

Foundations of Math

Chapter 8 Packet

name:

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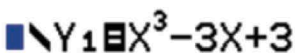
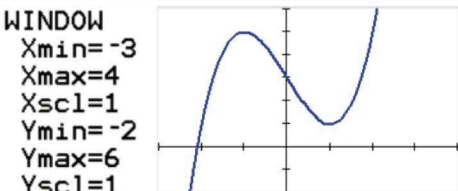
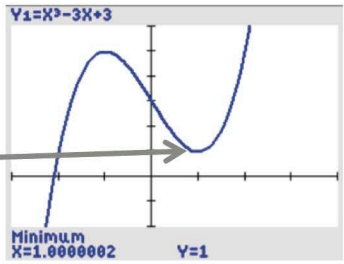
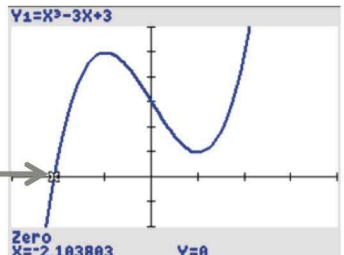
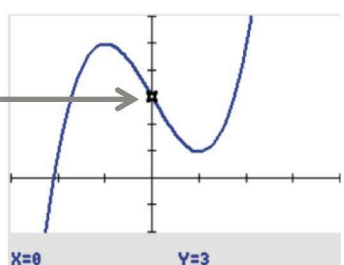
POLYNOMIAL GRAPHS

Graphing Calculator Reference Sheet

Example: $y = x^3 - 3x + 3$
 $-3 \leq x \leq 4$

FIND

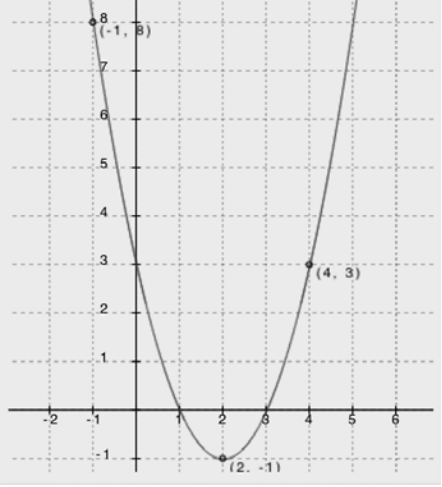
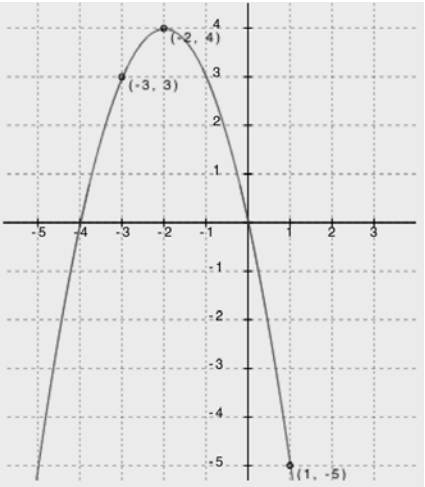
MINIMUM/MAXIMUM, ZEROS, Y-INTERCEPT, and INTERVALS of INCREASE/DECREASE

STEPS	PICTURE
<input type="checkbox"/> STEP 1: Enter your equation into Y1 =	
<input type="checkbox"/> STEP 2: Adjust your WINDOW <ul style="list-style-type: none"> GRAPH the function to see if you need to adjust your window In this case, Xmin = -3 and Xmax = 4 	
<input type="checkbox"/> STEP 3: Find the MINIMUM & MAXIMUM <ul style="list-style-type: none"> MINIMUM: 2ND – TRACE – Choose 3: minimum Move the cursor LEFT of the point – ENTER Move the cursor RIGHT of the point – ENTER Guess? – ENTER MAXIMUM: 2ND – TRACE – Choose 4: maximum Repeat the other steps above 	
<input type="checkbox"/> STEP 4: Find the ZERO(S) <ul style="list-style-type: none"> 2ND – TRACE – Choose 2: zeros Move the cursor LEFT of the point – ENTER Move the cursor RIGHT of the point – ENTER Guess? – ENTER Repeat these steps to find other zeros (In this case, there is only one zero) 	
<input type="checkbox"/> STEP 5: Find the Y-INTERCEPT <ul style="list-style-type: none"> 2ND – TRACE – Choose 1: value X = 0 – ENTER 	
<input type="checkbox"/> STEP 5: Find the INTERVALS of INCREASE & DECREASE <ul style="list-style-type: none"> Use the X-VALUE of the minimum and maximum to identify the intervals 	

MIN: (1, 1), MAX: (-1, 5), ZERO: (-2.1, 0), Y-INT: (0, 3)
 INC: $(-\infty, -1) \cup (1, \infty)$, DEC: (-1, 1)

Intro to quadratics

Use the graphs of quadratic functions *A* and *B* to fill in the table and answer the questions.

Graph A	Graph B																																
																																	
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>x</th> <th>$f(x)$</th> </tr> </thead> <tbody> <tr><td>-1</td><td>8</td></tr> <tr><td>0</td><td></td></tr> <tr><td>1</td><td></td></tr> <tr><td>2</td><td>-1</td></tr> <tr><td>3</td><td></td></tr> <tr><td>4</td><td>3</td></tr> <tr><td>5</td><td></td></tr> </tbody> </table>	x	$f(x)$	-1	8	0		1		2	-1	3		4	3	5		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>x</th> <th>$f(x)$</th> </tr> </thead> <tbody> <tr><td>-5</td><td></td></tr> <tr><td>-4</td><td></td></tr> <tr><td>-3</td><td>3</td></tr> <tr><td>-2</td><td>4</td></tr> <tr><td>-1</td><td></td></tr> <tr><td>0</td><td></td></tr> <tr><td>1</td><td>-5</td></tr> </tbody> </table>	x	$f(x)$	-5		-4		-3	3	-2	4	-1		0		1	-5
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-3	3																																
-2	4																																
-1																																	
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1	-5																																

