Day 7-8 Homework

Solve each equation using the quadratic formula. Give exact answers and when necessary leave in simplest radical form!

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

1. $4x^2 + 11x - 20 = 0$	2. $x^2 - 5x - 24 = 0$
3. $x^2 = 3x + 3$	4. $x^2 + 5 = -5x$
5. $x^2 = -x + 1$	6. $4x^2 - 1 = -8x$
7. $4x^2 + 7x - 15 = 0$	8. $x^2 + 3x - 10 = 0$
9. $x^2 + 14 = 8x$	10. $-3x^2 + 6x = -5$
11. $4x^2 + 5 = -6x$	12. $3x^2 + 4x + 8 = 0$
13. $3x^2 = 10x + 4$	14. $4x^2 - 6x = 14$

Select answers to the above problems. Check your answers to make sure you are on the right track.

1. $x = 1.25,\ x = -4$ 3. $x = \frac{3 \pm \sqrt{21}}{2}$

Day 7-8 Homework – Working with the Discriminant

Part 1 - Find the value of the discriminant for each quadratic. Show your work!

First: What is the formula used to calculate the discriminant? _____

1) $6p^2 - 2p - 3 = 0$

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

3) $-4m^2 - 4m + 5 = 0$

4) $5b^2 + b - 2 = 0$

5) $r^2 + 5r + 2 = 0$

6) $2p^2 + 5p - 4 = 0$

Part 2 - Find the value of the discriminant of each quadratic **AND** state the number of **real** solutions and the number of **imaginary** solutions.

First: Explain the difference between real and imaginary solutions.

_____

_____

7) $9n^2 - 3n - 8 = -10$

8) $-2x^2 - 8x - 14 = -6$

9) $9m^2 + 6m + 6 = 5$

10) $4a^2 = 8a - 4$

11) $-9b^2 = -8b + 8$

12) $-x^2 - 9 = 6x$

13) $-4r^2 - 4r = 6$

14) $8b^2 - 6b + 3 = 5b^2$

(Homework is continued on the next page.)

Part 3 - Find the value of the discriminant of each quadratic **AND** state the number of **rational** solutions, **irrational** solutions and **imaginary** solutions.

First: Explain the difference between rational and irrational solutions.

_____

_____

15) $-6x^2 - 6 = -7x - 9$

16) $4k^2 + 5k + 4 = -3k$

17) $-7n^2 + 16n = 8n$

18) $2x^2 = 10x + 5$

19) $-10n^2 - 3n - 9 = -2n$

20) $-9r^2 - 8r - 1 = r - r^2 - 9$

Critical thinking and application questions -

23) Write a quadratic equation that has 2 imaginary solutions and show why your answer must have 2 imaginary solutions.

24) In your own words, explain why a quadratic cannot have only one imaginary solution.

25) Farmer Smith built a rectangular pen for his animals using 14 meters of fence. He used part of one side of his barn as one length of the pen. He maximized the area for the 14 meters of fence.

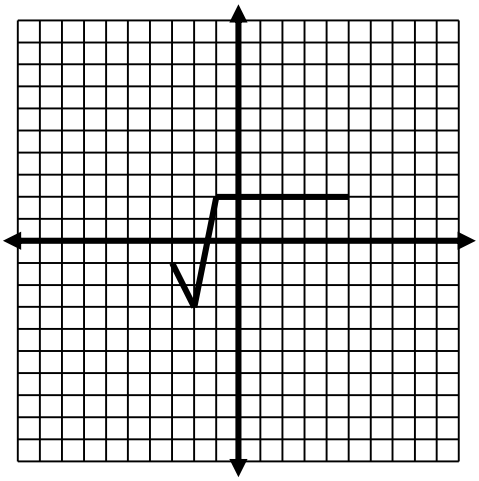
Farmer Jones built a rectangular pen for her animals using 18 meters of fence. She used part of one side of her barn as one length of the pen. Her pen had a length that was 2 meters greater than the length of Farmer Smith's pen. Her pen had a width that was 1 meter greater than the width of Farmer Smith's pen.

How much larger is Farmer Jones' rectangular pen than Farmer Smith's?

