Name: _____Date: _____ # 62 Vertex Form Equations

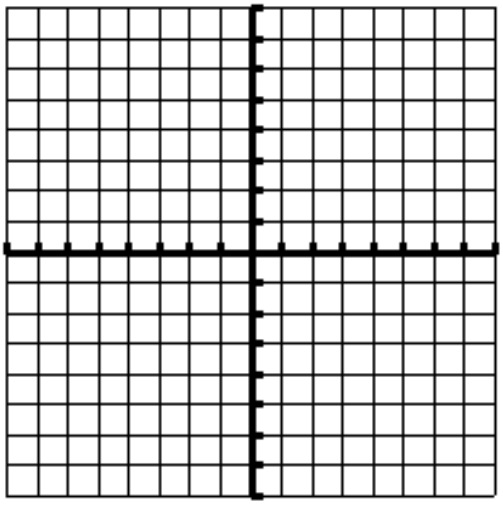
Graph each function.

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

Vertex = _____

A.O.S. = _____

Is the vertex a max or min?

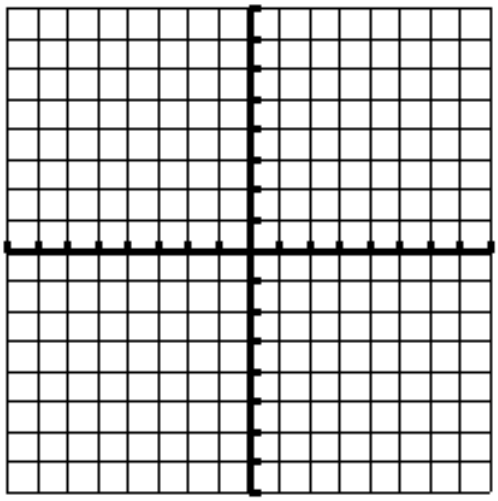


2. $f(x) = 2(x-2)^2 - 5$

Vertex = _____

A.O.S. = _____

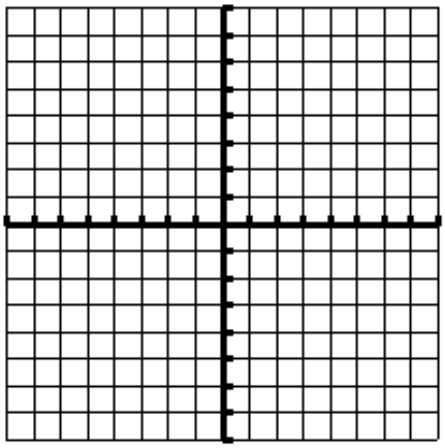
Is the vertex a max or min?



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

Vertex = _____ A.O.S. = _____

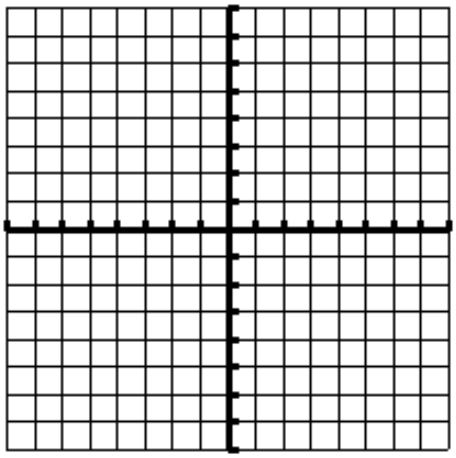
Is the vertex a max or min?



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

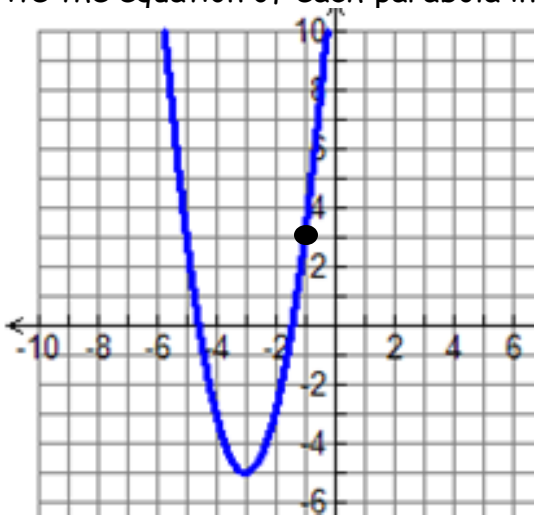
Vertex = _____ A.O.S. = _____

Is the vertex a max or min?