		Graph A	Graph B
1	x -intercepts/roots/zeros		
2	Vertex		
3	Sign of the leading coefficient		
4	Vertex represents a minimum or maximum?		
5	Points of Symmetry	Find $f(-1)$ and $f(5)$ Is $f(7)$ greater than or less than 8? Explain	Find $f(-1)$ and $f(-3)$ $f(2) = -12$ Predict the value for $f(-6)$ and explain your answer.
6.	y-intercept		

KEY VOCABULARY:

1) x-intercept - _____

2) Vertex - _____

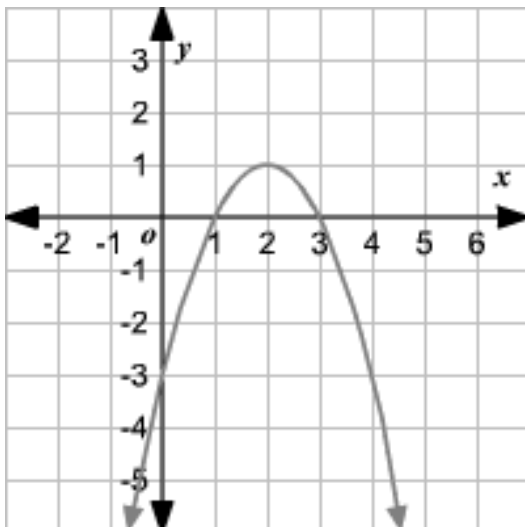
3) Points of Symmetry - _____

4) y-intercept - _____

$y = mx + b$ is a _____ / _____ that we can graph. The equation is called a _____ and the actual graph is called a _____.

$y = ax^2 + bx + c$ is an equation/function that we can graph. The _____ is called a _____ and the actual graph is called a _____.

Use the graph below to fill in the table:



x-intercepts/roots/zeros		
Vertex		
Sign of the leading coefficient		
Vertex represents a minimum or maximum?		
y-intercept		

Graphing quadratics by hand

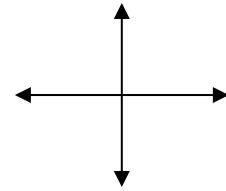
Review- Define the following:

- 1) x-intercept - _____
- 2) y-intercept - _____
- 3) points of symmetry - _____
- 4) vertex - _____

Steps to Graph a Quadratic:

1.) FIRST, find the **axis of symmetry**.

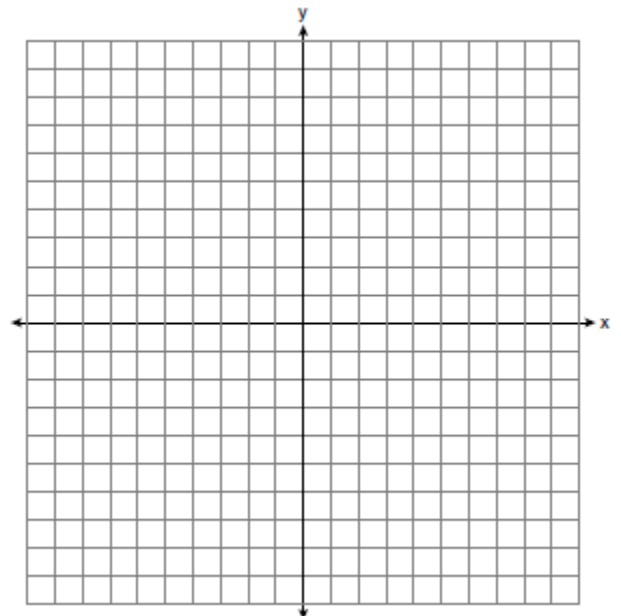
The A.O.S. formula is:



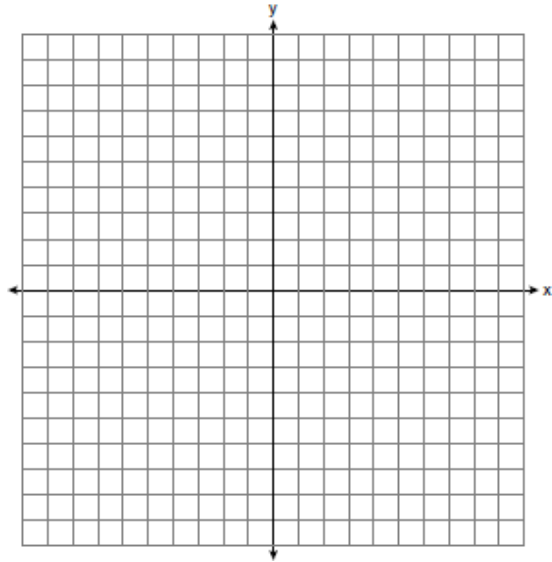
- 2.) Put the axis of symmetry in the _____ of the _____ of your chart and use 3 values above and 3 values below this number to complete this chart. This gives you the x-value of the vertex.
- 3.) To find the y-value of the vertex (the **Turning Point**) *by hand*, _____ the axis of symmetry value into the original _____ to get the y-value of the turning point.
- 4.) Plug the rest of the x-values in to find the rest of the _____.

