Name: ________________________________ Date: ________________________ Hour: ____Alg 1____

Unit 7B Day 11: Equations and Graphs in Vertex Form

Focus Question: Can I transfer between a graph and equation of a quadratic in vertex form?

A. Vertex Form:

1. Without graphing, give all the information you can about the graph of each function.

   a. $g(x) = \frac{1}{4}(x-3)^2 - 4$ b. $f(x) = -2|x+4| + 6$

You can very quickly identify the vertex in the functions above, thus, the following functions demonstrate **vertex form of a quadratic** or **standard form of an absolute value**.

$$f(x) = a(x-h)^2 + k \qquad\qquad g(x) = a|x-h| + k$$

2. Why is it called "vertex form" of a quadratic?

3. Tell what all of the information in the functions represents by filling in the blanks.

a. The vertex is at ____________________.

b. The graph is symmetrical about the line ___________.

c. If a > 0, the parabola opens/is concave ___________ and the vertex is a ______________________.

d. If a < 0, the parabola opens/is concave ______________ and the vertex is a ____________________.

e. If $|a| > 1$ the parabola (or V) is _________________ or vertically _______________________.

f. If $0 < |a| < 1$, the parabola (or V) is ___________________ or vertically ______________________.

g. The y intercept can be found by finding f(0) which means __________________________________.

h. The function can have _______, _________, or _________ zeros. These are also called

   ________________ or ______ intercepts. In the case of quadratics, they are also called __________.

B. From an Equation to a graph (should be review!)

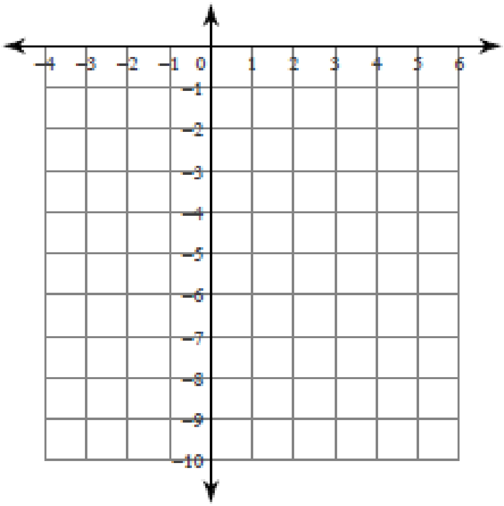
1. The rest of the unit we will focus only on quadratics. What situations do you think will create a quadratic graph?

2. How many points do you need to accurately graph a quadratic? Explain your answer.

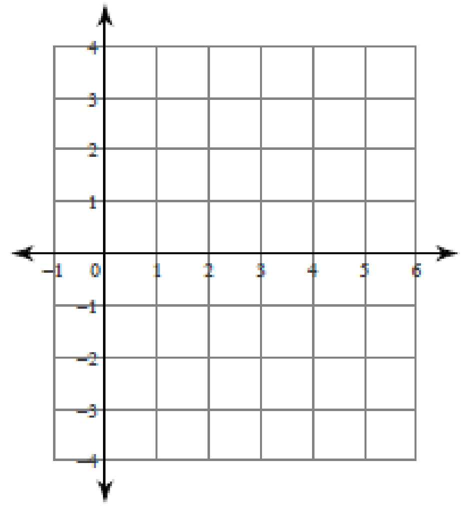
3.For each quadratic below give the following information and then graph the function.