Write the equation of each parabola in vertex form. Show all work to find *a*.

5.



6. A quadratic has vertex at (-2, 0) and goes through the point (4, 10)

7. Write the equation of javelin throw #3.

8. The equation of javelin throw #2.

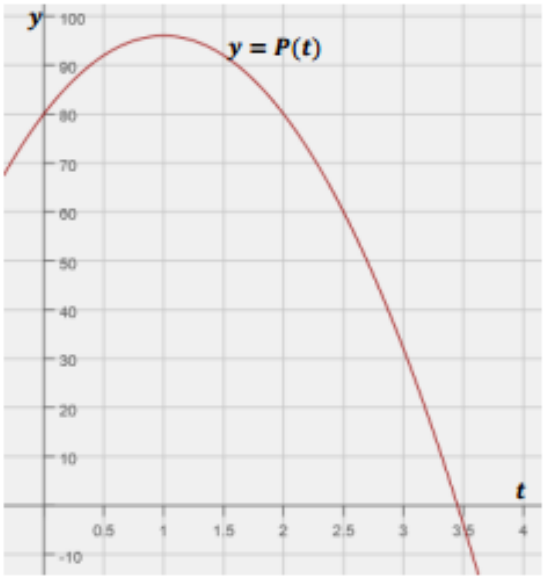
Name: _____Date: _____ #63 Interpreting Quadratic Graphs

For each problem:

A. Answer the question

B. <u>Explain your answer</u> by including whether you used the vertex, x – intercepts, y intercept, or some other point to answer. (This is the more important part of the question!)

Paul and Ryan each threw a paper airplane into the air. The vertical height in inches off the ground is represented by P(t) on the graph for Paul and by R(t) on the table for Ryan. *t* is the time of the flight.



t	$R(t)$
0	86
0.5	98
1	102
1.5	98
2	86
2.5	66
3	38
3.52	0

1. Whose airplane went higher? By how much?

2. Whose airplane was in the air longer?

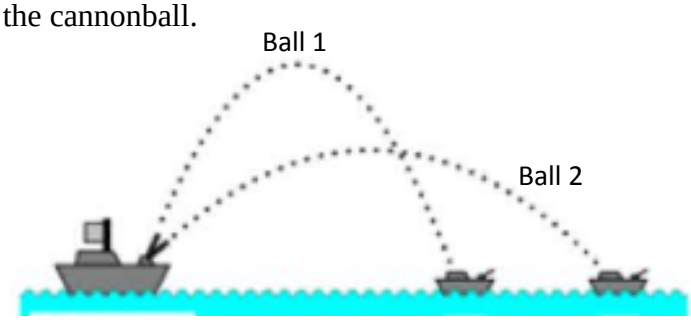
3. Who was holding their plane higher when they let it go?

4. Whose airplane reached their maximum height first?

5. How high off the ground was Paul's airplane after 2.5 seconds?

More on the back.

A pirate ship was firing cannon balls at smaller ships trying to escape. The x-axis represents the horizontal distance traveled and the y-axis represents the height of the cannonball.



6. Which cannon ball went higher?

7. Which cannon ball traveled further?

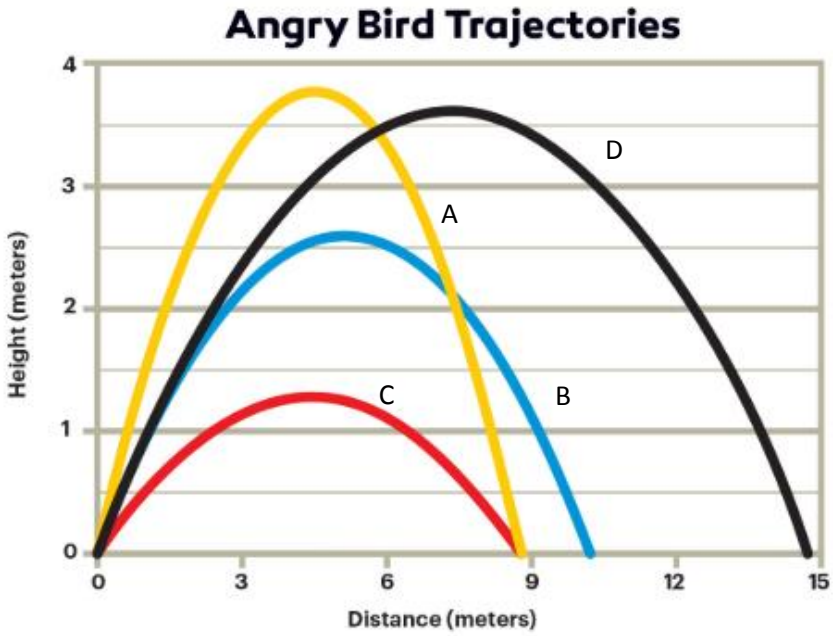
8. Which cannon ball was in the air longer?