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

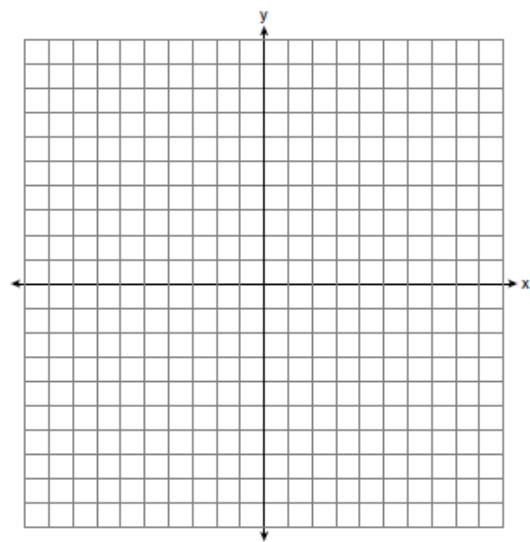
X	Y	



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



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



a. What is the equation of the axis of symmetry: _____

b. What are the coordinates of the turning point: _____

c. Is the turning point a maximum or a minimum? _____

4) Given: $f(x) = x^2 + 6x + 4$

a. What is the axis of symmetry?

b. What are the coordinates of the vertex?

GRAPHING PARABOLAS (USING YOUR CALCULATOR)

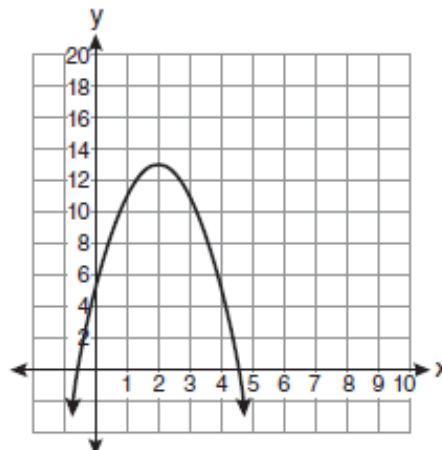
a. Given: $f(x) = x^2 - 6x + 5$

What is the axis of symmetry: _____

What is the vertex? _____

Is the vertex a maximum or a minimum?

b.



What is the axis of symmetry: _____

What is the vertex? _____

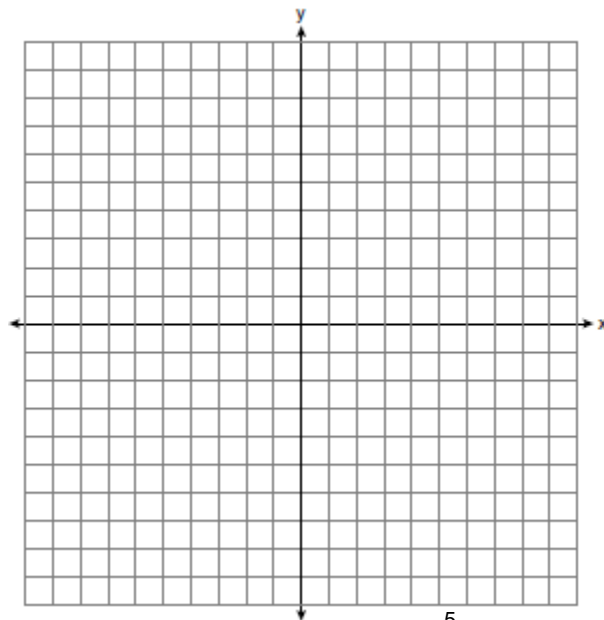
Is the vertex a maximum or a minimum?

STEPS TO GRAPHING A QUADRATIC USING YOUR CALCULATOR:

- 1) Go to _____ button on your calculator.
- 2) Input the _____
- 3) Select _____ and _____
- 4) **Find where the _____ starts. (Your _____)
 **To find what number the pattern will start at, use the A.O.S. formula!
- 5) Fill in your table with the points and plot them on the graph.

Graph:

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

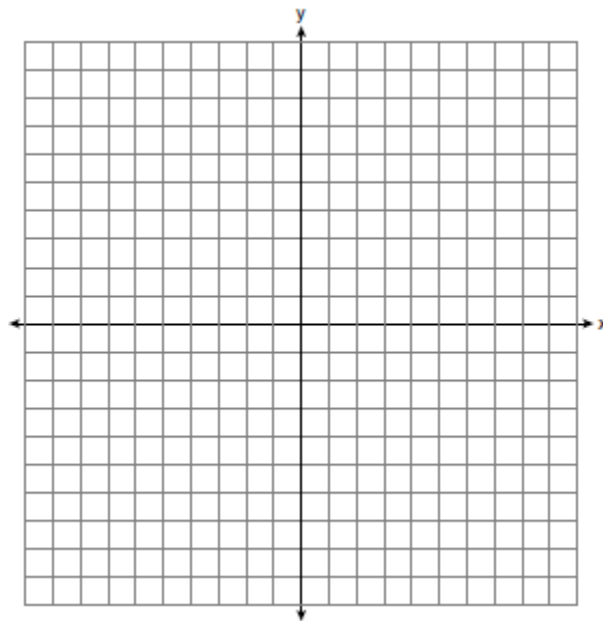


What is the axis of symmetry: _____

What is the vertex? _____

Is the vertex a maximum or a minimum?

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

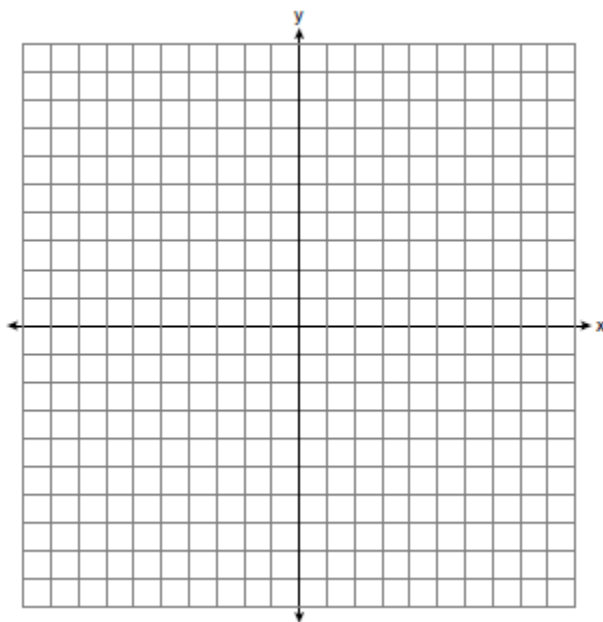


What is the axis of symmetry: _____

What is the vertex? _____

Is the vertex a maximum or a minimum?