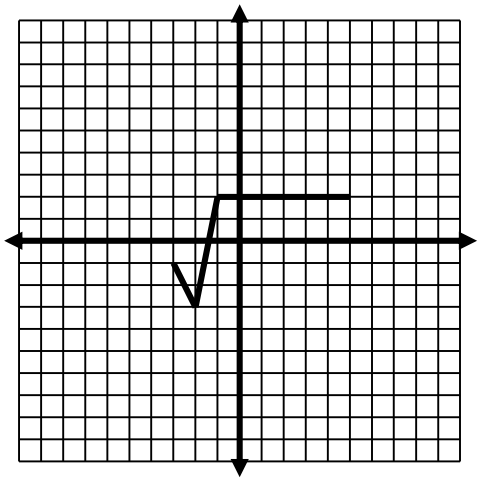
Day 9 Homework- Fred Functions

I. On each grid, **Ginger, G(x)** is graphed. Graph the given function.

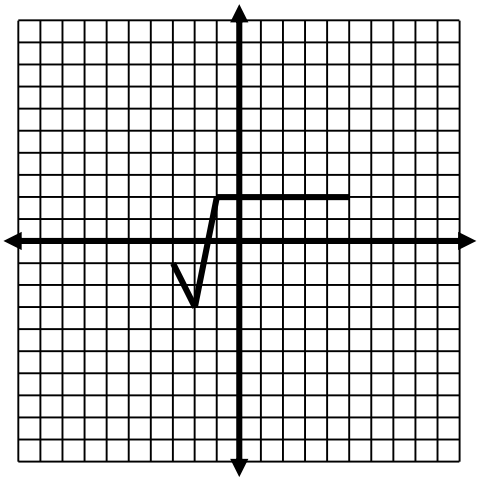
1. Graph: y = G(x) – 6.



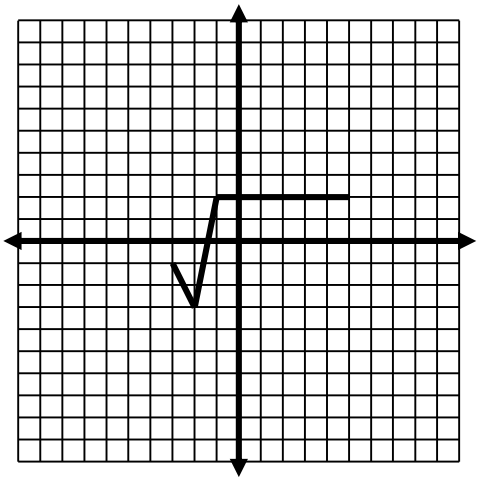
3. Graph: y = G(x + 2) + 5



2. Graph: y = G(x + 6)



4. Graph: y = G(x – 4) – 5



II. Using the understanding you have gained so far, describe the effect to Fred for the following functions.

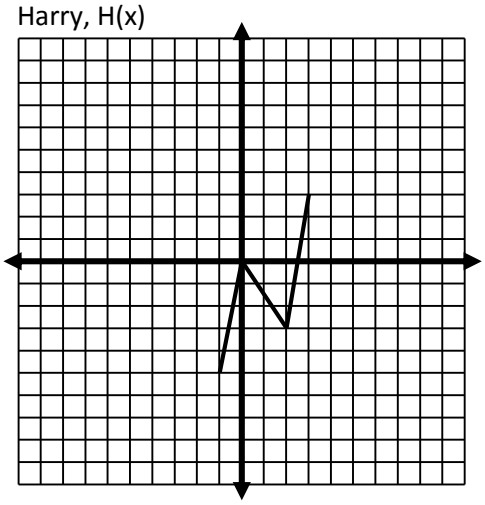
Equation	Effect to Fred's graph
1. y = F(x) + 82	
2. y = F(x – 13)	
3. y = F(x + 9)	
4. y = F(x) – 55	
5. y = F(x – 25) + 11	

Using the understanding you have gained so far, write the equation that would have the following effect on Fred's graph.

Equation	Effect to Fred's graph
1.	Translate left 51 units
2.	Translate down 76
3.	Translate right 31
4.	Translate right 8 and down 54
5.	Translate down 12 and left 100

III. Determine the domain and range of each parent function.

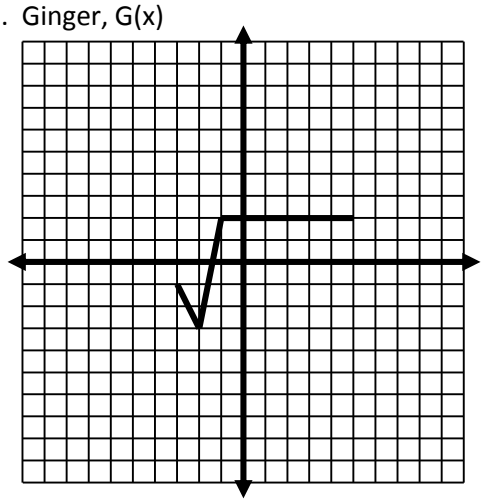
1. Harry, H(x)



Domain: _____

Range: _____

2. Ginger, G(x)



Domain: _____

Range: _____

IV. Consider a new function, Polly, P(x).
Polly's Domain is $\{x \mid -2 \le x \le 2\}$. Its range is $\{y \mid -3 \le y \le 1\}$.