A teacher made a class project where students were virtually sling-shotting an angry bird onto a pig target located at (9,2) by transforming the parent function $f(x) = x^2$.

9. Which student sent their angry bird the highest?

10. Which student sent their angry bird the farthest?

11. Which student came closest to hitting the pig target?



12. Which student's angry bird was in the air the longest?

Name: _____Date: _____ #64 Solving from vertex form

Simplify each of the following:

$\sqrt{-80}$ $\sqrt{-25}$ $\sqrt{200}$ $\sqrt{-275}$ $\sqrt{-48}$

$\sqrt{243}$ $\sqrt{-98}$ $\sqrt{-225}$ $\sqrt{-23}$ $\sqrt{-320}$

Do the rest on your own paper!

Solve each quadratic below. Then, give the number and type of solutions, its domain, range, and vertex.

1. $f(x)=\frac{1}{4}(x+4)^2+3$
2. $g(x)=(x+2)^2-1$
3. $h(x)=-2(x+5)^2-8$
4. $k(x)=(x-2)^2$
1. $f(x)=(x-6)^2+6$
6. $d(x)=\frac{1}{2}(x-1)^2-1$
7. $a(x)=8(x+1)^2-2$
8. $g(x)=-3(x-1)^2+3$
9. $r(x)=\frac{1}{8}(x+1)^2-1$
10. $f(x)=\frac{1}{2}(x+6)^2-2$
11. $g(x)=-2(x+1)^2$

Name: _____Date: _____ #65 Vertex form word problems

For each problem tell which point(s) you need to find (x – ints, y-int, vertex…which part, or some other point) THEN solve.

1. The equation for a small rocket that is ***h (height)*** feet in the air of a small rocket ***t* seconds** after it is launched is $\boldsymbol{h(t) = -16(t-4)^2 + 256}$.

a. How long is the rocket in the air? _____

b. What is the greatest height the rocket reaches? _____

c. About how high is the rocket after 1 second? _____

d. After 2 seconds, is the rocket going up or going down? _____ Explain.

e. After 5 seconds, is the rocket going up or going down? _____ Explain.

f. Do you think the rocket is traveling faster from 0 to 1 second or from 3 to 4 seconds? Explain your answer.

2. A rocket carrying fireworks is launched from a hill 80 feet above a lake. The rocket will fall into the lake after exploding at its maximum height. The rocket's **height (*h*)** above the surface of the lake after ***t* seconds** is given by $h(t) = -16(t-2)^2 + 144$.

a. When will the rocket explode?

b. At what height will the rocket/fireworks explode?

c. When will the spectators hear the rocket fall into the lake?

d. How long will it take for the rocket to hit 128 feet?

3. Al is an avid daredevil skateboarding fanatic. His most recent trick involves doing a 720 off a ramp on the roof of a building landing in a pillow truck on the street below. The equation of his flight off the ramp is $h(d) = -5(d-3)^2 + 80$ where ***h*** is the **height** in yards and ***d*** is the **horizontal distance** in yards.

a. How tall is the building that Al skateboarded off?

b. How far from the building was the pillow truck placed?

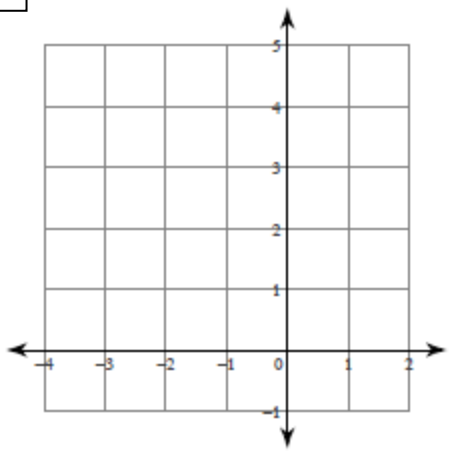
c. How long was Al in the air?

d. What was the maximum height that Al reached?