* Concavity * Vertex * Axis of symmetry * y-intercept *One additional point

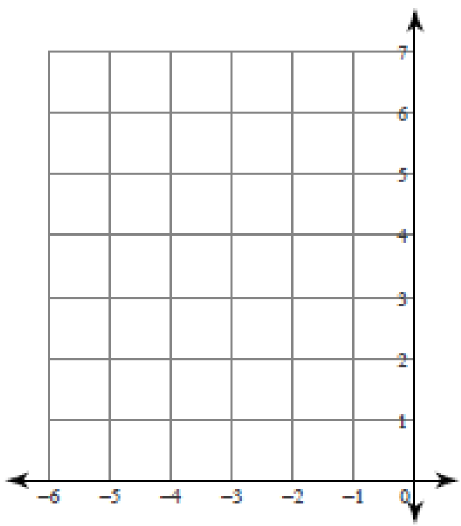
1) $y = -2(x-1)^2 - 1$



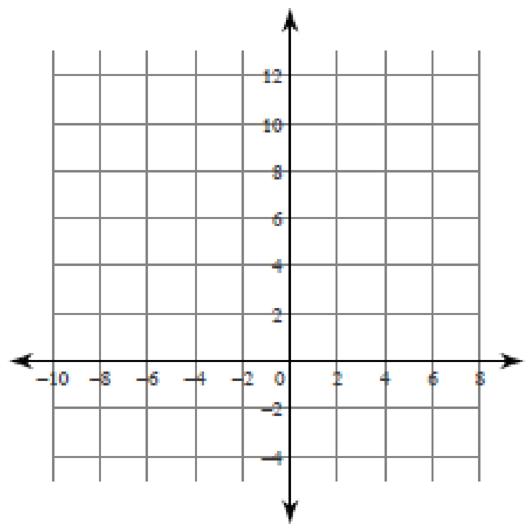
2) $y = -(x-4)^2 + 2$



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

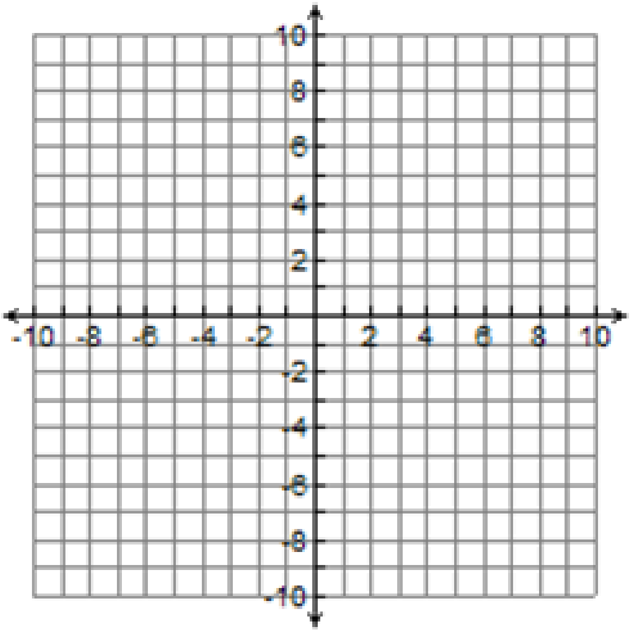


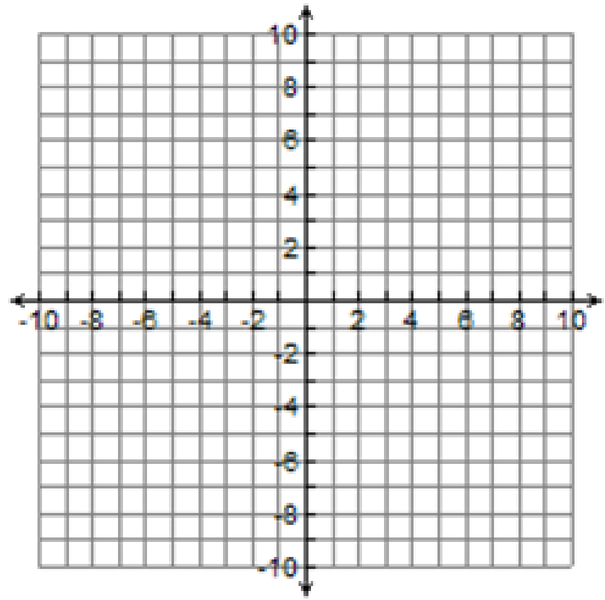
4) $y = 4(x+1)^2 - 4$



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

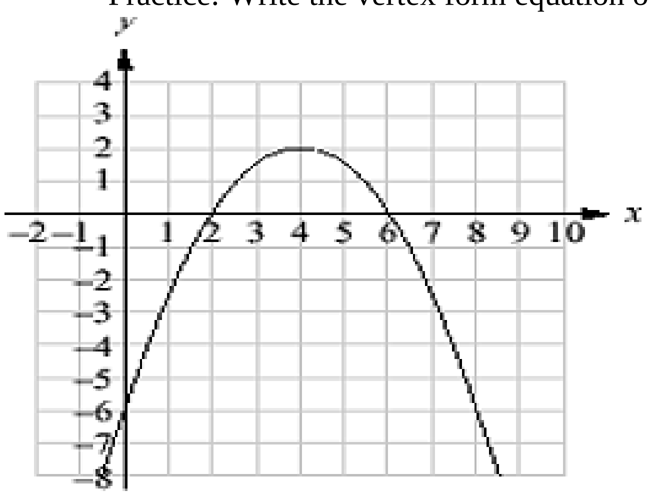
6. $f(x)=\frac{1}{4}x^2-8$

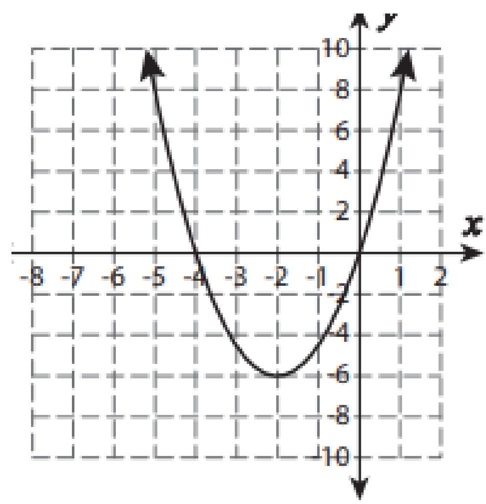




C. Graph to Equation (a little tougher!)

Practice: Write the vertex form equation of each quadratic function. **Show all work to find *a*.**





3. The quadratic has a vertex at (-2, 4) and goes through the point (1, 8)

4. The quadratic has a vertex at (9, 6) and an x intercept of (12, 0)

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Unit 7B Day 12: Using Quadratic Graphs and Tables

Focus Question: What information can I learn from a quadratic graph or table?

A: Important Points

While all points on a graph give you information about the situation, some points are more important (give more critical information) than others.

1. What are the most important points on a quadratic graph?

2. How do you find each point on a graph?

3. How do you find each point on a table?

B. Any situation that involves jumping/throwing/hitting/kicking/shooting something into the air will create a quadratic. Hugo and Rose were playing tennis and Hugo lobbed the ball up to Rose. The height of the ball based on the time it has been in the air is represented in the table below.

t (in seconds)	*h(t)* in meters
0	1
0.5	6.775
1	10.1
1.5	10.975
2	9.4
2.5	5.375
3	-1.1

1. What point tells you the height of the ball when it was hit?

2. How high was the ball when it was hit?

3. What point tells you the maximum height the ball reached?

4. Which part of the coordinate represents the maximum height reached?

5. What is the approximate maximum height the ball reaches? How can you tell it's the approximate and not exact?

6. Which part of the maximum coordinate represents the length of time to reach the maximum height?

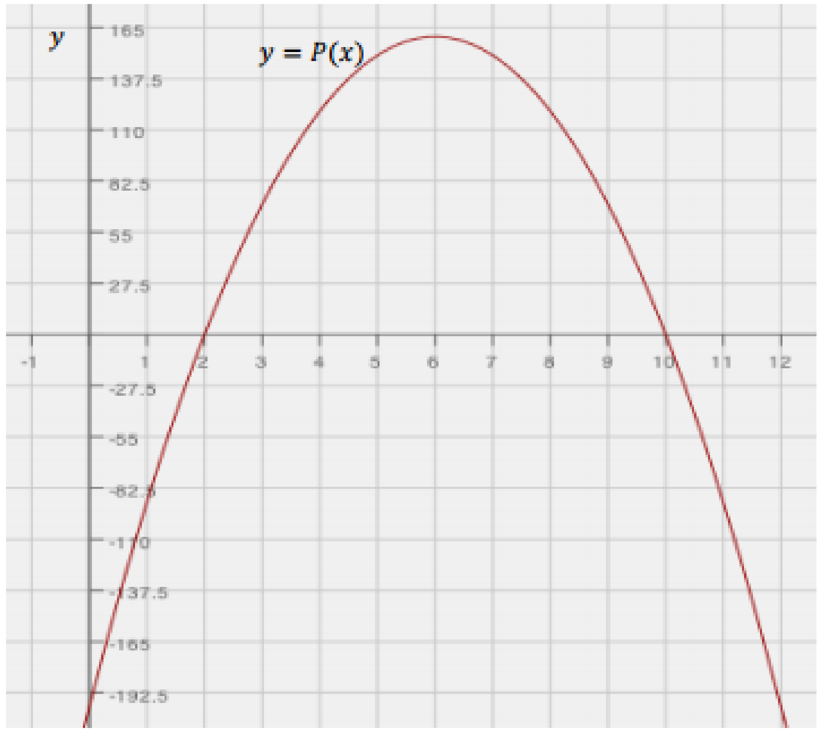
7. Approximately how long was the ball in the air when it reached its maximum height?