Use your understanding of transformations of functions to determine the domain and range of each of the following functions. *(Hint: You may want to write the effect to Polly first.)*

1. P(x) + 5

Domain: _____

Range: _____

2. P(x + 5)

Domain: _____

Range: _____

Day 10 Homework

Part I) Transformations of quadratic graphs

Describe how the graph of $y = x^2$ is changed to produce the graphs of the following equations? Use vocabulary like *translate, reflect, shrink, stretch* in the blank. If more than one change is needed, you may write up to 3 of these options in the blank. You must be able to answer questions like these without a calculator. **Use your calculator only to check answers.**

1. $y = x^2 + 5$ 1. _____Example: Translate up 5_____

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

3. $y = (x-9)^2$ 3. _____

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

5. $y = x^2 - 3$ 5._____

6. $y = \frac{1}{3}x^2$ 6. _____

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

8. $y = 2(x-4)^2$ 8. _____

9. $y = -\frac{1}{2}x^2 + 1$ 9. _____

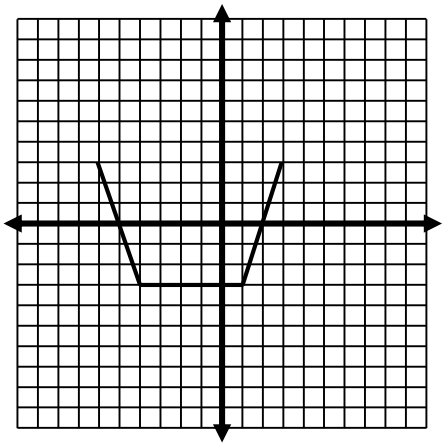
10. $y = -(x-4)^2 + 2$ 10. _____

11. $y = \frac{2}{5}(x+2)^2 + 1$ 11. _____

12. $y = 3(x-1)^2 - 2$ 12. _____

13. The graph of $f(x) = x^2$ is translated 6 units up and 3 units to the right. Write a function g(x), in standard form, to describe the graph produced by the translation. 13. _____

Part II) Transformations of Fred Functions



This is the function **Bowl, B(x)**.

1. List its characteristic points.

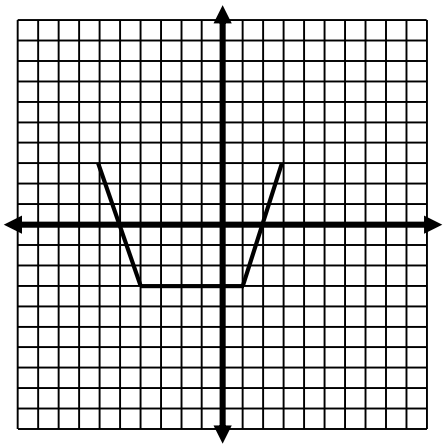
2. Are these the only points on the graph of Bowl? Explain.

3. What is the domain of Bowl?

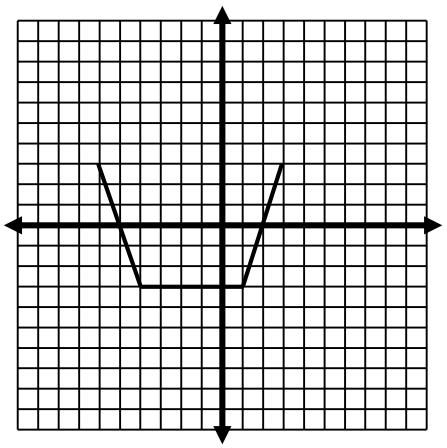
4. What is the range of Bowl?

For each of the following, list the effect on the graph of Bowl and then graph the new function.