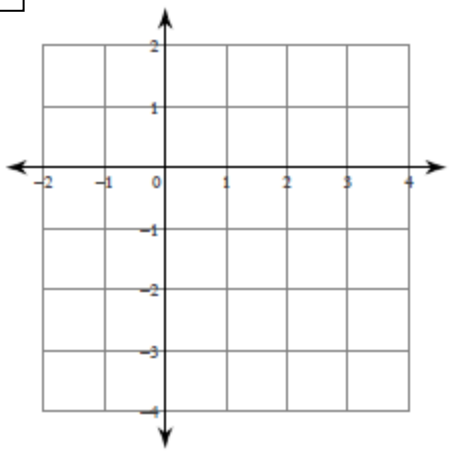
Name: _____Date: _____ #66 Graph from Standard Form

Graph each quadratic function. On your own paper, show your work to find the axis of symmetry, vertex, and any other points you use to graph it.

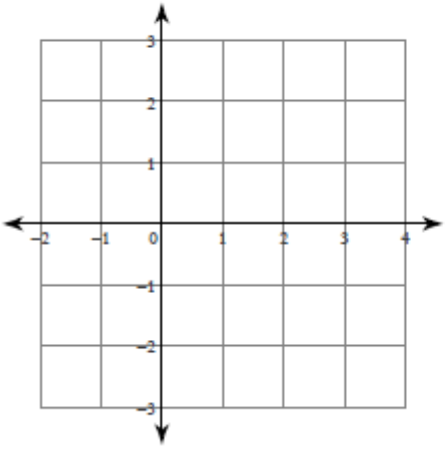
1) $f(x) = -x^2 - 2x + 3$



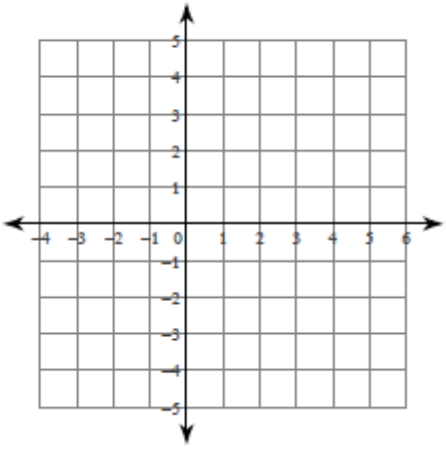
2) $f(x) = -x^2 + 4x - 3$



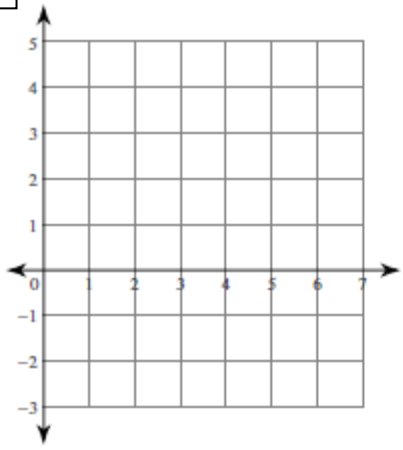
3) $f(x) = -x^2 + 4x - 2$



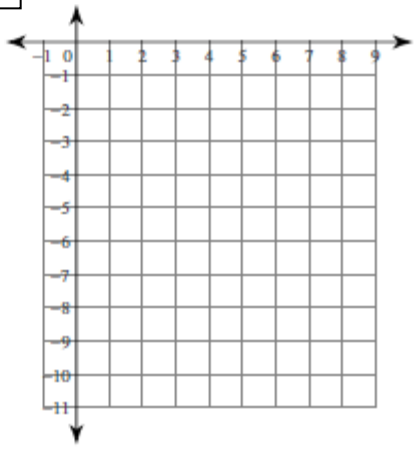
4) $f(x) = 2x^2 - 4x - 2$



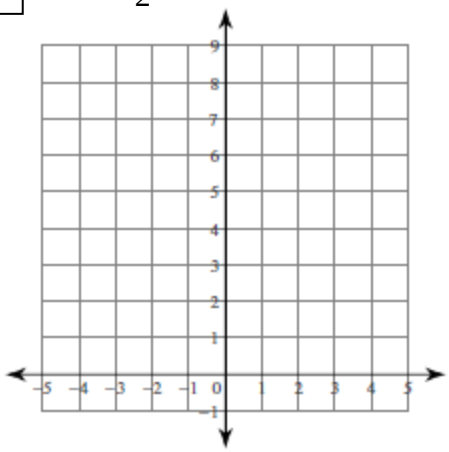
5) $f(x) = x^2 - 8x + 15$



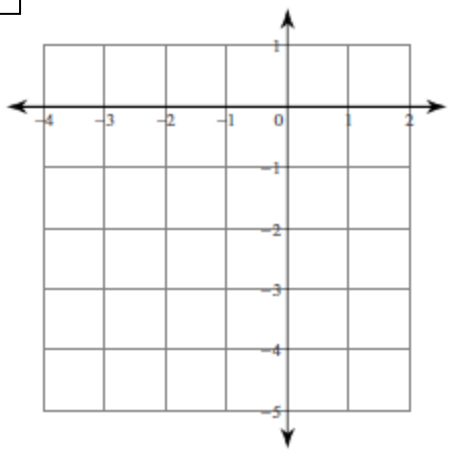
6) $f(x) = -2x^2 + 8x - 10$



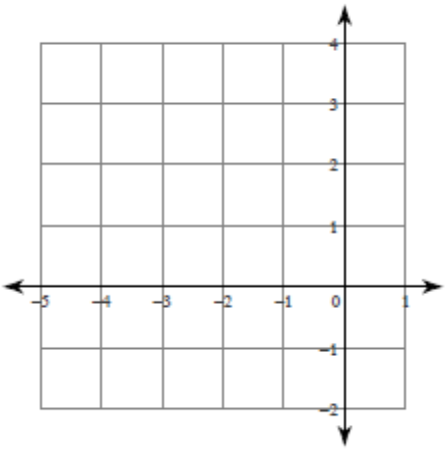
7) $f(x)=\frac{1}{2}x^2$