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



What is the axis of symmetry: _____

What is the vertex? _____

Is the vertex a maximum or a minimum?

Name: _____

Finding Zeroes (or Roots or X-intercepts) Day 1

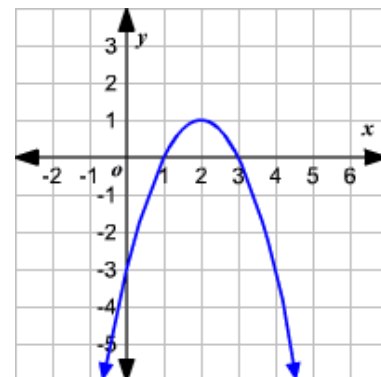
Review- Factor the following:

a. $3x^2 + 14x - 24$

Roots/Zeroes- Where the _____ crosses the _____.

We can find the roots 3 ways!

1. _____
2. Quadratic Formula
3. Completing the Square *(You will learn this next year)*



What value do we already know?

In order to be a "root", the _____ must be equal to _____.

★ This means that we can change any _____ to _____ when we are trying to find the roots. ★

Find the Roots/Zeroes/X-Intercepts:

1) $x^2 - 13x + 42 = y$

2) $3x^2 + 14x - 24 = f(x)$

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

4) $d^2 + 6d + 5 = y$

5) $-10 = 4x^2 + 13x$

Name: _____

Notes #88

Finding Zeroes (or Roots or X-intercepts) Day 2

Before we start to factor, our quadratic equation MUST look like _____

Find the roots:

1) $8x^2 - 70x + 48 = 0$

3) $108x^2 = 75$

2) $5x^2 - 55x = -150$

4) $128 - 32x^2 = 0$

5) $-42x = 7x^2 + 56$

7) $16x^2 + 142x - 180 = y$

6) $-100m^2 = 230m + 60$

8) $-4p^2 - 36p - 72 = f(x)$

Name: _____

Notes #89

Finding Zeroes (or Rootroots or X Intercepts) Day 3

Find the roots:

1) $10x^2 - 86x = -48$

2) $4x^2 + 44x = -120$

3) $-2 = -72x^2$

4) $f(x) = -4x^2 - 36x - 72$

5) $36x^2 = 121$

6) $6n^2 = 16 - 20n$

Q**U****A****D****R****A****T****I****C****S** **Q****U****I****Z** **R****E****V****I****E****W**

1. Which is the solution set of the equation $2x^2 + 3x - 2 = 0$?

- A. $\{-\frac{1}{2}, 2\}$ B. $\{\frac{1}{2}, -2\}$
C. $\{\frac{1}{2}, 2\}$ D. $\{-\frac{1}{2}, -2\}$

2. What is the solutions set of the equation $2x^2 + x - 3 = 0$?

- A. $\{\frac{1}{2}, -3\}$ B. $\{-\frac{3}{2}, 1\}$
C. $\{-\frac{1}{2}, -3\}$ D. $\{\frac{3}{2}, 1\}$

3. What is the solution set of the equation $x^2 - 7x - 18 = 0$?

- A. $[9, -2]$ B. $[-9, 2]$
C. $[-6, 3]$ D. $[6, -3]$

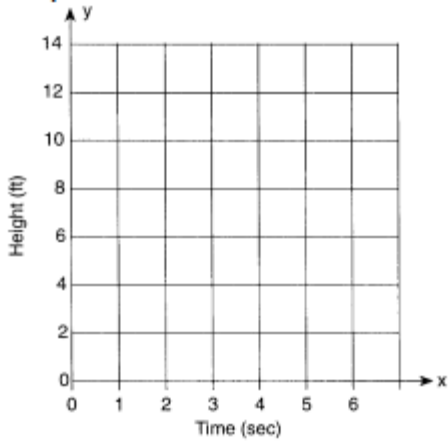
4. The larger root of the equation $(x + 4)(x - 3) = 0$ is

- A. -4 B. -3 C. 3 D. 4

5. What is the solution set of the equation $3x^2 = 48$?

- A. $[-2, -8]$ B. $[2, 8]$
C. $[4, -4]$ D. $[4, 4]$

- 6) Amy tossed a ball in the air in such a way that the path of the ball was modeled by the equation $y = -x^2 + 6x$. In the equation, y represents the height of the ball in feet and x is the time in seconds. Graph $y = -x^2 + 6x$ for $0 \leq x \leq 6$ on the grid provided below. At what time, x , is the ball at its highest point?



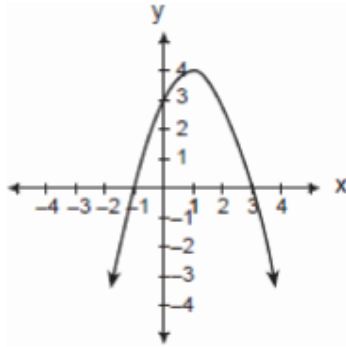
Axis of symmetry _____

Vertex _____

- 7) Find the roots of the equation $f(x) = 200x^2 - 18$ | 8) Find the roots of the equation $x^2 + 6 = 5x$

Answer each question, and then estimate the roots of each graph.

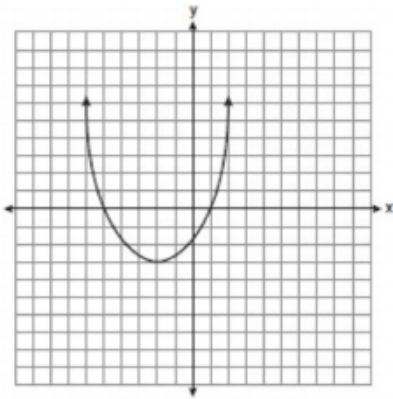
- 9) Which is an equation of the parabola shown in the accompanying diagram?