8. What is the name of the point that indicates when the ball hits the ground?

9. Approximately how long does Rose have to hit the ball before it hits the ground?

C. Other situations that create quadratics are attempts to maximize profits. Prices that are too low create great sales figures, but the company has to spend more money to produce more items. Prices that are too high create few sales and the company has spent money on a product that is not selling, meaning too much waste.

A toy company is manufacturing a new toy and trying to decide on a price that maximizes profits. The graph below represents profit (P) in millions of $ expected to be generated by each price of a toy (x) in $.



1. What is the maximum expected profit?

2. At what price should they sell the toy to make the maximum profit?

3. What is the minimum price the company needs to charge in order to make a profit?

4. What is the maximum price the company can charge and still make a profit?

5. What is P(0)? What does this represent?

6. Estimate P(3). What does this point represent?

7. What is P(x) = 137.5? What do these points represent?

D. Using the Calculator

A calculator can be used to find all of these points. As we go through the unit you may use a calculator to CHECK your answer(s). You are required to algebraically show how to arrive at the answer otherwise you will not receive credit.

The equation for a school rocket from a project that was shot up into the air off the roof is $h(t) = -4.9(t-13)^2 + 840$ where h is the height in meters and t is the time in seconds since launch.

1. What point represents the height of the roof?
2. To find this on the calculator you ____
3. How tall was the building?
4. What does the vertex represent?
5. To find this on the calculator you ____
6. When did the rocket reach its highest point? _________ How high did the rocket go?_____________
7. What point would represent how long the rocket was in the air?
8. To find this on the calculator you ____.
9. When did the rocket hit the ground?

Name: ____________________________________ Date: _________________________ Hour: ____Alg 1____

Unit 7B Day 13: Introduction to *Imaginary* numbers!

Focus Question: Are there really no solutions if there are no x-intercepts?

A. Review

1. What were the other names for x intercepts? Explain why they have these names.

2. A linear function always has _______ x intercepts (or solutions) and it is degree ________.

3. A quadratic can have _______, __________, or ___________ x-intercepts.

4. A quadratic is degree ___________.

B. The Fundamental Theorem of Algebra

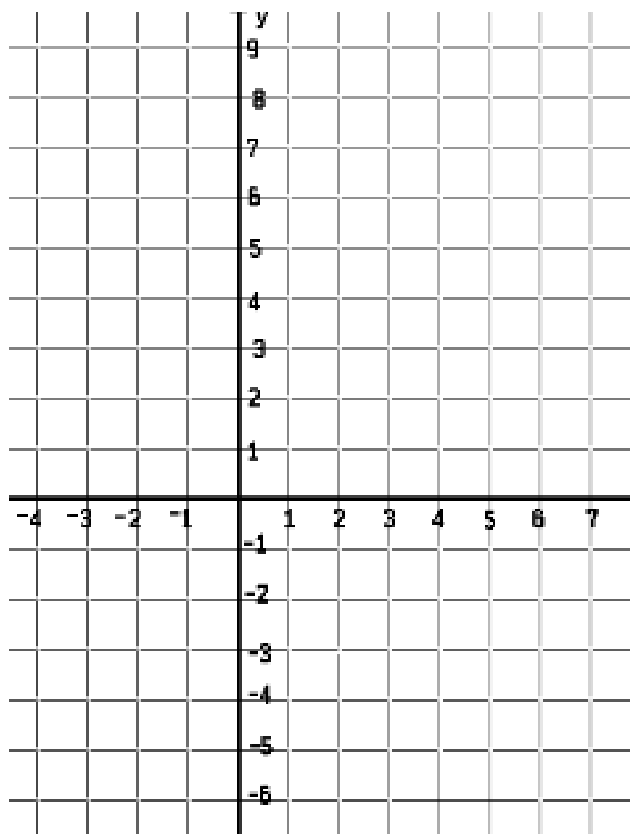
1. What does fundamental mean?

2. **The fundamental theorem of algebra: A polynomial of degree *n* will have exactly *n* roots.**

   So if a quadratic is degree 2, **it has to have** _______ roots.

3. Graph and solve each of the following in a different color

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



When a quadratic has two x intercepts we say it has two *real* solutions.

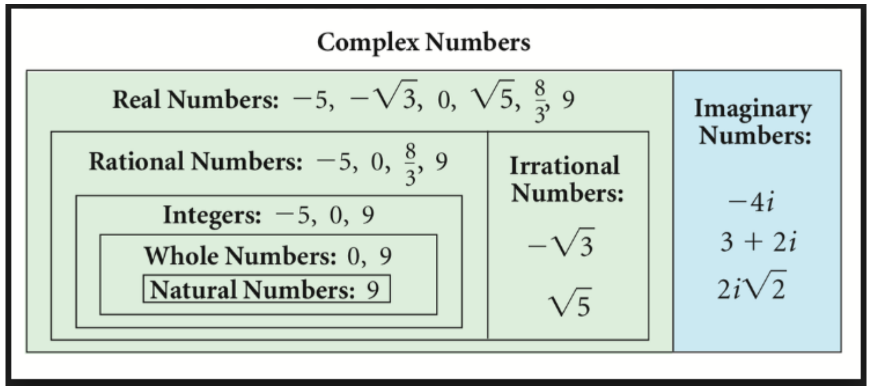
   b. $g(x) = (x-4)^2$

When a quadratic has one x intercept, we say it has one real (repeated) solution and it is always the vertex

   c. $h(x) = x^2 + 4$

When a quadratic has no x intercepts we say it has no *real* solutions. But that doesn't mean that it doesn't have solutions!

C. The complex number system

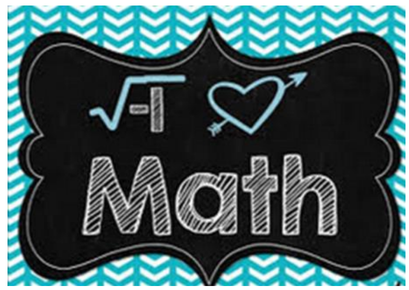


When a quadratic has no x intercepts, we say it has <u>no *real* solutions</u> or <u>two *complex* solutions</u>.