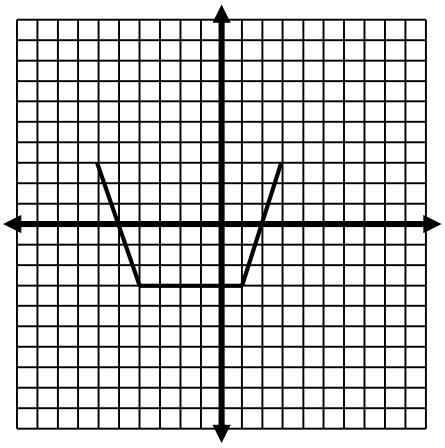
5. $y = B(-x)$



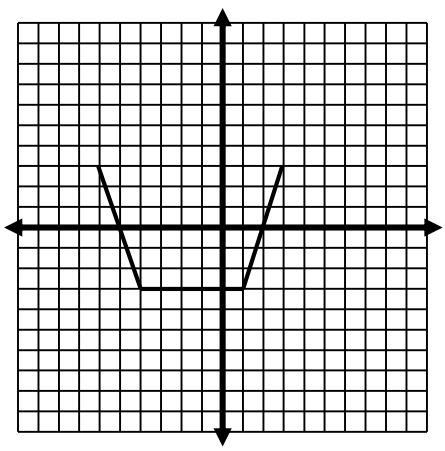
6. $y = -B(x)$



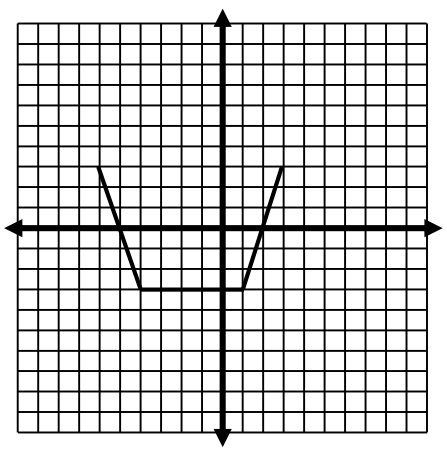
7. $y = \frac{1}{3} B(x)$



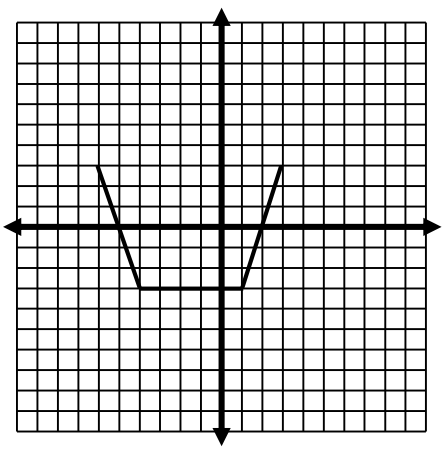
8. $y = 3\,B(x)$



9. $y = B(x - 3)$



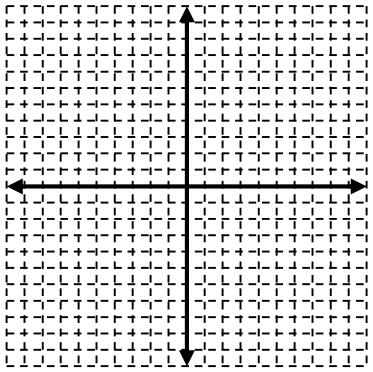
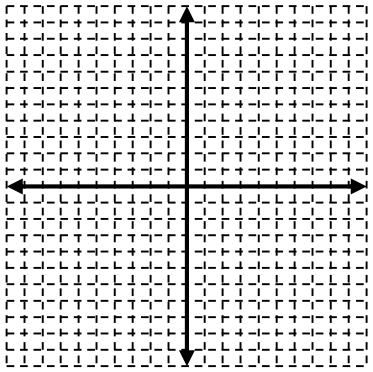
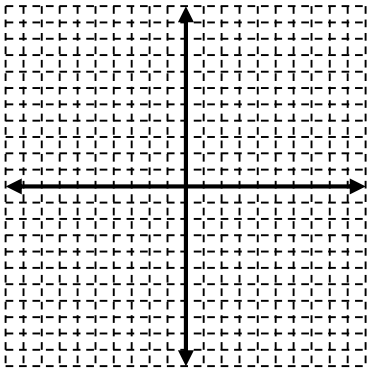
10. $y = B(x + 2) - 1$



Day 11 Homework – Quadratic Systems and Inequalities

Graph each quadratic inequality. Remember to show your work algebraically to receive full credit!

1. $y \le -x^2 + 2x + 3$
2. $y > 3x^2 + 18x + 15$
3. $y \le 4x^2 - 1$

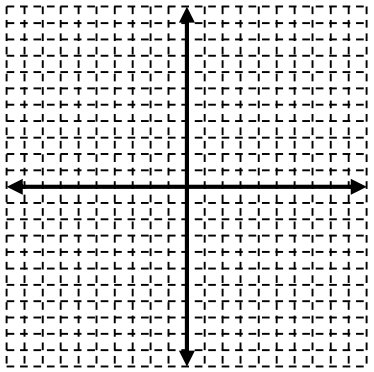
Solving Quadratic Inequalities

Solve each inequality. Express your solution using set notation.

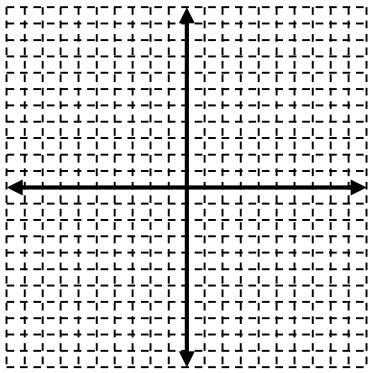
4. $x^2 - x - 20 > 0$
5. $x^2 - 10x + 16 < 0$
6. $x^2 + 4x + 3 \le 0$
7. $9z \le 12z^2$
8. $4t^2 < 9$
9. $9x^2 + 31x + 12 \le 0$
10. $4x^2 + 4x + 1 > 0$
11. $x^2 + 64 \ge 16x$

Solve each system of equations graphically. Remember to show your work algebraically to receive full credit!