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

Roots:

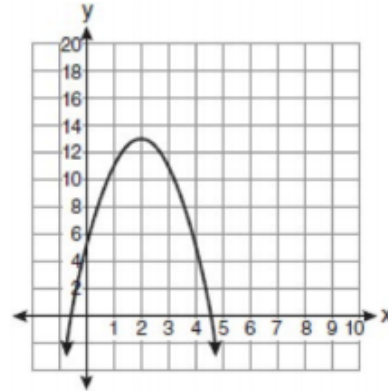
- 11) What are the vertex and the axis of symmetry of the parabola shown in the diagram below?



- 1) The vertex is $(-2, -3)$, and the axis of symmetry is $x = -2$.
- 2) The vertex is $(-2, -3)$, and the axis of symmetry is $y = -2$.
- 3) The vertex is $(-3, -2)$, and the axis of symmetry is $y = -2$.
- 4) The vertex is $(-3, -2)$, and the axis of symmetry is $x = -2$.

Roots:

- 10) What is the equation of the axis of symmetry of the parabola shown in the diagram below?



- 1) $x = -0.5$
- 2) $x = 2$
- 3) $x = 4.5$
- 4) $x = 13$

Roots:

- 12) Find the roots of the equation:

$$6x^2 - 8x = -2$$

Roots:

13) What are the roots of the equation

$$x^2 - 10x + 21 = 0?$$

- 1) 1 and 21
- 2) -5 and -5
- 3) 3 and 7
- 4) -3 and -7

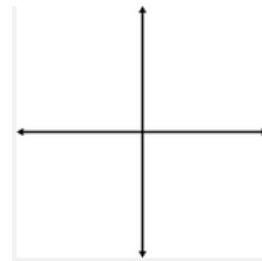
14) If the roots of a quadratic equation are -2 and 3, the equation can be written as

- 1) $(x - 2)(x + 3) = 0$
- 2) $(x + 2)(x - 3) = 0$
- 3) $(x + 2)(x + 3) = 0$
- 4) $(x - 2)(x - 3) = 0$

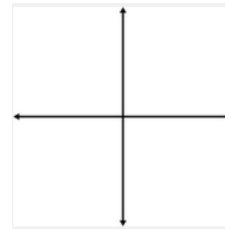
15 a) Give two other vocabulary terms for "roots" _____

b) Describe the meaning of roots _____

16) Draw an example of a parabola with a negative leading coefficient:



17) Draw an example of a parabola with a positive leading coefficient:



18. For the following equations, find the vertex and axis of symmetry:

a) $x^2 - 14x + 48$

b) $-2x^2 + 24x - 100$

Name: _____

Notes #91

Quadratic Word Problems

- 1) A flower garden has a length that is 4 feet shorter than twice its width. The area of the garden is 48 square feet. Find the dimensions of the garden.

- 2) Two consecutive numbers have a product of 306. What is the value of the higher number?

3) The area of the rectangular playground enclosure at South School is 500 square meters. The length of the playground is 5 meters longer than the width. Find the dimensions of the playground, in meters.

4) When 36 is subtracted from the square of a number, the result is five times the number. What is the positive solution?

Simplifying Radicals

Warm-up:

List the squares for numbers 1-15:

$1^2 = \underline{\hspace{2cm}}$

$2^2 = \underline{\hspace{2cm}}$

$3^2 = \underline{\hspace{2cm}}$

$4^2 = \underline{\hspace{2cm}}$

$5^2 = \underline{\hspace{2cm}}$

$6^2 = \underline{\hspace{2cm}}$

$7^2 = \underline{\hspace{2cm}}$

$8^2 = \underline{\hspace{2cm}}$

$9^2 = \underline{\hspace{2cm}}$

$10^2 = \underline{\hspace{2cm}}$

$11^2 = \underline{\hspace{2cm}}$

$12^2 = \underline{\hspace{2cm}}$

$13^2 = \underline{\hspace{2cm}}$

$14^2 = \underline{\hspace{2cm}}$

$15^2 = \underline{\hspace{2cm}}$

Take the square root of the following:

$\sqrt{1} = \underline{\hspace{2cm}}$

$\sqrt{4} = \underline{\hspace{2cm}}$

$\sqrt{9} = \underline{\hspace{2cm}}$

$\sqrt{16} = \underline{\hspace{2cm}}$

$\sqrt{25} = \underline{\hspace{2cm}}$

$\sqrt{36} = \underline{\hspace{2cm}}$

$\sqrt{49} = \underline{\hspace{2cm}}$

$\sqrt{64} = \underline{\hspace{2cm}}$

$\sqrt{81} = \underline{\hspace{2cm}}$

$\sqrt{100} = \underline{\hspace{2cm}}$

$\sqrt{121} = \underline{\hspace{2cm}}$

$\sqrt{144} = \underline{\hspace{2cm}}$

$\sqrt{169} = \underline{\hspace{2cm}}$

$\sqrt{196} = \underline{\hspace{2cm}}$

$\sqrt{225} = \underline{\hspace{2cm}}$

Simplifying Radicals: What if the number is not a perfect square?

1.) $\sqrt{8}$

2.) $\sqrt{20}$

3.) $\sqrt{32}$

4.) $2\sqrt{75}$

5.) $\sqrt{40}$

6.) $\sqrt{98}$

7.) $\sqrt{243}$

8.) $3\sqrt{28}$

9.) $5\sqrt{216}$

10.) $\sqrt{605}$

11.) $10\sqrt{500}$

QUADRATIC FORMULA DAY I

Find the roots:

1.) $x^2 - 8x + 3 = 0$

What are roots again?

