Unit 9: Quadratics

Name: ________________________________

Goals:

Target A: I can write quadratic functions in standard, vertex, or factored form to model real world and mathematical situations

Target B: I can graph quadratic functions given a table or equation in any form

Target C: I can solve quadratic equations algebraically or graphically

Resources:

http://mrnohner.com/quad.html

Unit Test Date	

Homework	
Page(s)	Problems

Homework Grading	
Homework completed	Grade
100% AND 50% of challenge problems Or unit project	4
75%	3
50%	2
49% or less	1

Most Valuable Retakes	
Retake	Done?
1.	
2.	
3.	

Quadratic Functions Vocabulary

Quadratic Function is a polynomial function with the highest degree of 2 for the variable x. It can be written in the form $y = ax^2 + bx + c$.

Parabola is the graph of a quadratic function.

x-intercepts are the points where the parabola intersects the x-axis.

y-intercept is the point where the parabola intersects the y-axis.

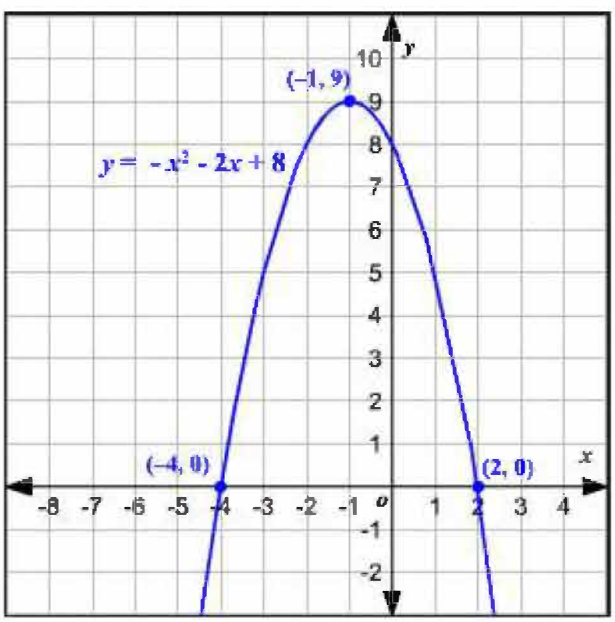
Vertex of a parabola is the highest or the lowest point on the graph.

Axis of Symmetry is the vertical line that passes through the vertex and divides the parabola into two mirror images.

Standard form of a quadratic function: $y = ax^2 + bx + c$

Intercept form of a quadratic function is $y = a(x - p)(x - q)$; where p and q are the x-intercepts.

Vertex form of a quadratic function is $y = a(x - h)^2 + k$; where (h, k) is the vertex of the parabola.



x-intercepts: ________________________

y-intercept: __________________________

Vertex: ______________________________

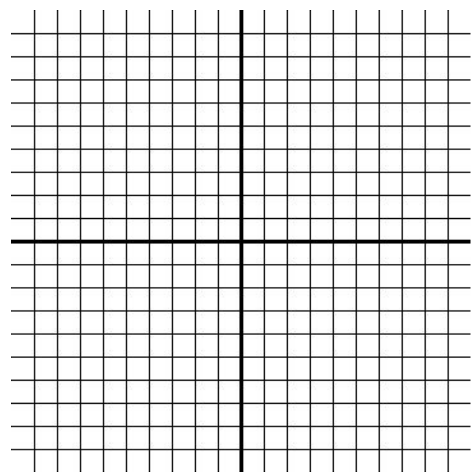
Axis of Symmetry: ____________________

Standard form: _______________________

Intercept form: _______________________

Vertex form: _________________________

SKILLS CHECKLIST

I can use double distribution (FOIL) to simplify quadratic expressions. 1) Multiply the first term in each set of parentheses, then the outside terms, then the inside terms, then the last terms. This is the same as distributed each term. 2) Now you should have 4 terms, combine any that are like terms.	$(3x - 4)(2x + 9)$
I can graph a quadratic function and identify the vertex, axis of symmetry, x-intercepts and y -intercepts. 1) The axis of symmetry is the vertical line that cuts right down the middle of the parabola. 2) The vertex is the point where the parabola turns around. So it is the highest point or the lowest point depending on if it opens up or down. 3) The x -intercepts are located where the parabola crosses the x-axis. You could have 0,1, or 2 of them with parabolas. 4) The y-intercept is where the parabola crosses the y-axis. It is also the c-value.	$y = 2x^2 -4x - 6$ 

SKILLS CHECKLIST

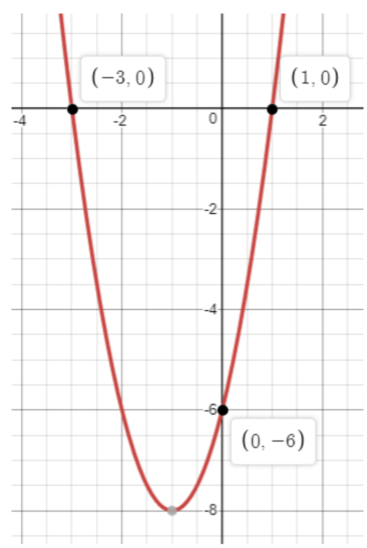
I can factor a quadratic expression. 1) If there is not a number in front of your x^2 term (so a coefficient of 1): a) We need to find values that multiply to "C" and add up to "B". b) Create a list and find the two numbers that achieve this. c) Those two numbers go in the parenthesis with x in our factored form. FOIL the expression out to confirm your answer. 2) If there is a number in front of your x^2 term: a) We need to find values that multiply to "A*C" and add up to "B". b) Create a list and find the two numbers that achieve this. c) Those two numbers goes in the parenthesis with the "Ax" value. d) Divide to reduce in either parenthesis to get your final answer. e) FOIL to confirm your result.	$x^2 - 2x - 8$ $x^2 - 64$ $2x^2 - 13x - 7$
I can solve quadratic equations by factoring. 1) Get one side equal to zero. 2) Factor the expression 3) Split into two equations that are equal to zero and solve each one separately.	$x^2 + 4x - 27 = 5$
I can solve quadratic equations using the Quadratic Formula. 1) Get one side equal to zero. 2) Find your A, B, and C values. Plug them into the Quadratic Formula. 3) Evaluate the expression	$x^2 + 4x - 27 = 5$

SKILLS CHECKLIST

<table>
<tr><td>I can calculate the axis of symmetry and the vertex of a parabola from an equation.