They are called complex solutions because they involve imaginary numbers. See video for intro to imaginary numbers. http://viewpure.com/T647CGsuOVU?start=0&end=0

The person who "created" imaginary numbers felt they should be called ______________________________.

Have you ever seen something like this?



Mathematicians find the humor because

$\sqrt{-1} = i$ so it says ____ ______ __________

So what is $\sqrt{-4}$?

$$\sqrt{-4} = \sqrt{4 \cdot -1} = \sqrt{4} \cdot \sqrt{-1} = \pm 2i$$

Simplify each square root.

1. $\sqrt{-25}$

2. $\sqrt{-121}$

3. $\sqrt{-81}$

4. $\sqrt{-225}$

5. $\sqrt{-37}$

6. $\sqrt{-2}$

7. $\sqrt{-105}$

8. $\sqrt{-22}$

9. $\sqrt{40}$

10. $\sqrt{300}$

11. $\sqrt{147}$

12. $\sqrt{80}$

Name: ___________________________________ Date: ________________________ Hour: ____Alg 1____

Unit 7B Day 14: Solving quadratics in vertex form

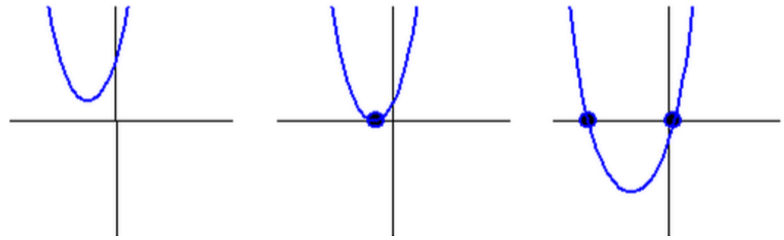
Focus Question: How do I solve a quadratic in vertex form? (Good news, you've already done this mostly!)

A. Solutions.

1. What are other synonyms for "solve" or solutions when referring to a quadratic?

2. The graph of a quadratic function can have 0, 1, or 2 x intercepts. Why can it have up to two, but no more than 2 x-intercepts?

3. For each graph at right, give the number and type of solutions the quadratic has.



4. The correct order to write a monomial complex number is: ***rational*** then ***imaginary*** then ***irrational***
   Write the following numbers in the correct order
   a. $\sqrt{47}i4$ b. $i\sqrt{238}$ c. $3\sqrt{2}i$

5. The correct order to write a binomial complex numbers is: ***real term*** then ***imaginary term***
   Correctly write the following complex numbers
   a. $i\sqrt{6}+5$ b. $7i-\sqrt{2}$ c. $-2i+4$

B. Solving a Quadratic in Vertex Form:

1. What is the order of operations?

2. How are these relevant when solving an equation?

3. But we don't have an equation, we have a function $f(x) = a(x-h)^2 + k$. So, what equation do we make? Why?

4. Solve the following quadratics. For each one give its number/type of solutions, sketch a graph, and give its range.

$$g(x) = \frac{1}{4}(x+5)^2 + 2$$

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

$k(x) = -\frac{1}{3}(x+6)^2 + 5$

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

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

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

$f(x) = -2(x-6)^2 - 8$

$g(x) = 5(x-3)^2 + 25$

Name: ____________________________________ Date: _________________________ Hour: ____Alg 1____

Unit 7B Day 15: Applications of Quadratics

Focus Question: How do I solve a word problem?

Solve each problem by hand. You may use the calculator to check your answer after you have completed the problem.

1. The arch of Gateshead Millennium Bridge forms a parabola with the equation $f(x) = -0.016(x-52.5)^2 + 45$ where x is the horizontal distance in meters from the arch's left end and $f(x)$ is the distance in meters from the base of the arch.

a) How tall is the arch?

b) How wide is the arch?

2. The function $f(x) = -0.03(x-14)^2 + 6$ models the jump of a red kangaroo where x is the horizontal distance (in feet) and $f(x)$ is the corresponding height (in feet).

a) How high can a red kangaroo jump?

b) What distance does the kangaroo's jump cover?

c) Can you answer the question "how long was the kangaroo in the air?" Explain.

3. The Cinemagic Theater keeps track of the price of tickets and the number of people in attendance. The function $a(p) = -10(p - 6.5)^2 + 150$ models the theater attendance, a, where p is the price of a ticket in dollars.

a) What price should the theater charge to maximize attendance?

b) What does the 150 represent in the context of this problem?

c) Find a(0). What point is this? What does this represent in the context of the problem?

d) What price(s) will cause the theater to have zero people in attendance?

4. The Big Bagel Bakery sells more bagels when it reduces its prices, but then its profit changes. The function $P(s) = -200(s – 1.50)^2 + 400$ models the bakery's daily profit, P, in dollars from selling bagels when s is the selling price of a bagel in dollars.

   a) What is the realistic domain of the function? Explain.

   b) What is the vertex and what does each part of it represent?

   c) What is P(0) and what does it represent?

   d) What price(s) will cause the bakery to have zero profit?

Name: ___________________________________ Date: _________________________ Hour: ____Alg 1____

Unit 7B Day 16: Standard form of Quadratic Functions

Focus Question: What is standard form of a quadratic function?

A. Review standard form of polynomials
   Use the polynomial $6x^3 + 2x^5 - 3x^4$
   1. Write the polynomial in standard form.   2. What makes a polynomial in standard form?

B. Vertex Form to Standard Form
   Use the quadratic $f(x) = 3(x-2)^2 + 4$
   1. What information can you automatically tell?   2. Can every quadratic be written in this form? Explain

   3. Expand it so that it is in standard form of a polynomial.

4. What do you notice has remained the same between the vertex form and the standard form?

C. Standard form of Quadratics

Any situation that involves jumping/throwing/hitting/kicking/shooting something into the air will create a quadratic equation of the form $\boldsymbol{f(x) = ax^2 + bx + c}$. which is the standard form of a quadratic. This is the most useful form to physics because it is easy to write the equation of an object being sent upward. In these real cases, *a* represents ½ of the gravitational constant (it is always negative because gravity pulls down) and will either be -4.9 if you are in meters per second or -16 if you are in feet per second..*b* represents the initial upward velocity and *c* represents the initial height. You will also see it written as $\boldsymbol{h(t) = -gt^2 + v_0 t + h_0}$
Whether it is about an object going up in the air or a non-situational graph, the value of *a* still tells you the same thing it did in vertex and intercept form.