12. $y \geq -x^2 - 6x - 5$
    $y \leq -x^2 + 6x$



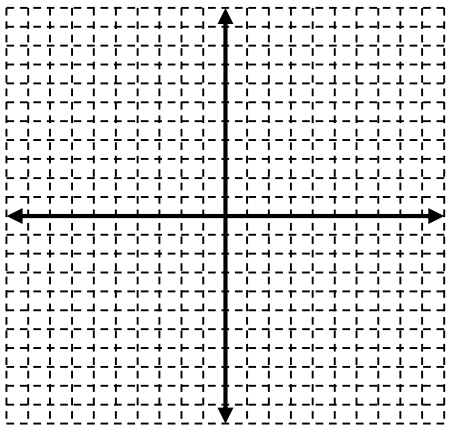
13. $y \geq x^2 - x - 6$
    $y \geq -x^2 - x + 6$



14. Consider the system of equations: $y = 2x^2 + 13x - 15$ and $y = 2x + 25$

    a. Illustrate with a graph what you expect to see.

    b. Find a solution to the system of equations algebraically.



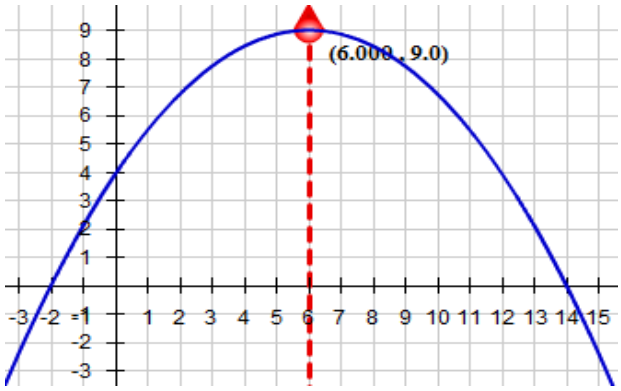
15. Explain how it is possible for a system with a linear equation and a quadratic equation to have no solutions.

Review and Practice – some of these problems are like ones on the Released Final Exam

1. Which one of these is an even function?

   a) $y = x^2 + 4x + 4$ b) $y = x^2 - 4x + 4$ c) $y = x^2 + 7x$ d) $y = x^2$

2. Write Equation of the Parabola in Standard Form. Show ALL work by hand!!



3. A rectangular floor has a rectangular rug on it. The floor's width is 5 feet greater than the floor's length, x. The rug's width is 3 feet less than the floor's width. The rug's length is 6 feet less than the rug's width. Write a function, R(x), in simplified form to represent the area of the floor not covered by the rug.

4. A piece of cardboard that is 14 inches by 18 inches is used to form a box with an open top by cutting away congruent squares with side lengths, x, from the corners. Write an equation y, in terms of x, in standard form to model the surface area of the open box after the corners are cut away.

5. Each year, a local school's Rock the Vote committee organizes a public rally. Based on previous years, the organizers decided that the Income from ticket sales, I(t) is related to ticket price *t* by the equation $I(t) = 400t - 40t^2$. *Cost* C(t) of operating the public event is also related to ticket price *t* by $C(t) = 400 - 40t$.

   a. What ticket price(s) would generate the greatest income? What is the greatest income possible? Explain how you obtained the value you got.

      Ticket price(s) _____ Income _____

   b. For what ticket price(s) would the operating costs be equal to the income from ticket sales? Explain how you obtained the answer.

   c. Which of the following rules would give the predicted profit *P(t)* as a function of the ticket price?

      i. $P(t) = -40t^2 + 440t - 400$
      ii. $P(t) = -40t^2 - 440t - 400$
      iii. $P(t) = -40t^2 - 360t + 400$
      iv. $P(t) = -40t^2 - 360t - 400$
      v. $P(t) = 40t^2 - 440t + 400$

Day 12 Homework – Test Review & Study Guide

Unit 2 Test – Modeling with Quadratics Show ALL work for credit! Use extra paper, if needed.