1) Find the axis of symmetry which is -b/2a. This will tell you the location of your vertex.
2) Plug that value in for the "x's" in your equation. This will tell you the height of your vertex.</td><td>$y = 2x^2 - 4x - 6$</td></tr>
<tr><td>I can write a quadratic equations.</td><td>Rewrite y = ½(4x+2)(5x-2) in <u>standard quadratic form</u>.

What is the equation of the line in <u>vertex form</u> that has a vertex at (8,5) and passes through the point (12,85)

Write the quadratic equation in <u>factored form</u>

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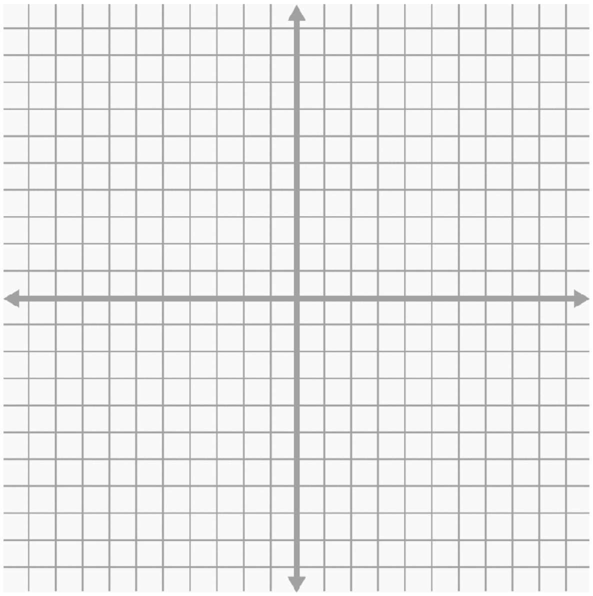
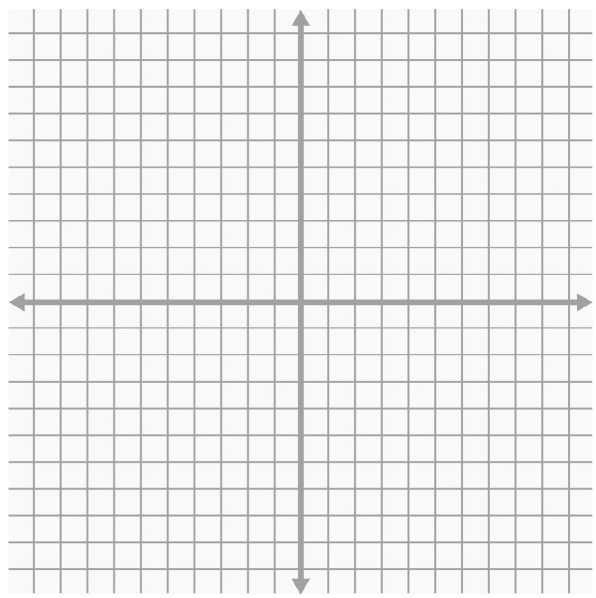
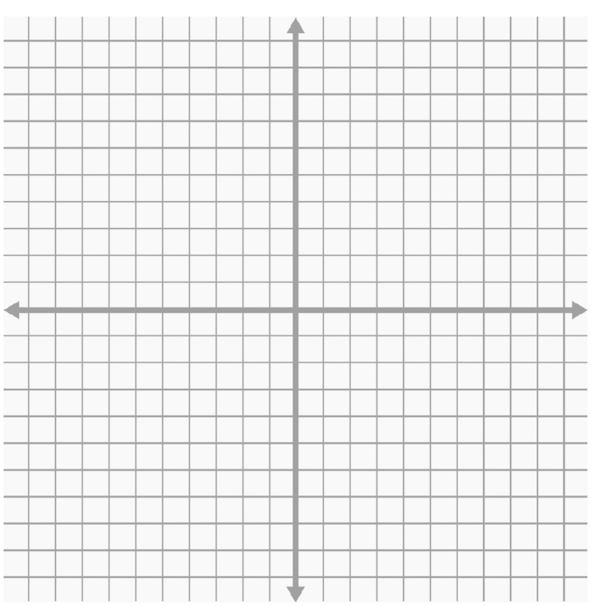
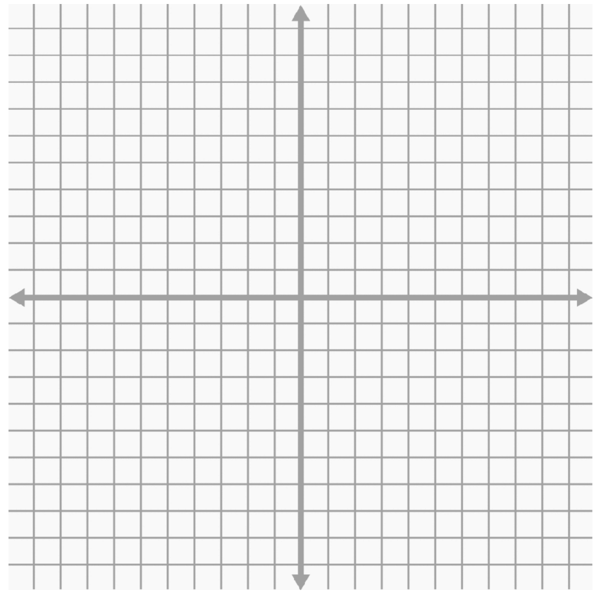
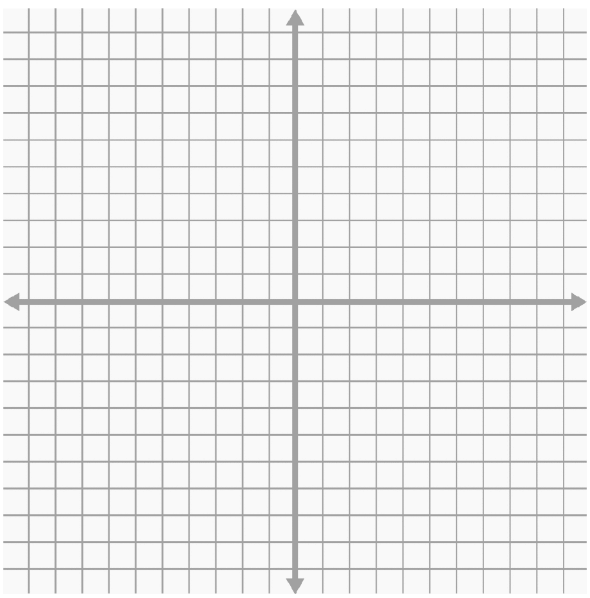
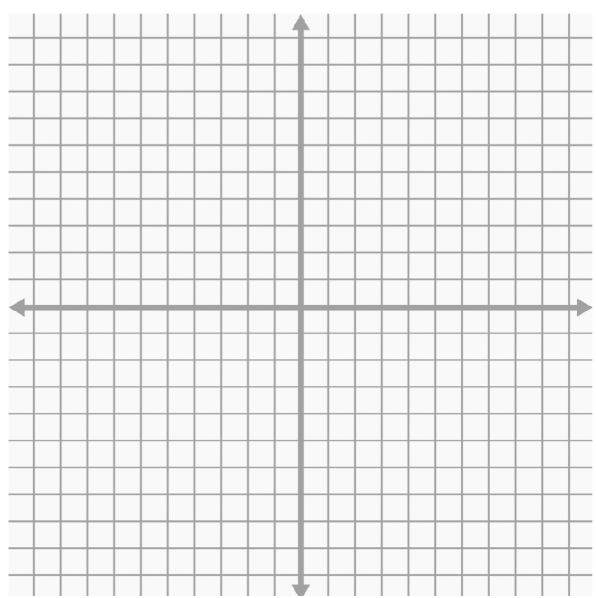