1. If a < 0, the parabola ___________________________.

If $|a| > 1$ the parabola _____________________. If $0 < |a| < 1$, the parabola ___________________.

2. What information does c give you? Explain.

3. Give the *a*, *b*, and *c* values, then give the y-intercept of the following functions.
   a) $f(x) = x^2 - 3x + 4$ b) $g(x) = -5x^2 - 3$ c) $h(x) = 2x^2 + x$ d) $j(x) = \frac{1}{4}x^2 + 3x + 8$

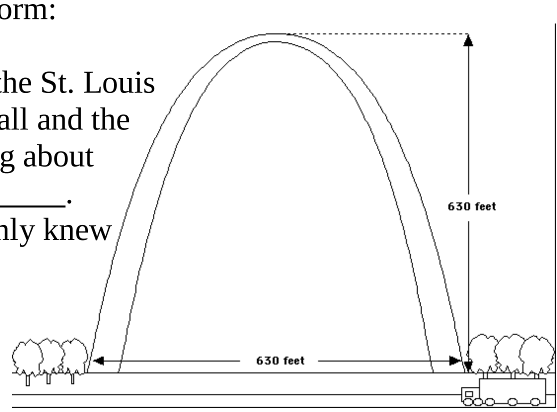
4. Turn each of the following vertex form quadratics into standard form.

Then, give the vertex, a and b values, and y- intercept.

a. $g(x) = -\frac{1}{2}(x-3)^2 + 6$

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

5. Besides physics, there is another reason you need to know standard form:



During a spring break trip to St. Louis, Missouri, Melissa paid a visit to the St. Louis Gateway Arch. On the guided tour, she learned that the arch is 630 feet tall and the legs of the arch are 630 feet apart. Being on spring break but still thinking about math, she looked at the arch and immediate saw a ________________________.
In a fervent effort to analyze this amazing curve, she realize that if she only knew three points, then she could determine the equation of the arch using her graphing calculator.

a. Fill in the blank in the situation above.

b. Draw an x and y axis on the picture. Then give three points on the arch.

c. Use your calculator to do quadratic regression and give the quadratic equation for the St. Louis Arch. What is the equation and what form is it in?

ANY TECHNOLOGY (the calculator, online calculators, excel, go motions, etc) will always give the equation in standard form!

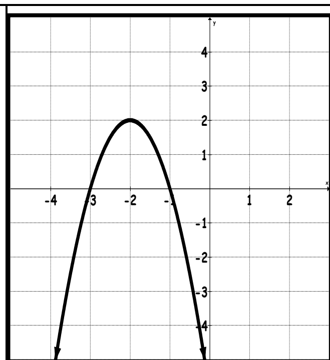
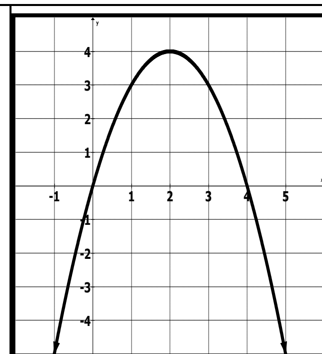
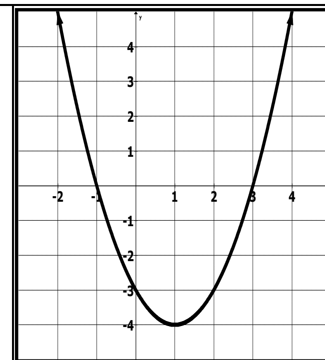
Name: ___________________________________ Date: _________________________ Hour: ____Alg 1____

Unit 7B Day 17: Graphing Standard form of Quadratic Functions

Focus Question: How do I graph from standard form?

A. Graphing from Standard form

1. The value of *c* gives you the y-intercept. The value of *a* tells you about the shape of the parabola, but that's not all! Complete the table below to find how the values of *a* and *b* are related to the axis of symmetry (remember, you no longer have vertex form to help you out with that).

Graph			
Function	$y = -2x^2 - 8x - 6$	$y = -1x^2 + 4x$	$y = x^2 - 2x - 3$
Axis of Symmetry			
a			
b			
How you think you find the line of symmetry using a and b			

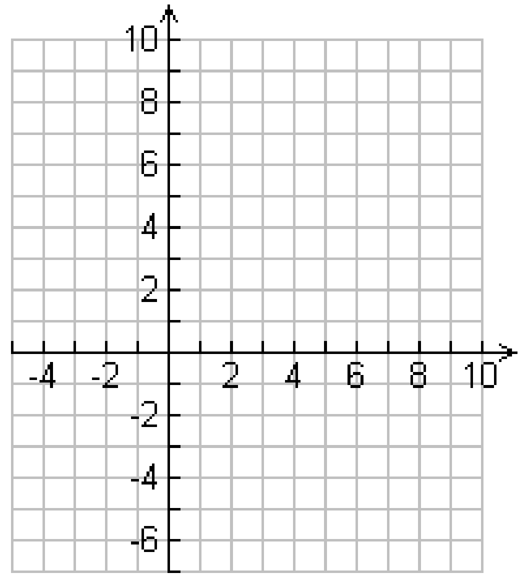
2. The line of symmetry is always at

3. Find the following for each quadratic: axis of symmetry, vertex, y-intercept, domain, and range.

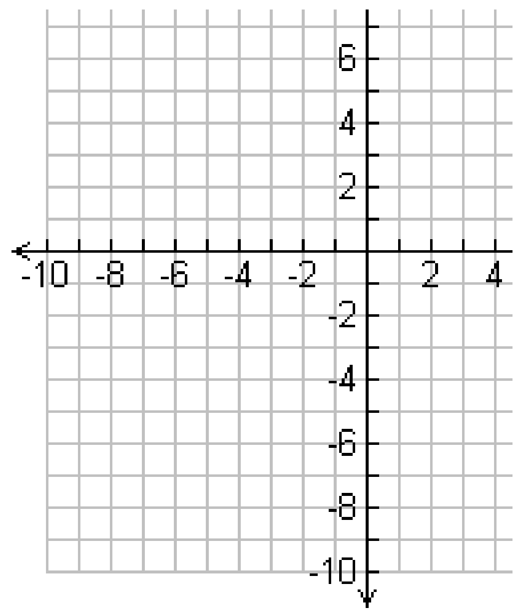
a) $f(x) = -2x^2 - 16x + 5$ b) $g(x) = x^2 - 7$ c) $h(x) = 5x^2 - 20x + 10$