Roots are where $y =$ _____ and where the _____ crosses the _____.

QUADRATIC FORMULA:

When using the Quadratic Formula, you will usually get _____ answers.

Steps to using the Quadratic Formula:

1. Plug in _____, _____, and _____
2. Simplify the _____. (Do this by typing in the stuff under the radical into your calc.)
3. Solve

1) $2x^2 + 2x - 12 = 0$

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

3) $2x^2 - 7x - 13 = -10$

4) $9x^2 + 4x - 16 = 0$

5) $x^2 + 7x - 44 = 0$

6) $x^2 - 6x = -2$

Name: _____

Notes #94

QUADRATIC FORMULA DAY 2

Quadratic Formula:

Find the zeroes using the quadratic formula:

1) $x^2 - 8x + 3 = 0$

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

3) $2x^2 + 3x - 5 = 0$

Quadratic Formula:

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

5) $x^2 + 2x - 7 = 0$

6) $-2x^2 + 3x + 3 = 0$

Name: _____

Notes #95

Standard Form

Review: Find the vertex and axis of symmetry of the equation $y = x^2 - 6x + 5$

What is this form of the equation called: _____

To find the y-intercept you _____

For the equations below, get into standard form and find the y intercept.

1) $(2x + 5)(x - 1) = f(x)$

2) $(x - 4)^2 - 13 = y$

For each question, (a) get into standard form, (b) find the axis of symmetry, (c) find the vertex, (d) find the y-intercept.

3) $4 = 3(x + 2)^2$

A.O.S.: _____

Vertex: _____

Y-Intercept: _____

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

A.O.S.: _____

Vertex: _____

Y-Intercept: _____

Name: _____

Notes #96

Factored Form

Review: Factor the x-intercepts:

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

Factored form: _____

For the following questions, find the x-intercepts:

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

2) $3(x + 10)(x - 10) = y$

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

When we are given the solutions and have to find the equation:

$$x^2 - 4x + 21 = y$$

$$x^2 - 4x - 21 = 0$$

$$(x + 3)(x - 7) = 0$$

$$x = -3 \quad | \quad x = 7$$

How can we write a quadratic form if we know the roots?

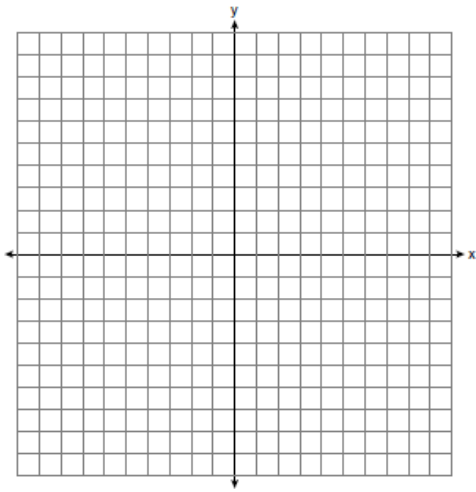
1) Which quadratic equation has 5 and -4 as its solutions?

2) Which quadratic equation has only 7 as its solution?

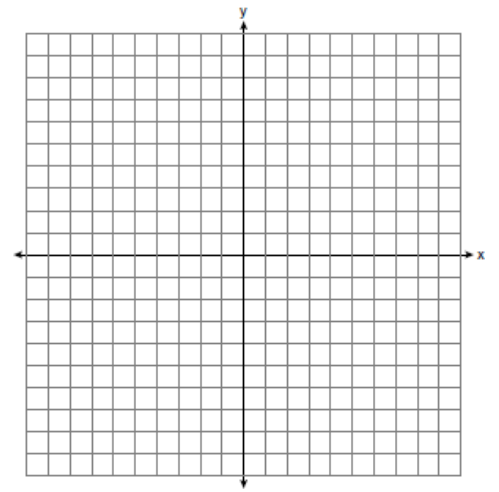
3) Which quadratic equation has 3 and 9 as the solutions?