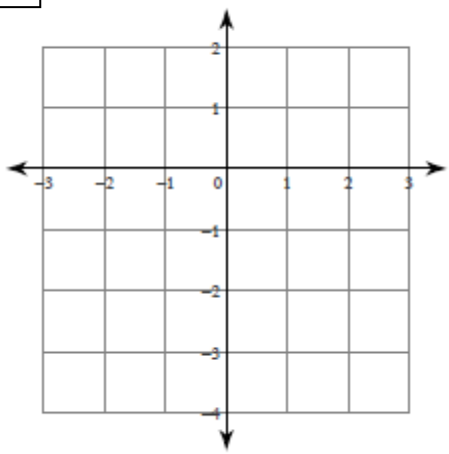
8) $f(x)=-x^2-1$



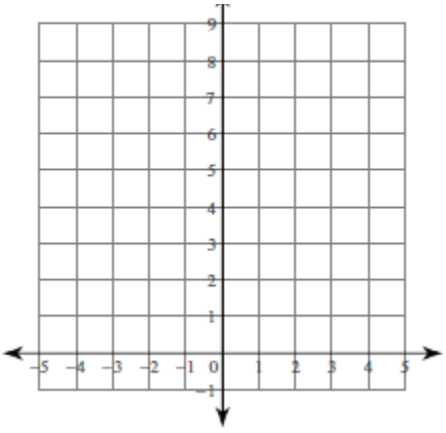
9) $f(x)=x^2+4x+3$



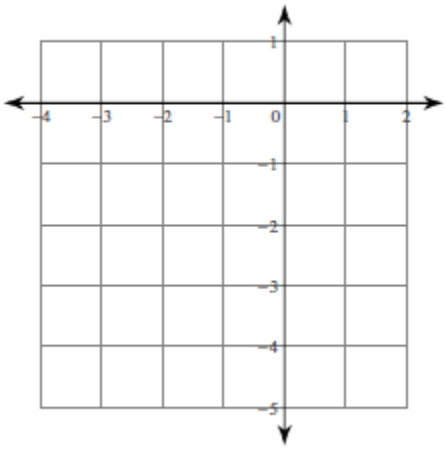
10) $f(x)=-x^2-2x$



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



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



Name: _____ Date: _____ # 67 The Discriminant

1. Define Rational number and give an example.

2. Define irrational number and give an example.

3. Decide if each of the following is rational, irrational, or imaginary.

a) $\sqrt{-4}$	b) $\sqrt{25}$	c) $\sqrt{68}$	d) $\sqrt{-12}$	e) $\sqrt{32}$

For the following problems, find the discriminant, then check the appropriate column. (You may do the work on the back or on your own paper.