4. Graph the following quadratic functions: (remember 5 points are required – 2 can be found with symmetry)

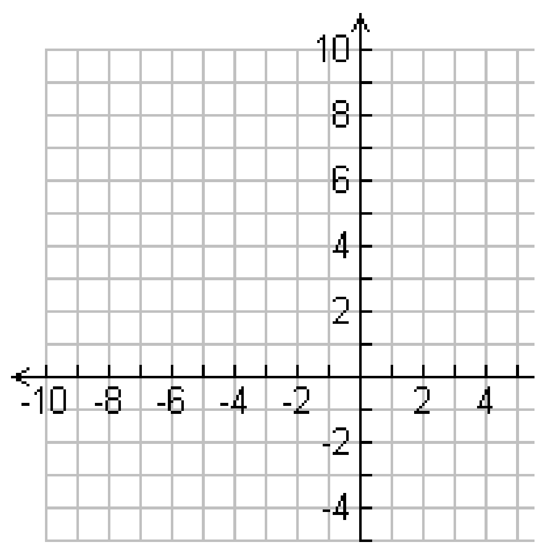
a) $f(x) = x^2 - 6x + 4$



b) $f(x) = \frac{1}{4}x^2 + 2x + 1$



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



Name: ______________________________________ Date: ___________________________ Hour: ____Alg 1____

Unit 7B Day 18: Determining the types of solutions in standard form

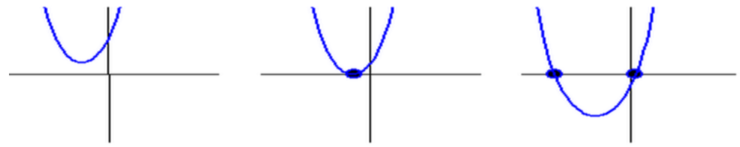
Focus Question: How do I know if a quadratic has two real, one real, or no real solutions?

A. Review

1. The fundamental theorem of algebra is that the degree of the equation is equal to ______________ ________________________________.

2. What are all the synonyms for solutions to a quadratic?

3. Give the number and type of solutions for each quadratic pictured.



4. Use the quadratic $f(x) = 4(x-3)^2 - 28$

a) What form is it in?

b) Can you tell right away how many/what type of solutions it has?

c) What are the solutions?

d) Make one change to the function that will cause this to have complex solutions.

$$f(x) = 4(x-3)^2 - 28$$

e) The number and type of solutions, when in vertex form, depend on which two parts of the function $f(x) = a(x - h)^2 + k$?

If ______________ is > 0, then there are _____ __________solutions.

If _____________ is = 0, then there is _______ _____________ __________ solution.

If _____________ is < 0, then there are _______ ___________ solutions.

B. The Discriminant

When a quadratic is written in standard form, we use **<u>the discriminant</u>** to determine the number and type of solutions. The formula for the discriminant is $b^2 - 4ac$ (We will discuss where it comes from when we are able to complete the square.)

If ______________ is > 0, then there are _____ __________solutions.

If _____________ is = 0, then there is _______ _____________ __________ solution.

If _____________ is < 0, then there are _______ ___________ solutions.

For each quadratic below, find the discriminant and give the number and type of solutions.

1. $f(x) = 9x^2 - 5x + 2$

2. $g(p) = \frac{1}{3}p^2 - 7p - 9$

3. $g(u) = 5u^2 + 2u - 3$

4. $m(x) = 7x^2 + 9x - 4$

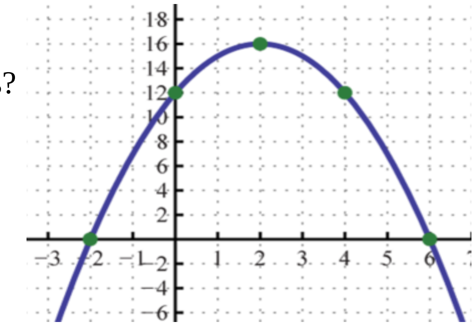
5. $h(t) = 3t^2 - 4t + 1$

6. $d(s) = 6s^2 - 8s + 5$

Name: ___________________________________ Date: _________________________ Hour: ____Alg 1____

Unit 7B Day 19: Finding the solutions in standard form

Focus Question: How do I solve a quadratic in standard form?



A. Review the last two lessons

1. What is the relationship between the axis of symmetry and the solutions?

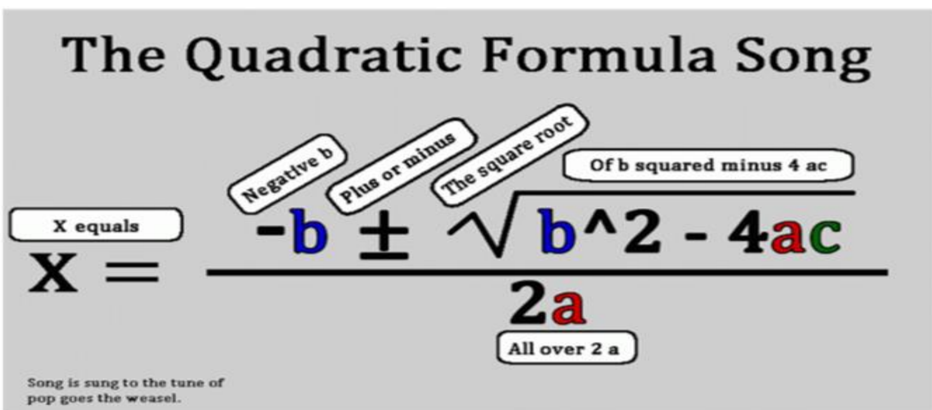
2. How did we find the axis of symmetry in standard form?

3. How did we find the types of solutions in standard form?

B. Quadratics written in standard form can always be solved using the **quadratic formula**. (We'll derive it after we can complete the square.)
How am I going to remember that?????

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

1) The one your math teacher suggests you learn: http://viewpure.com/O8ezDEk3qCg



Don't like those??????

2) Journey fan? Watch on your own time: http://viewpure.com/VqU_2y77_eI
3) Adele fan? Watch on your own time: http://viewpure.com/z6hCu0EPs-o
4) 1- D fan? Own time: https://www.youtube.com/watch?v=-gwz6d9NYz0 (start at 1:20)

Why do I need it in the first place? I'll just do it like the others.