graphing practice

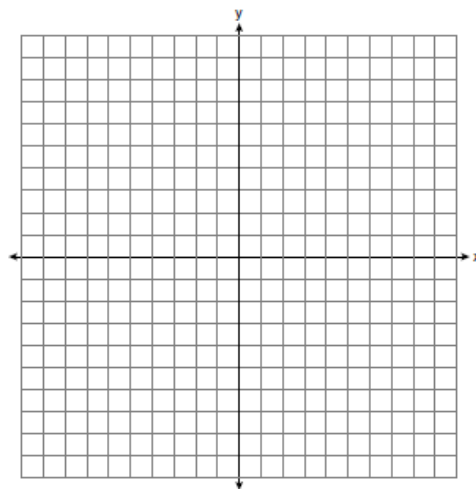
1) Graph $y = x^2$



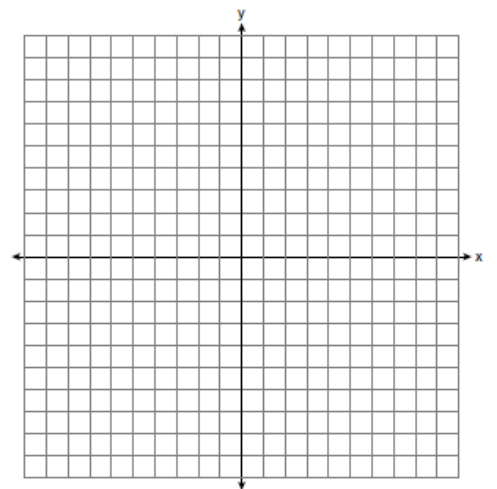
2) Graph $y = 2x^2$



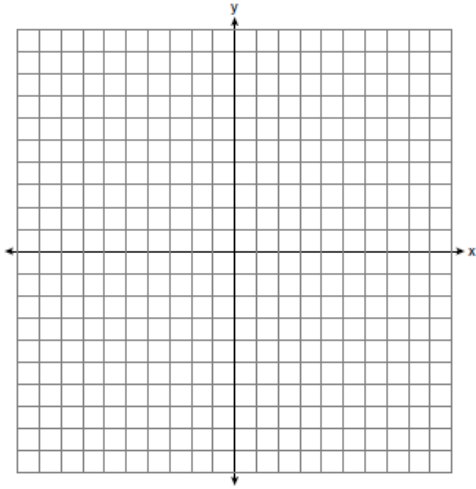
3) Graph $y = \frac{1}{2}x^2$



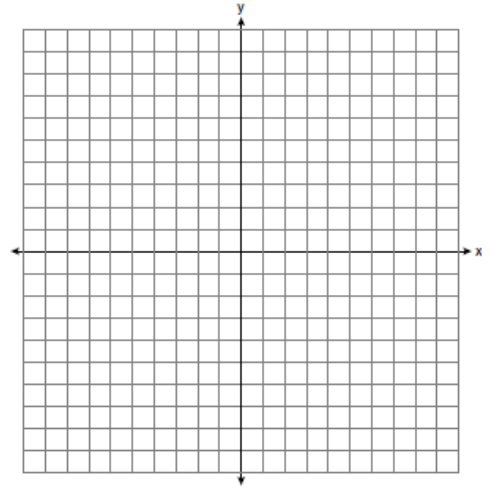
4) Graph $y = x^2$



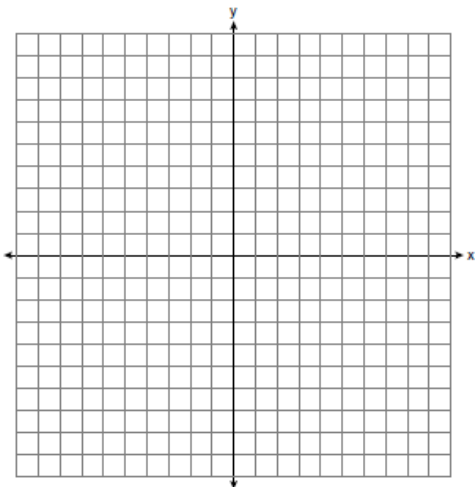
5) Graph $y = (x + 4)^2$



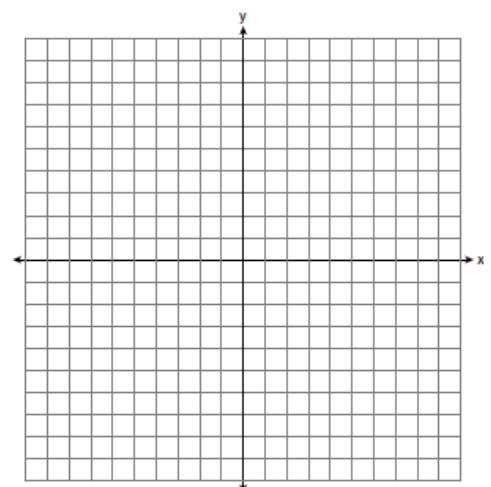
6) Graph $y = (x - 6)^2$



7) Graph $y = x^2 - 5$



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



Name _____

1) Find the roots of $y = 3x^2 + 13x - 10$

2) Give the quadratic equation if the roots are 7 and -9

Name: _____

For each, (a) get into standard form, (b) find the y intercept, (c) vertex, (d)axis of symmetry .

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

A.O.S.: _____

Vertex: _____

Y-Intercept: _____

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

A.O.S.: _____

Vertex: _____

Y-Intercept: _____

Name: _____

Find the roots using the quadratic formula.

1) $x^2 + 4x + 3 = 0$

3) $3x^2 + 2x = 4$

2) $x^2 - 4x - 2 = 0$

Name: _____

List the squares of 1 through 15 _____

Pick 4, or do all for extra credit (back included)!!

Simplify the following Radicals:

1.) $\sqrt{80}$

2.) $4\sqrt{27}$

3.) $\sqrt{250}$

4.) $\sqrt{90}$

5.) $\sqrt{175}$

6.) $\sqrt{192}$

7.) $5\sqrt{196}$

8.) $7\sqrt{40}$

9.) $\sqrt{148}$

10.) $5\sqrt{125}$

Name _____

1) The length of a rectangle is 3 inches more than its width. The area of the rectangle is 40 square inches. What is the length, in inches, of the rectangle?

2) Find two consecutive whole numbers whose product is 132.

Name _____

Find the roots of each equation:

1) $5x^2 - 20 = y$

2) $-42 = 3x^2 + 27x$

3) $-8 = -18x^2$

Name: _____

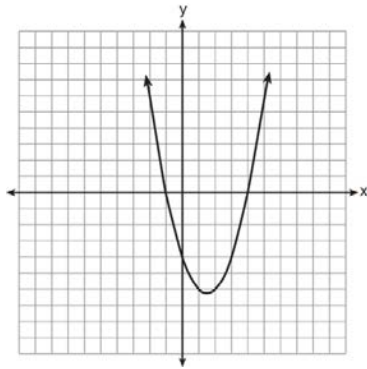
Find the zeroes of the following:

1) $f(x) = x^2 - 3x - 28$

2) $6x^2 - 5x = 6$

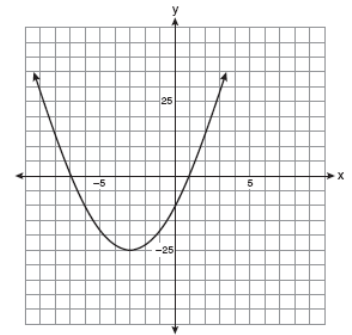
Name: _____

- 1) The x-intercepts of a quadratic equation can be found using the graph below. What are the x-intercepts of this equation?