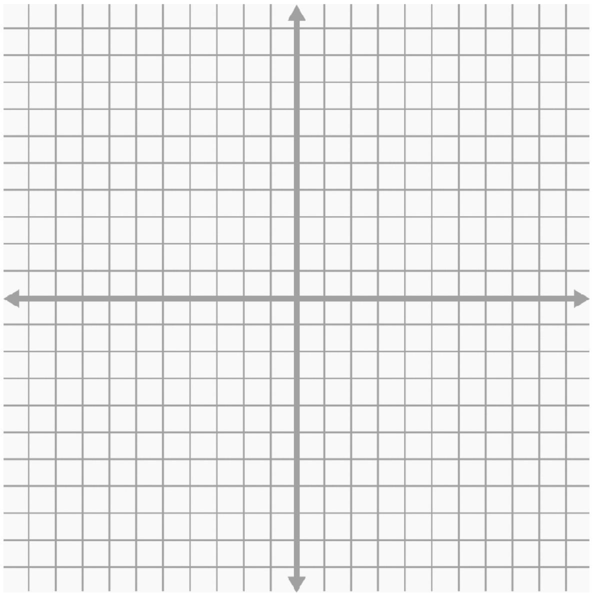


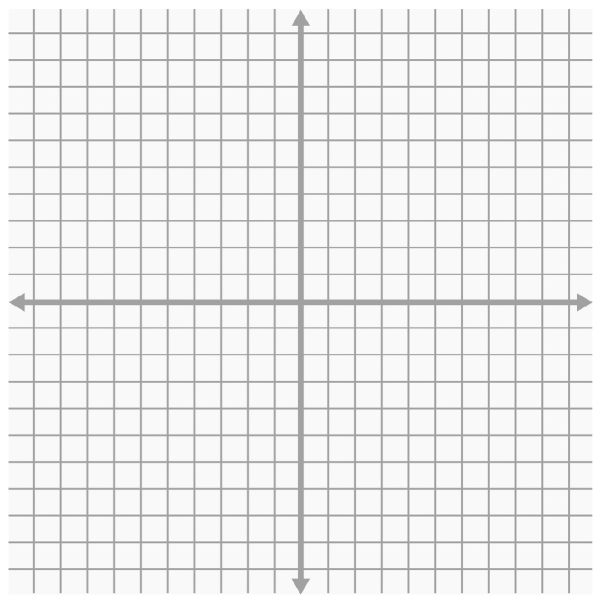


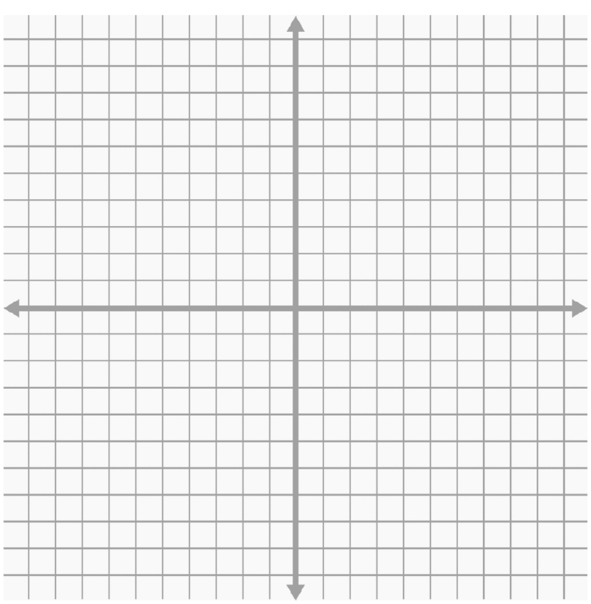


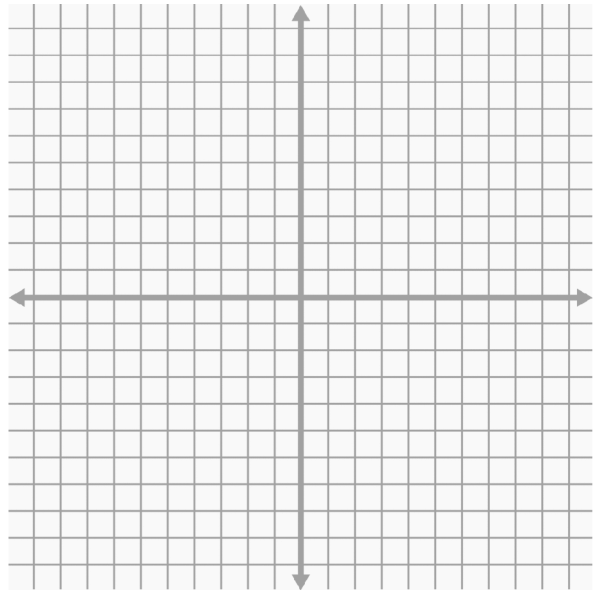


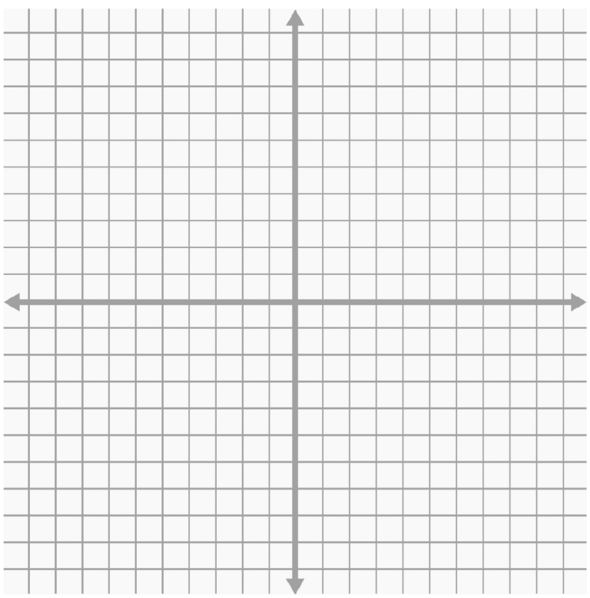


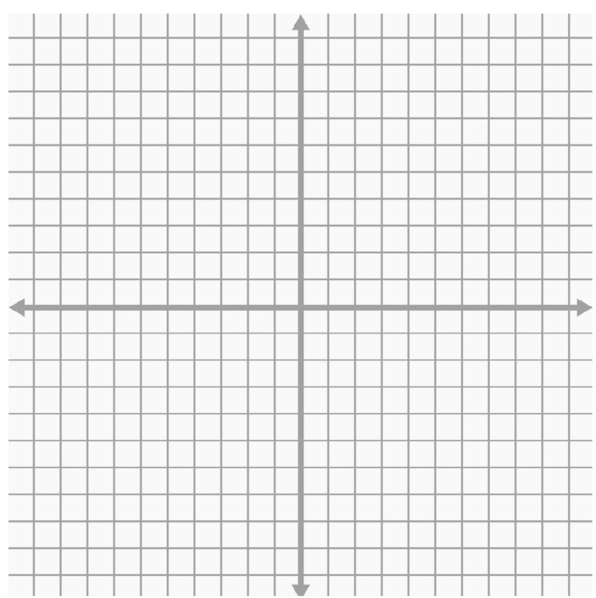












Multiplication Table - 20x20

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
1	**1**	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2	2	**4**	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
3	3	6	**9**	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
4	4	8	12	**16**	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
5	5	10	15	20	**25**	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
6	6	12	18	24	30	**36**	42	48	54	60	66	72	78	84	90	96	102	108	114	120
7	7	14	21	28	35	42	**49**	56	63	70	77	84	91	98	105	112	119	126	133	140
8	8	16	24	32	40	48	56	**64**	72	80	88	96	104	112	120	128	136	144	152	160
9	9	18	27	36	45	54	63	72	**81**	90	99	108	117	126	135	144	153	162	171	180
10	10	20	30	40	50	60	70	80	90	**100**	110	120	130	140	150	160	170	180	190	200
11	11	22	33	44	55	66	77	88	99	110	**121**	132	143	154	165	176	187	198	209	220
12	12	24	36	48	60	72	84	96	108	120	132	**144**	156	168	180	192	204	216	228	240
13	13	26	39	52	65	78	91	104	117	130	143	156	**169**	182	195	208	221	234	247	260
14	14	28	42	56	70	84	98	112	126	140	154	168	182	**196**	210	224	238	252	266	280
15	15	30	45	60	75	90	105	120	135	150	165	180	195	210	**225**	240	255	270	285	300
16	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	**256**	272	288	304	320
17	17	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	**289**	306	323	340
18	18	36	54	72	90	108	126	144	162	180	198	216	234	252	270	288	306	**324**	342	360
19	19	38	57	76	95	114	133	152	171	190	209	228	247	266	285	304	323	342	**361**	380
20	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	**400**