Solve: $f(x) = x^2 - 4x - 6$

1. Why can't you just reverse PEMDAS?

C. Solve each of the following quadratics.

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

2. $g(x) = \frac{1}{3}x^2 - 7x - 9$

3. $h(x) = 5x^2 - 4x + 1$

4. $j(x) = x^2 - 2x - 24$

Name: ____________________________________ Date: _________________________ Hour: ____Alg 1____

Unit 7B Day 20: Solving a System with Quadratics

Focus Question: How do I solve a system that involves a quadratic?

A. Systems Review

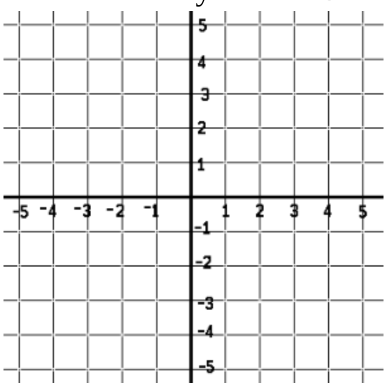
1. Define system: ____
2. What are the three methods for solving a system?

3. Solve each system below using the indicated method:

a) By Graphing
y= 2x – 4
y = -2x + 5

b) By Substitution
f(x) = 3x + 2
g(x) = -2x – 8

c) By elimination
5x – 2y = 10
2x – 4y = 16



4. Why is graphing not always the best method?

5. To use elimination on quadratics requires knowledge of matrices. Therefore, you'll learn that in a later math class. So, which method are we left to use?

B. Systems with quadratics

1. Look at all of the equations below, how are the different from the ones we solved yesterday?

$6x^2 + 4x - 5 = -7x - 3$ $x^2 + 5x - 7 = 2$ $2x^2 - 4x + 7 = x^2 + 2x - 2$ $-3x^2 + 2x - 1 = x$

2. Tell what you are finding when you solve each equation above.

3. What will you have to do first?

4. Solve each equation, then sketch what the graph would look like.

a. $6x^2 + 4x - 5 = -7x - 3$

b. $x^2 + 5x - 7 = 2$

c. $2x^2 - 4x + 7 = x^2 + 2x - 2$

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

Name: ________________________________ Date: _______________________ Hour: ____Alg 1____

Unit 7B Day 21: Applications of standard form

Focus Question: How do I use standard form knowledge to solve a word problem?

1) The profits of Mr. Unlucky's company can be represented by the function $P(x) = -3x^2 + 18x - 4$, where P is the amount of profit in hundreds of thousands of dollars and x is the number of years of operation.

a) How long can Mr. Unlucky stay in business before going into debt?

b) When should Mr. Unlucky sell his business for the most profit?

c) If Mr. Unlucky sold his business after 4 years, how much less would his profit be than if he had sold it for the maximum profit?

2) A garden measuring 12 meters by 16 meters is to have a pedestrian pathway installed all around it, increasing the total area to 285 square meters. What will be the width of the pathway?

3) An airplane took off from JFK airport with a climbing altitude of 30 feet per second. At the same time, George threw a penny off the Main Deck observatory at the Empire State Building which has a height of 1050 feet. The height of the penny, h, in feet after t seconds can be modeled by the function $h(t) = -16t^2 + 18t + 1050$. When are the penny and the plane at the same height?

Name: ___________________________________ Date: _________________________ Hour: ____Alg 1____

Unit 7B Day 22: Standard Form back to Vertex Form

Focus Question: If I can go from vertex form to standard form, can I go from standard form to vertex?

A. Completing the Square

The process to turn standard form into vertex form is called completing the square. We are going to start this process by examining **perfect square trinomials**.

1. List some perfect squares that you already know.

(These are all __________________________)

2. Are there perfect square binomials? (Remember "perfect square" means something times itself can make the polynomial.)

3. Turn each square into standard form.

a. $(x + 6)^2$ b. $(x - 8)^2$ c. $(2x + 5)^2$ d. $(4x - 3)^2$

e. What do you notice about the *a* and *c* terms of the standard form?

f. What pattern do you notice in the *b* term?

g. Turn $(x - h)^2$ into standard form.

B. **Perfect square Trinomials**

For a trinomial to be a perfect square, the *a* and *c* terms must be a positive perfect squares and the *b* term must be twice the product of the numbers that were squared.

1. Decide if each trinomial is a perfect square trinomial

a. $x^2 + 6x + 9$ b. $x^2 - 4x + 16$ c. $4x^2 - 4x - 1$ d. $9x^2 - 12x + 4$

2. Decide if each trinomial is a perfect square trinomial. If it is, write it as a binomial squared.

$a^2 + 4a + 4$

$y^2 - 8y + 10$

$n^2 - 8n + 16$

$x^2 - 10x - 100$

$4x^2 - 4x + 1$

$x^2 + 6x - 9$

$n^2 - 13n + 36$

$9b^2 - 6b + 1$

$121y^2 + 22y + 1$

4. Show your work to decide what number would need to go in the blank to make a perfect square trinomial. Then write the binomial that was squared.

$x^2 + 16x +$ ________

$x^2 - 20x +$ ___________

$x^2 - 8x +$ __________

$x^2 + 50x +$ ________

5. What you did in #3 is called **completing the square**. Why do you think this name is appropriate?

Name: ___________________________________ Date: _________________________ Hour: ____Alg 1____

Unit 7B Day 23: Solving by Completing the Square

Focus Question: Where did the quadratic formula come from?

A. **All** quadratics can be solved by the quadratic formula which is :

All quadratics have a vertex so __________ quadratics can be solved by "completing the square."
To most people, this process is a simpler alternative to the quadratic formula.
(There is one more alternative to the quadratic formula that we will learn in the next part, but it does NOT work for ALL quadratics.)

B. Solve each of the following by completing the square. Remember to complete the square you want the *a* and *b* terms to be alone on the same side (Also tell what your answer represents.)

1. $x^2 - 2x - 15 = 0$

2. $x^2 + 6x = 35$

3. $x^2 - 4x - 8 = 0$

4. $x^2 - 7x = 18$

5. $2x^2 + 8x - 6 = -2$

6. $8x = 4x^2 - 1$

7. $2x^2 - 16x + 5 = -5$

8. $ax^2 + bx + c = 0$

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Unit 7B Day 24: Completing the Square to make Vertex form

Focus Question: How do I complete the square?