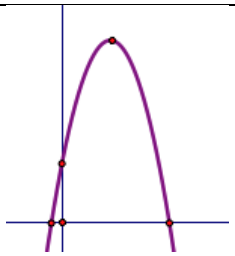
Factor Completely:

1. Factor $x^2+8x+15$ Answer: _____	2. Factor $x^2-11x+24$ Answer: _____
3. Factor x^2+x-12 Answer: _____	4. Factor $3x^2+8x+5$ Answer: _____

Factor And Solve:

5. Solve $(5x-4)(x+3)=0$ Answer: _____	6. Solve $x^2-8x+12=0$ Answer: _____
7. Solve $x^2+12=7x$ Answer: _____	8. The quadratic formula is
9. A quadratic has a. 2 real solutions when _____ b. 1 real solution when _____ c. 0 real solutions when _____	10. Find the exact value of the solution(s) of a. $-4x+3=x^2$ b. $3=3x^2+4x$
11. How many real solutions does each quadratic have? *a.* $y=x^2+x+5$ *b.* $y=x^2+6x+9$ *c.* $y=x^2+6x+8$	12. How many times will a parabola touch the x-axis if its quadratic has a. 2 real solutions _____ b. 1 real solution _____ c. 0 real solutions _____

Graphs of Quadratics

13. Label the graph to show the y-intercept zeros vertex	
14. To find the x-value of the vertex you average the _____.	15. What are two other vocabulary terms for x-intercept?

16. The vertex of $y=-x^2+8x-13$ is at	17. The x-intercepts of $y=x^2+2x-8$ are
18. A parabola opens up (like a smile) if	19. A parabola opens down (like a frown) if
20. Which parabolas will open up? *a.* $y=-x^2+3x-5$ *b.* $y=x^2-3x+5$ *c.* $y=x^2+3x-5$ *d.* $y=-x^2-3x+5$	21. Which parabolas will open down? *a.* $y=-x^2+3x-5$ *b.* $y=x^2-3x+5$ *c.* $y=x^2+3x-5$ *d.* $y=-x^2-3x+5$
22. The y-intercept of $y=-x^2+8x-13$ is	23. Describe how the graph of $y=x^2$ is translated for each equation. *a.* $y=x^2+4$ *b.* $y=x^2-5$ *c.* $y=(x-3)^2$ *d.* $y=3(x+2)^2$ *e.* $y=(x+6)^2+2$

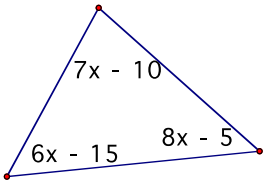
Applications

24. A rocket is launched into the air. Its height, in feet, is given by the equation $h(x)=-16x^2+300x+20$.	The starting height of the rocket is _____. The maximum height is _____. The rocket hits the ground after _____ seconds.
25. Two teenagers throw pennies from the top of the school. The quadratics at the right show how high each penny over time. What are the maximum heights of each penny? When did each penny hit the ground?	Emily: $y=-16x^2+20x+47$ Isaiah: $y=-16x^2+15x+47$
26. You are working as an intern for Isaac Newton. Professor Newton is researching the behavior of gravity. He gathered the data to the right showing the height of a projectile at different times. a. What is the equation of the quadratic that matches the data? b. When will the object hit the ground?	

x	*y*
0	12
1	15
2	16
5	7

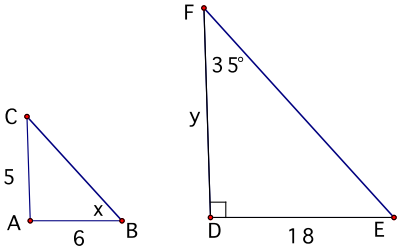
Review from last unit

27. Solve for *x*.



Answer _____

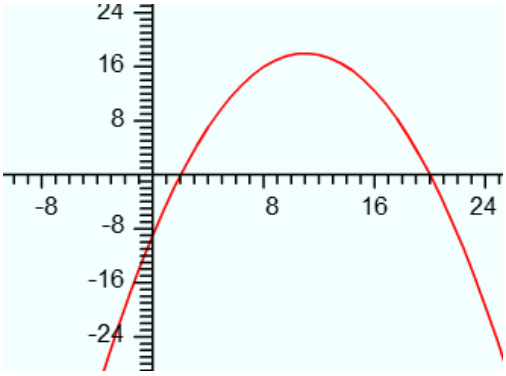
28. In the figure to the right, ΔABC ~ ΔDEF.
What do *x* and *y* equal?



x = _____ *y* = _____

29. Given B is between A and C, AB = 2*x* +9, BC = 4*x* – 7, and AC = 38. Find BC.

30. Write the equation, in standard form, of the parabola in the graph below. The vertex is at (11, 18). Show ALL your work by hand.



_____

31. Meg is building a garden up against one side of her house. She has 150 feet of fencing. Find the dimensions of the dog's pen to maximize the area.