THE ADAMS BROTHERS

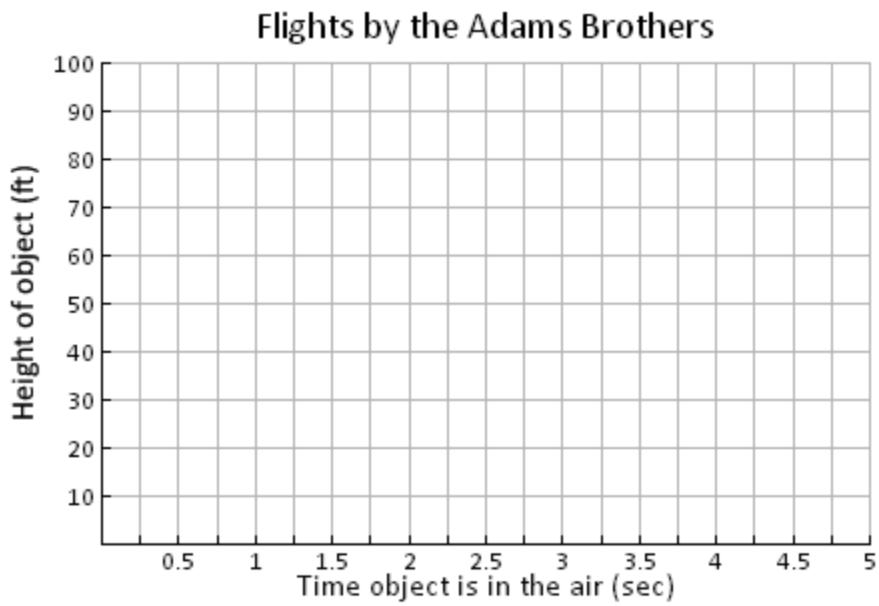
The Adams brothers are renowned for their physical strength and amazing athleticism. The four brothers decided to have a little contest between them. Each was to throw, shoot, or hit an object into the air. So Chris, Gregory, Pete, and Scott each chose their own object and the place from where they would launch them.

The following equations model the flight of each of the four objects.

$y_1 = -16x^2 + 32x + 20$
$y_2 = -16x^2 + 64x + 20$
$y_3 = -16x^2 + 50x + 50$
$y_4 = -16x^2 + 80x + 0$

Using the aid of your graphing calculator, plot each function on the grid provided.

(Hint: setting your table with steps of 0.25 will give you good data to plot.)



Using the clues below, determine what equation belongs to each brother as well as the object and their age order. Be prepared to share the reasoning you used.

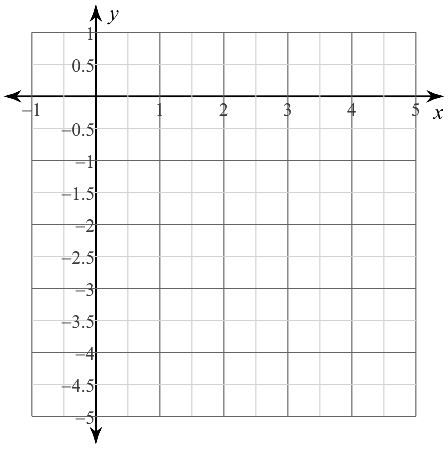
a. The youngest launched his object from atop the garage.
b. Scott climbed a tall tree to launch his object.
c. Chris's object went the highest.
d. Pete's object was in the air the shortest amount of time.
e. The arrow was shot by the oldest.
f. The golf ball went 100 feet into the air.
g. Scott shot his arrow higher than the tennis and bowling balls.
h. The bowling ball reached its maximum height at 1 second.
i. Chris's ball was in the air twice as long as the 2nd oldest brother.
j. The objects of the youngest brothers were each in the air for more than 4 seconds.

Brother	Age Order	Object
Pete		
Gregory		
Chris		
Scott		

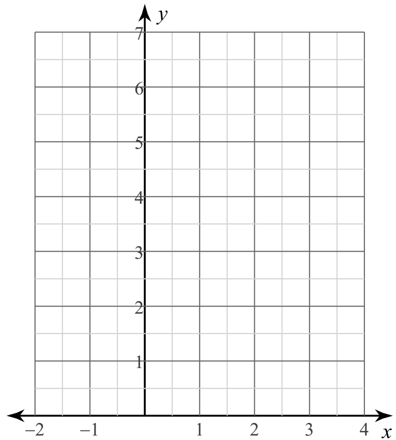
Graphing/Labeling Quadratics

Sketch the graph of each function. Make sure to label the X-intercepts, Y-intercept, Vertex, and Axis of Symmetry for each problem.