#	Function	Discriminant	2 rational real solutions	2 irrational real solutions	1 repeated real solution	2 complex solutions
4	$f(x) = x^2 + 5x + 4$					
5	$g(x) = x^2 + 10x + 25$					
6	$h(d) = d^2 - 3d - 2$					
7	$v(t) = -3t^2 + 5t - 2$					
8	$s(t) = -2t^2 + 4t - 3$					
9	$j(x) = 4x^2 - 12x + 9$					
10	$v(x) = 2x^2 - 9x + 13$					
11	$p(m) = 6m^2 - 11m - 21$					
12	$d(x) = \frac{1}{2} x^2 + 3x + 8$					
13	$r(t) = -t^2 - 4t$					

Name: _____ Date: _____ #68 Solving from Standard Form

On your own paper,

a) Tell what you are finding when you solve the equation.
b) Solve the equation.
c) Make a sketch of the situation using your answers.

1) $-5a^2 - 2a + 51 = -4a$

2) $8x^2 + 2x - 15 = 0$

3) $5x^2 + 23x + 12 = 0$

4) $10x^2 + x - 9 = 0$

5) $10x^2 - 9x + 6 = 0$

6) $6k^2 + 2k + 9 = -3$

7) $3a^2 = 6a - 3$

8) $4a^2 - 8 = a$

Name: _____ Date: _____ #68 Solving from Standard Form

On your own paper,

d) Tell what you are finding when you solve the equation.
e) Solve the equation.
f) Make a sketch of the situation using your answers.

1) $-5a^2 - 2a + 51 = -4a$

2) $8x^2 + 2x - 15 = 0$

3) $5x^2 + 23x + 12 = 0$

4) $10x^2 + x - 9 = 0$

5) $10x^2 - 9x + 6 = 0$

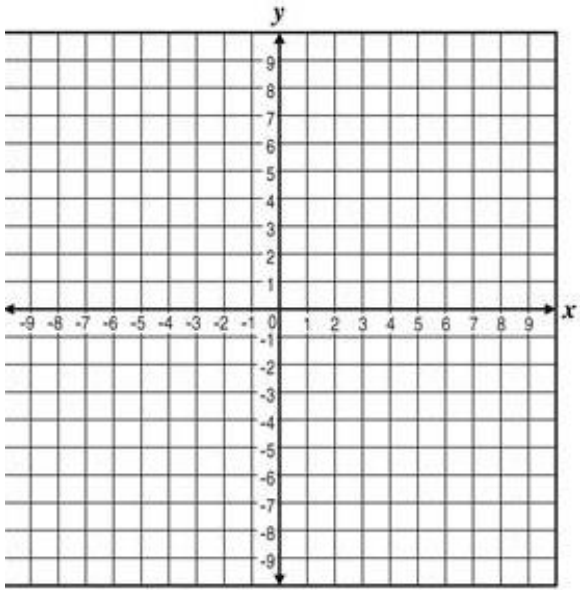
6) $6k^2 + 2k + 9 = -3$

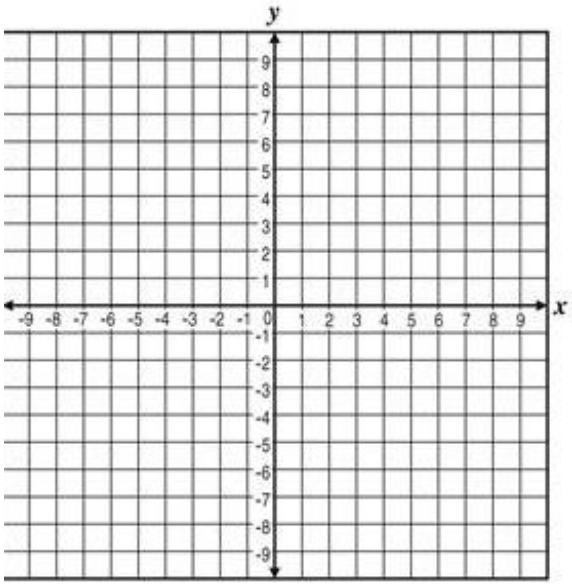
7) $3a^2 = 6a - 3$

8) $4a^2 - 8 = a$

Name: _____ Date: _____ #69 Stnd form so far…

1. Show all work to graph the following function.
   a. $f(x) = \frac{1}{4}x^2 + x - 6$ b. $g(x) = -x^2 + 6x - 4$





2. Use the discriminant to determine the number and type of solutions
   a. $f(x) = 3x^2 - 8x + 2$ b. $g(x) = -\frac{1}{2}x^2 + x - 6$