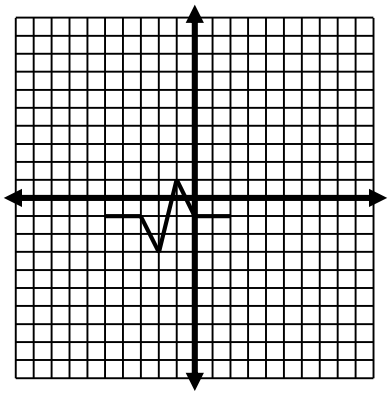
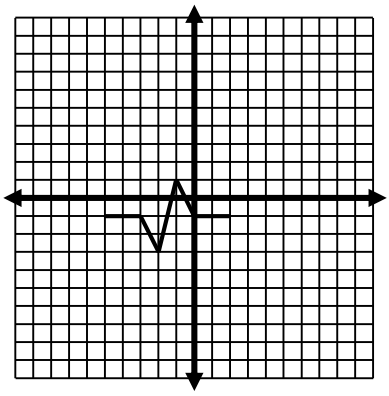
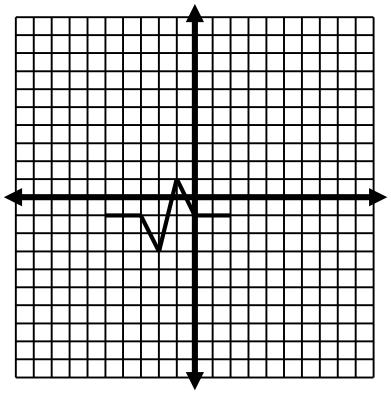
Solve each quadratic inequality. Express your solutions using set notation.

32. $x^2 + 5x \geq 24$

33. $5x^2 + 10 \geq 27x$

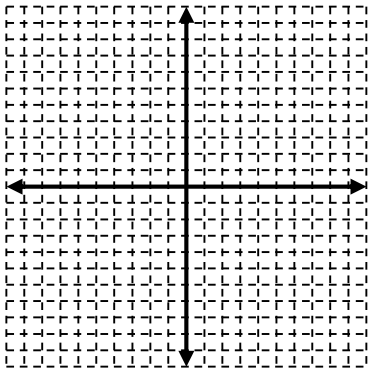
For each of the following, list the effect on the graph of Cardio, C(x), shown below. Then graph the new function.

34. y = C(– x) 35. y = –1/3 C(x) 36. y = C(x + 2) – 5

Graph each quadratic inequality. Remember to show your work algebraically to receive full credit!

37. $y > -x^2 + 4x + 5$ 38. $y \leq x^2 + 6x + 8$



x-intercepts: _____

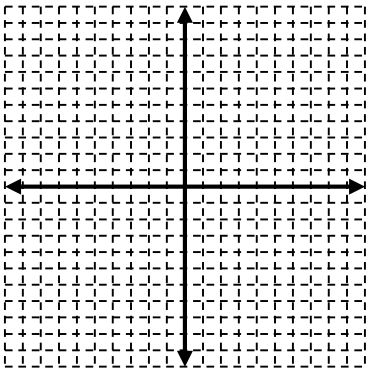
vertex: _____

is vertex a max or min?

_____

y-intercept: _____

AoS: _____



x-intercepts: _____

vertex: _____

is vertex a max or min?

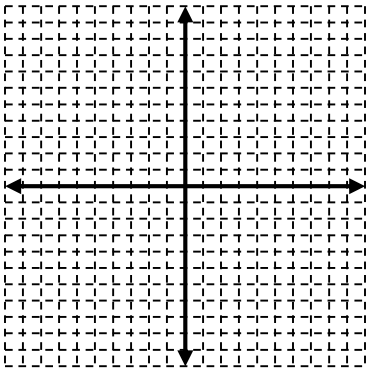
_____

y-intercept: _____

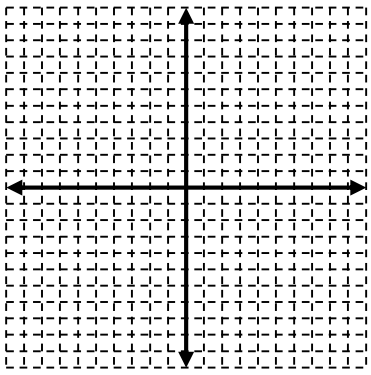
AoS: _____

Solve each system of equations. Remember to show your work algebraically to receive full credit!