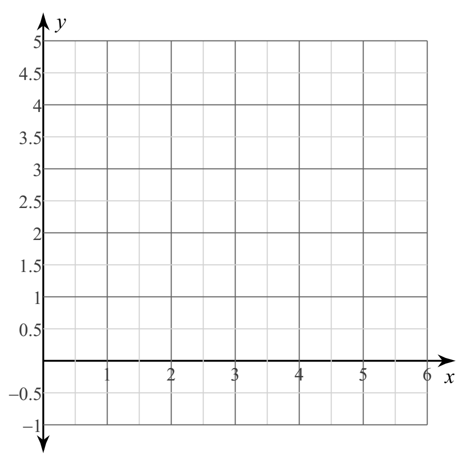
1) $y = x^2 - 4x$



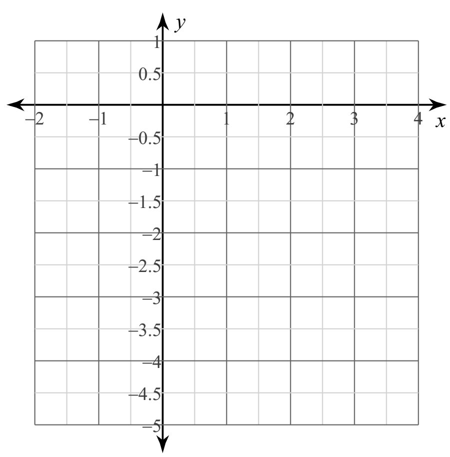
2) $y = x^2 - 2x + 3$

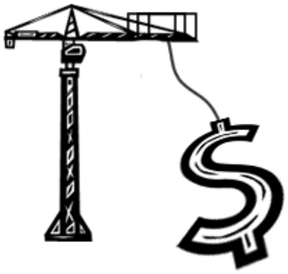


3) $y = -x^2 + 6x - 5$



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



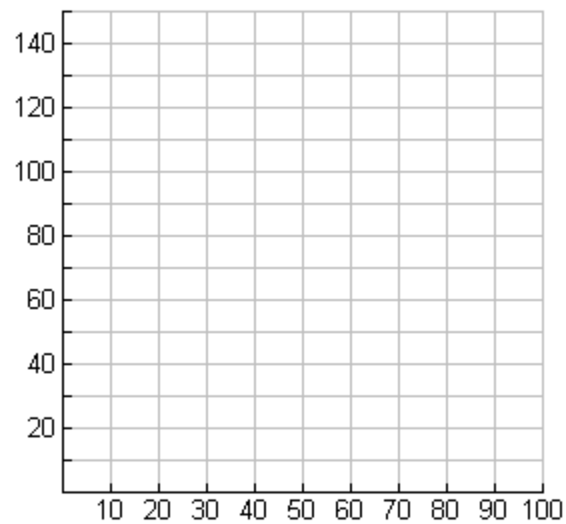


Bungee Profits

Jenna runs a bungee jumping company. She wants to make as much money as possible in her business. She collected some data to see what people might be willing to pay. The following table shows her data.

"How much would you be willing to pay to bungee jump?"						
price to jump ($)	5	15	25	30	50	75
# of people willing to jump	110	96	83	75	46	5

(data collected by randomly polling 150 people from the community)



1. Plot the data on the grid provided to the right.
   (Be sure to complete the graph with all important features.)

2. Draw in what you think is the best linear model (a straight line) for this data.

3. Write an equation for your line of best fit.

4. Using your model, answer the following:

   a. How many people would jump if it were free?

   b. What price is so high that nobody will jump?

   c. How many people would jump if each jump costs $20?

5. Jenna knows that the money she can collect (her income) will vary depending on how many people jump.

   a. If 110 people are willing to pay $5 to jump, what would her income be?

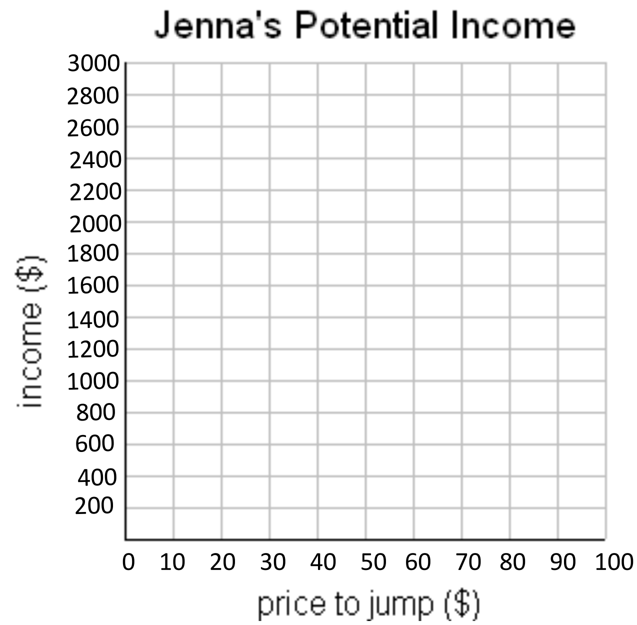
   b. Complete the table below to show Jenna's potential income.

price to jump ($)	5	15	25	30	50	75
# of people willing to jump	110	96	83	75	46	5
Income ($)	550					

   c. Using your model from #2, complete this table showing a more detailed look at the relationship between *price to jump* and *income*.

price to jump ($)	0	10	20	40	60	70	80
# of people willing to jump							
Income ($)							

d. Plot the *price to jump* versus *income* data on the grid. (You should have at least 13 data points.)



6. Let's find an equation that fits your model.

a. First our variables. Using what you have in your *Income* vs. *Price to Jump* graph, define the following.

- Let x = ____________________________
- Let y = ____________________________

b. When you completed the table to show Jenna's potential income, you multiplied two things together.

price to jump ($)	5	15	25	30	50	75
# of people willing to jump	110	96	83	75	46	5
Income ($)	550	1440	2075	2250	2300	375

$25 \cdot 83 = 2075$

Fill in the blank: Every time you found that "*Income = price to jump* · ___________________________ "

c. Now for the rule. Fill in the missing parts below to find a rule for your model.

"*Income = price to jump* · ___________________________ "

y = · ( )

Hint: Look back at your equation in #3 that you wrote to describe *# of people willing to jump*.

