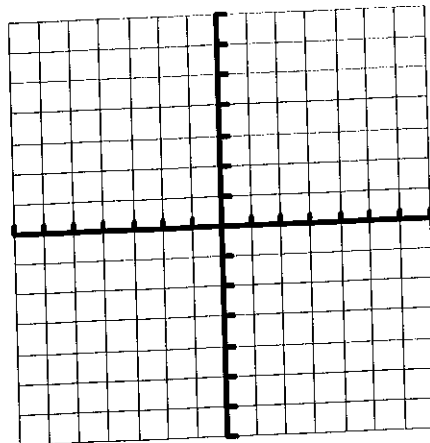
1.  $f(x) = 2x^2 - 12x + 18$

x-Intercept(s): \_\_\_\_\_

Vertex: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

y-intercept: \_\_\_\_\_



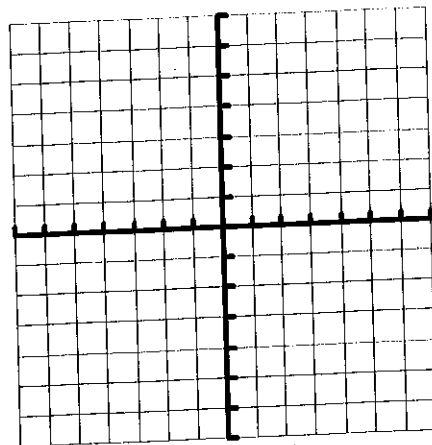
2.  $g(x) = 2(x+2)(x+4)$

x-Intercept(s): \_\_\_\_\_

Vertex: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

y-intercept: \_\_\_\_\_



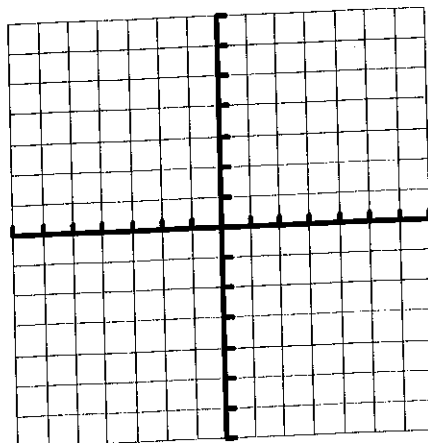
3.  $h(x) = -(x-3)^2 + 4$

x-Intercept(s): \_\_\_\_\_

Vertex: \_\_\_\_\_

Axis of Symmetry: \_\_\_\_\_

y-intercept: \_\_\_\_\_



(3 points each)

### Converting Quadratic Equations

4. Convert the following equations to standard form.

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

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

5. Convert the following equations to vertex form.

a.  $y = 4x^2 - 8x + 15$

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

6. Convert the following equations to intercept form.

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

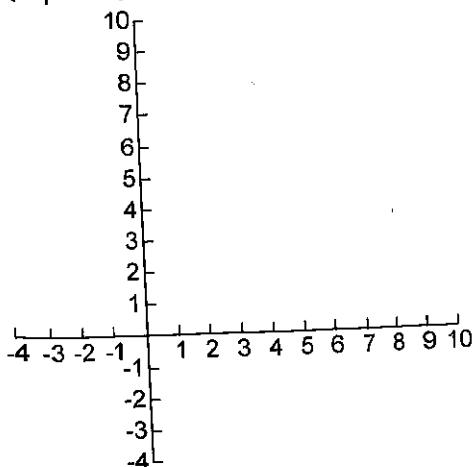
b.  $y = 4x^2 + 5x - 6$

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### Quadratic Inequalities

7. Graph  $y < -2(x-4)^2 + 8$

(2 points)



(3 points each)

8. Solve the following quadratic inequality algebraically

$$x^2 - x - 6 > 0$$

9. Solve the following quadratic inequality algebraically

$$3x^2 - 4x \leq 0$$