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



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



Selected Answers:

1. (x+3)(x+5)
2. (x-8)(x-3)
3. (x+4)(x-3)
4. (3x+5)(x+1)

5. x = 4/5, x = -3
6. x = 2, x = 6
7. x = 3, x = 4

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

9a. $b^2 - 4ac$ is positive
9b. $b^2 - 4ac$ is zero
9c. $b^2 - 4ac$ is negative

10.
a.
$$x = \frac{-4 \pm \sqrt{28}}{2} = \frac{-4 \pm 2\sqrt{7}}{2} = -2 \pm \sqrt{7}$$
b.
$$x = \frac{-4 \pm \sqrt{52}}{6} = \frac{-4 \pm 2\sqrt{13}}{6} = \frac{-2 \pm \sqrt{13}}{3}$$

11a. 0, 11b. 1, 11c. 2
12a. 2, 12b. 1, 12c. 0
14. zeros
15. zero, root
16. (4,3)
17. (-4,0), (2,0)
18. if x^2 is positive
19. if x^2 is negative
20. b and c
21. a and d
22. (0, -13)

23a. up 4
23b. down 5
23c. right 3
23d. 3 times narrower, and left 2
23e. left 6 and up 2

24. starting height = 20 feet
max height = 1426 feet
hits ground in 18.8 sec

25. Emily height 53.25 feet
Isaiah height 50.52 feet
Emily time 2.45 sec
Isaiah time 2.25 sec

26a. $y = -x^2 + 4x + 12$
26b. 6 seconds

27. x = 10
28. x = 55, y = 15
29. BC = 17
30.
y = -18/81x^2+ 44/9x – 80/9
31. 37.5 ft by 75 ft
32. a. $\{x \mid x \le -8 \text{ or } x \ge 3\}$
b. $\{x \mid x \le \frac{2}{5} \text{ or } x \ge 5\}$

Day 13 Homework- Post Test

Exponent Rules Review

Remember to show your work!!

Why is a hill like a lazy young dog?

Complete the problems using the power rules listed to the right. Then, insert the letter beside your answer in the place at the bottom of the page that matches your answer.

$x^6 \bullet x^3 =$ _____ S

$\frac{x^{11}}{x^3} =$ ___ O

$y^0 =$ ___ I

$(x^3)^4 =$ ___ A

$x^{-3} =$ ___ P

$3x^2y \bullet 2xy^3 =$ ___ P

$\frac{x^4}{x^{-7}} =$ ___ S

$\sqrt{72} =$ ___ E

$2^{-4} =$ ___ T

$\sqrt{16x^4} =$ ___ U

$\sqrt[3]{27} =$ ___ I

$(3x^3y^2)^2 =$ _____ L

Power Rules

1.Multiplication

$x^a \bullet x^b = x^{a+b}$

2.Division

$\frac{x^a}{x^b} = x^{a-b}$

3.Power to a Power

$(x^a)^b = x^{a \bullet b}$

4.Zero Exponent

$x^0 = 1$

5.Negative Exponent

$x^{-a} = \frac{1}{x^a}$

1	**$\frac{1}{16}$**	**x^{18}**	**3**	**x^9**	**$6x^2y^3$**	**x^{12}**	**16**	**x^{11}**	**$9x^6y^4$**	**x^8**	**$\frac{1}{x^3}$**	$6\sqrt{2}$	$3\sqrt{8}$	$4x^2$	$6x^3y^4$

EXPONENTS PRACTICE

Simplify the following problems completely. Remember to show your work for credit!

1. $3 \cdot 4^3$
2. $4x^3 \cdot 2x^3$
3. $x^5 \cdot x^3$
4. $2x^3 \cdot 2x^2$
5. $\frac{6^5}{6^3}$
6. $\frac{x^4}{x^7}$
7. 8^0
8. $(-9x)^0$
9. $(v^4)^3$
10. $(x^2 y)^4$
11. $\frac{6x^7}{2x^4}$
12. $\frac{8x^5}{4x^2}$
13. $(2cd^4)^2(cd)^5$
14. $(2fg^4)^4(fg)^6$
15. $\frac{x^5y^6}{xy^2}$
16. $\frac{x^2y^5}{xy^4}$
17. $\left(\frac{4x^5y}{16xy^4}\right)^3$
18. $\left(\frac{5x^3y}{20xy^5}\right)^4$
19. y^{-7}
20. 7^{-2}
21. $\frac{1}{x^{-5}}$
22. $\frac{1}{2^{-4}}$
23. $x^5 \cdot x^{-1}$
24. x^{-6}
25. $x^9 \cdot x^{-7}$
26. $(j^{-13})(j^4)(j^6)$
27. $\frac{x^{-1}}{x^{-8}}$
28. $\frac{52x^6}{13x^{-7}}$
29. $(f^{-3})(f^2)(f^{-3})$
30. $\frac{x^{-4}}{x^{-9}}$
31. $\frac{24x^6}{12x^{-8}}$
32. $\frac{3x^2y^{-3}}{12x^6y^3}$
33. $(2x^3 y^{-3})^{-2}$
34. $\frac{2x^4y^{-4}}{8x^7y^3}$
35. $(4x^4 y^{-4})^3$
36. $5x^2 y (2x^4 y^{-3})$