6. Try to expand your rule to see the x^2 term of your quadratic model.

Factored Form	Expanded Form
$y = x\,(100 - x)$	$y = 100x - x^2$

DANGER DAN

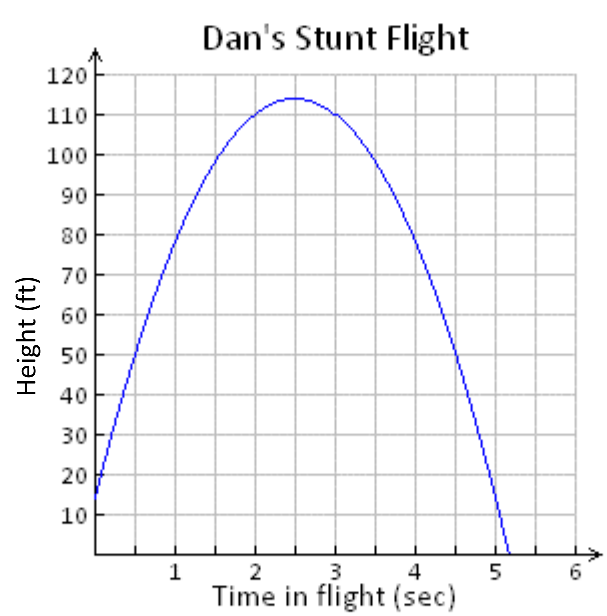
In this activity we will solve problems in various situations by using graphs and tables.

SITUATION 1. Danger Dan was shot out of a cannon. The equation $y = -16t^2 + 80t + 14$ models his height, *h*, in feet above the ground after being in the air for *t* seconds.

t	*y*
0	
0.5	
1	
1.5	
2	
2.5	
3	
3.5	
4	
4.5	
5	
5.5	

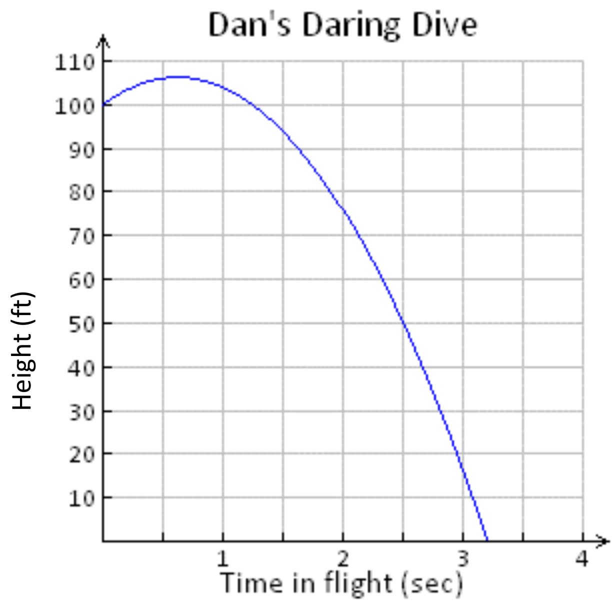
1. Complete the table to the right using your calculator for help.
2. Using your table, answer the following.
    a. How high in the air is Dan at *t* = 2 seconds?
    b. At what time do you think Dan hits the ground?
    c. When is Dan exactly 50 feet above the ground?
    d. When is Dan more than 50 feet above the ground?
    e. When is Dan less than 100 feet above the ground?
    f. What is the value when t = 3.5? What does that mean?
    g. When is *y* = 98? What does that mean?

3. Using the graph to the right, answer the following.
    a. How high in the air is Dan at *t* = 3 seconds?
    b. At what time do you think Dan hits the ground?
    c. When is Dan exactly 110 feet above the ground?
    d. When is Dan more than 110 feet above the ground?
    e. When is Dan less than 75 feet above the ground?
    f. What is the value for *at* t = 4? What does that mean?



SITUATION 2. Danger Dan dove off a super high dive. The equation $y = -16t^2 + 20t + 100$ models his height, *h*, in feet above the water after being in the air for *t* seconds.

t	*y*
0	100
0.25	104
0.5	106
0.75	106
1	104
1.25	100
1.5	94
1.75	86
2	76
2.25	64
2.5	50
2.75	34
3	16
3.25	-4



1. Using the table or the graph above, answer the following.
   a. When was Dan 100 feet above the water?

   b. When was Dan more than 100 feet above the water?

   c. When was Dan at least 80 feet above the water?