A. Review

1. Write the square that created each of the following perfect square trinomials.

a. $x^2 + 30x + 225$

b. $x^2 - 14x + 49$

c. $4x^2 - 20x + 25$

2. Fill in each blank to turn each binomial into a perfect square trinomial. Then write the binomial that was squared.

a. $x^2 - 12x +$ ________

b. $x^2 + 40x +$ ________

*c. $4x^2 + 48x +$ ______

3. If you are adding a value to the expression or equation, what must you remember to do so that you are not changing the value of the function?

B. We now know enough to turn simple standard form quadratics (a=1 and b is even) into vertex form by completing the square!

1) $f(x) = x^2 - 28x - 4$

2) $g(x) = x^2 + 4x - 23$

3) $h(x) = x^2 - 12x + 16$

4) $j(x) = x^2 + 2x + 16$

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

6) $m(x) = x^2 - 10x + 45$

C. Completing the Square a≠1 or b is odd

Turn the following standard form quadratics into vertex form.

1) $f(x) = 2x^2 + 8x - 9$

2) $g(x) = x^2 + 7x + 2$

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

4) $h(t) = t^2 - 3t + 2$

5) $n(w) = -6w^2 - 36w + 40$

6) $r(x) = x^2 + 3x - 10$

Name: ___________________________________ Date: _________________________ Hour: ____Alg 1____

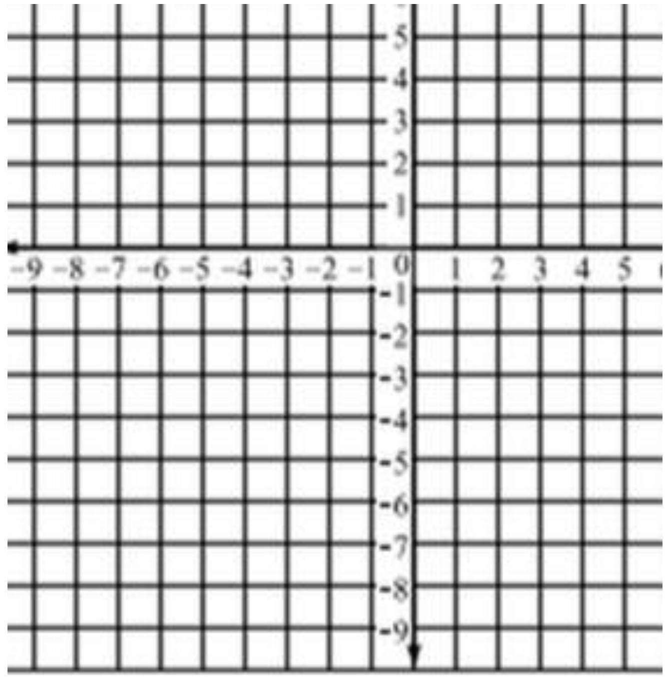
Unit 7B Day 25: Review Vertex and Standard Form of Quadratics

Focus Question: Do I remember standard and vertex form for my quiz tomorrow?

A. Vertex Form

Use the following quadratic

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



1. Give its vertex and a.o.s. Graph them.

2. Is the vertex a max or min?

3. Solve the function.

4. What are the other names for the solutions? Graph them.

5. Find the y intercept and graph it.

6. Give its domain

7. Give its range

8. Turn it into standard form

9. You have designed a new style of sports bikes and want to figure out what price to sell them at as well as your maximum profit. The profit can be modeled by the function $P(s) = -200(s - 230)^2 + 2180000$ where P is profit and s is selling price.

   a. What is your maximum profit?

   b. What selling price gives you the maximum profit?

   c. What selling price(s) will give you no profit? (do on your own paper)

   d. What selling price(s) will give you a profit of $1,000,000? (do on your own paper)

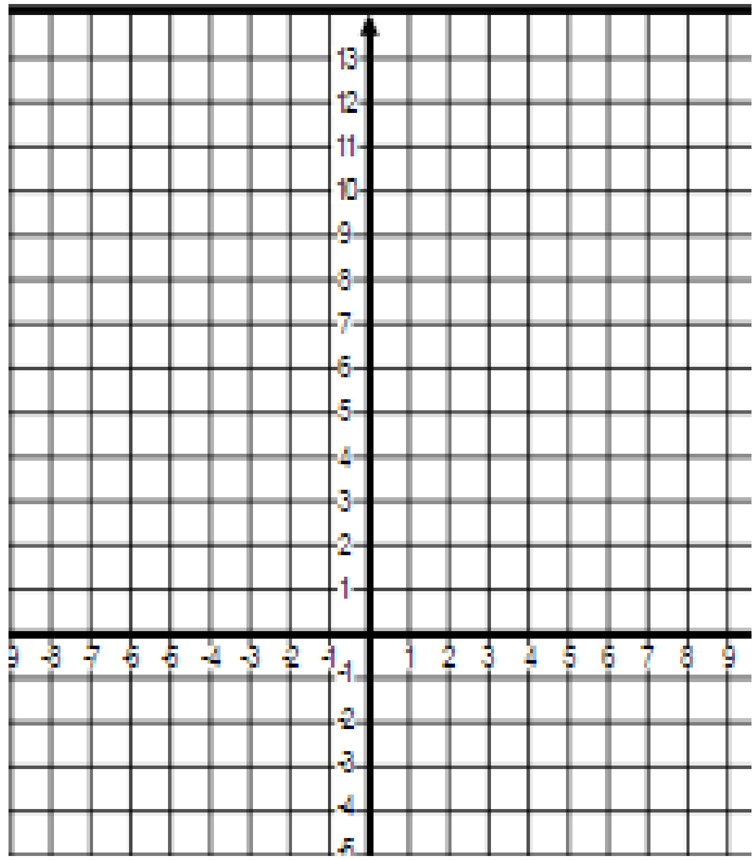
   e. What is P(0) and what does this represent in the context of the situation?

B. Standard Form
Use the following quadratic
$j(x) = 2x^2 + 12x + 13$

1. Find the y-intercept.

2. Find the axis of symmetry.

3. Find its vertex



4. Is the vertex a max or min?

5. Solve using the quadratic formula. Then graph.

6. Turn it into vertex form.

7. Cal Ripken hit a pop up above home plate. The height of the ball, *h*, in feet is related to time, *t*, in seconds described by the function $h(t) = -16t^2 + 64t + 2$.

a. At what height was the ball when he hit it?

b. How long does an infielder have to get under the ball before it hits the ground? (Do on own paper)

c. How high did the ball go? (do on own paper)

8. Solve the following using completing the square: $3x - 15 = x^2 + 9x - 2$. Explain what your answer means