- a) (4,0)
- b) (-4,0) and (1,0)
- c) (-1,0) and (4,0)
- d) (-4,0), (1,0) and (4,0)

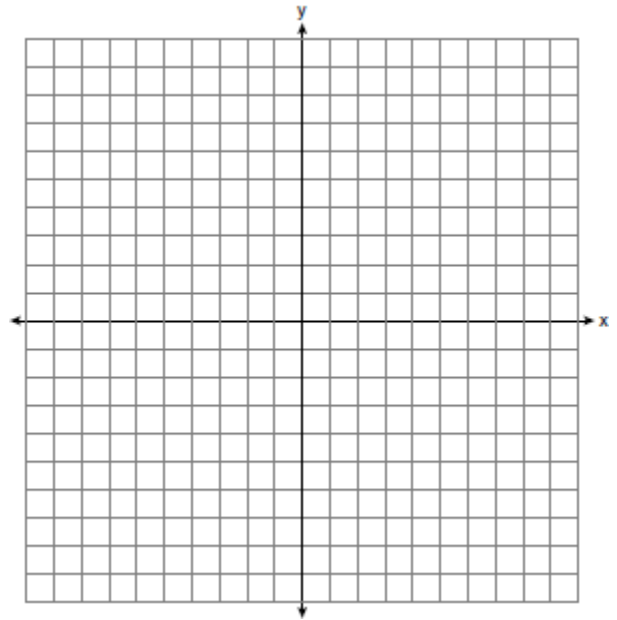
- 2) Which equation represents the axis of symmetry of the graph of the parabola below?



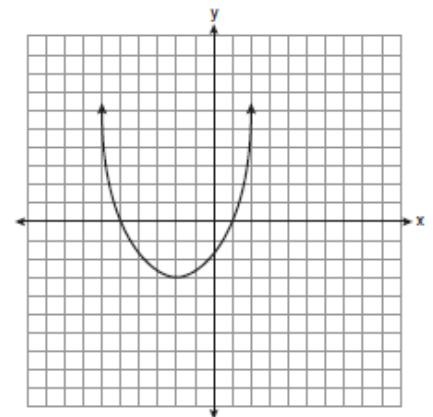
- a) $y = -3$
- b) $x = -3$
- c) $y = -25$
- d) $x = -25$

- 3) Graph the equation $y = x^2 + 6x + 2$.

a. What is the vertex? _____



- 4) What are the vertex and the axis of symmetry of the parabola shown in the diagram below?



- a) The vertex is $(-2, -3)$ and the axis of symmetry is $x = -2$.
- b) The vertex is $(-2, -3)$ and the axis of symmetry is $y = -2$.
- c) The vertex is $(-3, -2)$ and the axis of symmetry is $y = -2$.
- d) The vertex is $(-3, -2)$ and the axis of symmetry is $x = -2$.

1.) Identify the a , b , and c in each of the following equations:

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

$a =$ _____

$b =$ _____

$c =$ _____

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

$a =$ _____

$b =$ _____

$c =$ _____

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

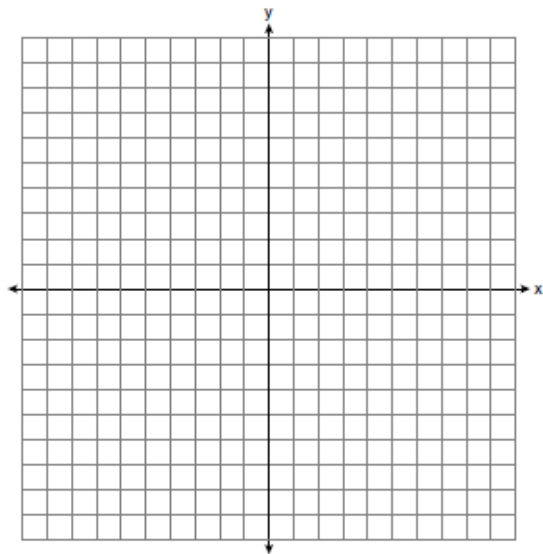
a. What is the equation for the axis of symmetry? _____

b. What are the coordinates of the turning point? _____

3.) Graph the following:

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

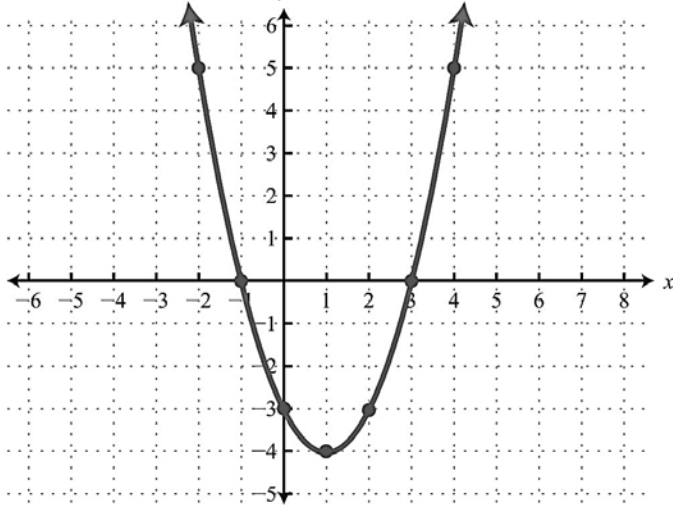
x	$f(x)$



What is the equation of the axis of symmetry? _____

What are the coordinates of the vertex? _____

Fill in the table and answer the questions below using the graph of the quadratic.



x	$f(x)$
-2	
-1	
0	
1	
2	
3	
4	

- 1) What are the coordinates of the x -intercepts?
- 2) What are the coordinates of the y -intercept?
- 3) What are the coordinates of the vertex? Is it a minimum or a maximum?
- 4) If we knew the equation for this curve, what would the sign of the leading coefficient be?