3. Find the axis of symmetry and x intercepts for each function below.
   a. $f(x) = 4x^2 + 5x + 1$ b. $g(x) = x^2 + 4x - 21$

4. A baker has modeled the monthly operating cost for making wedding cakes by the function $T(c) = \frac{1}{2}c^2 - 12c + 150$ where *T* stands for total operating cost and *c* is the number of cakes prepared.

a. How many cakes orders should the baker take on to yield the minimum operating cost?

b. What is the minimum operating cost?

c. Will the baker ever have no operating cost? Use the discriminant to explain.

5. The path that a motocross dirt bike rider follows during a jump is given by $h(d) = -0.4d^2 + 4d + 10$ where d is the horizontal distance (in feet) from the edge of the ramp and h is the height (in feet).

   a. What is the maximum height of the rider during the jump?

   b. What is the height of the ramp?

   c. How far from the ramp does the motocross dirt bike land?

Name: _____ Date: _____ #70 Perfect Square Trinomials

Fill in the blank to make a perfect square trinomial. Then write the binomial that was squared.

1. $x^2 + 14x +$ _____

2. $x^2 - 36x +$ _____

3. $x^2 + 9x +$ _____

4. $x^2 - 3x +$ _____

For each quadratic in standard form below:

- If it is a perfect square trinomial, write it in vertex form by writing the binomial that was squared.
- If it is not a perfect square trinomial, explain why it is not.

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

6. $g(x) = x^2 + 22x + 121$

7. $h(x) = x^2 - 6x + 25$

8. $j(x) = x^2 - 20x + 100$

9. $h(t) = t^2 + 14t + 49$

10. $h(d) = d^t + 12d - 36$

11. $P(y) = 9y^2 + 24y + 16$

12. $r(x) = 16x^2 - 8x + 1$

Name: _____ Date: _____ # 71 Solve by Comp the Sqr

Solve each equation by completing the square.

1) $p^2 + 14p - 38 = 0$

2) $v^2 + 6v - 59 = 0$

3) $a^2 + 14a - 51 = 0$

4) $x^2 - 12x + 11 = 0$

5) $x^2 + 6x + 8 = 0$

6) $n^2 - 2n - 3 = 0$

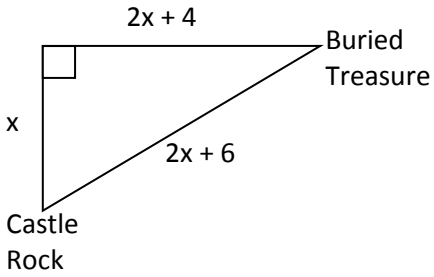
9) $r^2 - 4r - 91 = 7$

10) $x^2 - 10x + 26 = 8$

15) $5k^2 = 60 - 20k$

16) $6x^2 - 48 = -12x$

11. Ahmed has first half of a treasure map, which indicates that the treasure is buried in the desert (2x + 6) paces from Castle Rock. Vanessa has the other half of the map. Her half indicates that to find the treasure, one must go to the Castle Rock, walk x paces to the North, and then walk (2x + 4) paces to the East. If they share their information, then they can find x and save a lot of digging. What is x? Use the completing the square method.



Name: _____ Date: _____ #72 Comp the Sqr for Vertex

Turn each quadratic below into vertex form by completing the square.

1) $y = x^2 + 16x + 71$

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

3) $y = -x^2 - 14x - 59$

4) $y = 2x^2 + 36x + 170$

5) $y = x^2 - 12x + 46$

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

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

8) $y = (x + 5)(x + 4)$

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

10) $y = x^2 - 10x + 5$

11) $y = -3x^2 - 12x - 13$

12) $y = x^2 + 7x + 4$