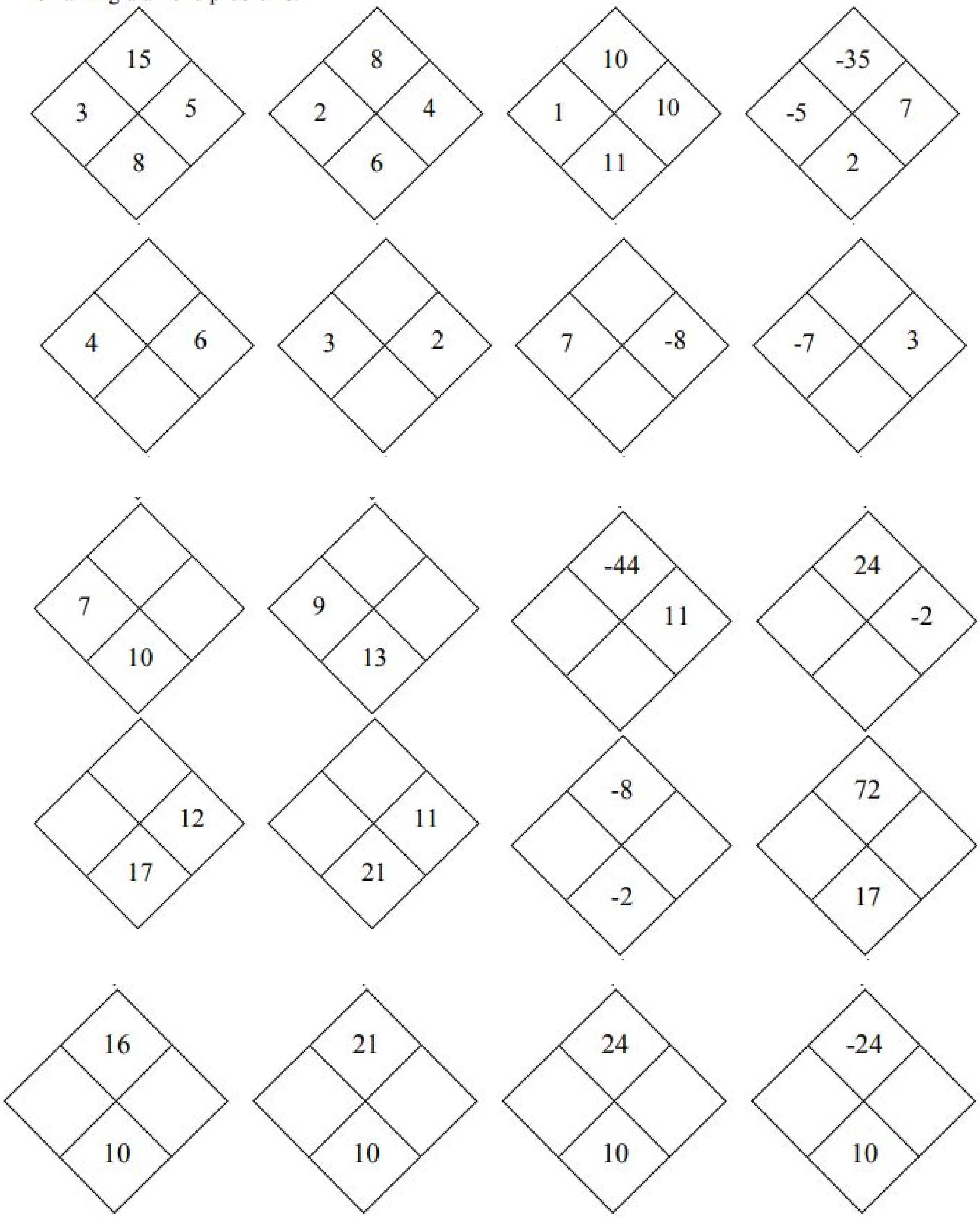
   d. How long until Dan hit the water?

2. Explain how someone could use the table to determine when Dan was 50 feet above the water.

3. Explain how someone could use the graph to determine when Dan was 50 feet above the water.

4. Which do you like better to use in determining when Dan was 50 feet above the water? Why?

Directions: Study the first four diamonds to figure out the pattern. Use that pattern to complete the remaining diamond problems.



FOILing and Factoring

Find each product.

1) $(7x-8)(3x-8)$

2) $(6x-5)(6x-2)$

3) $(a-4)(7a-7)$

4) $(5v+3)(5v+7)$

5) $(7b+1)(6b+3)$

6) $(3r-7)(2r-5)$

7) $(8v+8)(6v-2)$

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

Factor each completely.

9) $m^2 - 2m - 15$

A) $(m + 6)(m + 2)$
B) $(m + 9)(m + 5)$
C) $(m + 5)(m - 3)$
D) $(m - 5)(m + 3)$

10) $m^2 - m - 20$

A) $(m + 4)(m - 5)$
B) $(m + 10)(m + 8)$
C) $(m - 4)(m - 5)$
D) $(m + 4)(m + 2)$

11) $x^2 + 6x + 5$

12) $x^2 + 15x + 54$

13) $m^2 - 5m - 36$

14) $k^2 + 3k - 10$

15) $k^2 - 9k + 8$

16) $k^2 - 4k - 32$

Factoring when "a" doesn't equal 1

Find each product.

1) $(3r + 6)(r - 1)$

2) $(6m + 5)(4m + 4)$

Factor each completely.

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

4) $x^2 + x - 30$

5) $x^2 + 3x - 70$

6) $x^2 + 8x - 9$

7) $5x^2 + 14x - 3$

8) $2x^2 + x - 6$

9) $2x^2 - 7x + 5$

10) $3x^2 + 2x - 5$

Solving By Factoring

Solve each equation by factoring.

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

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

3) $x^2 - 6x + 8 = 0$

4) $x^2 + 6x - 7 = 0$

5) $x^2 - 4x + 12 = 3x$

6) $9x^2 - 21 = 4x + 8x^2$

7) $-6x^2 + 9x = -14 - 7x^2$

8) $6x^2 + 6x + 9 = 5x^2$

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

10) $2x^2 - 3x + 1 = 0$

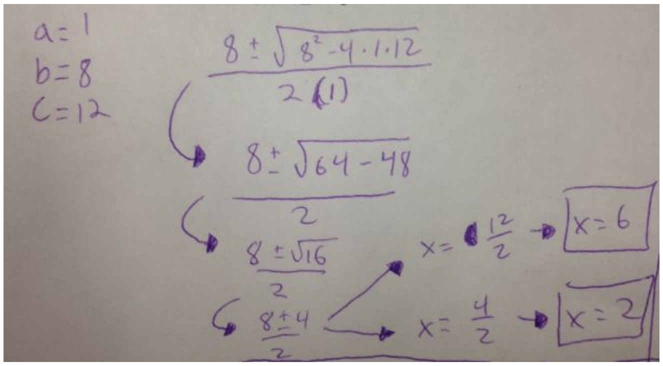
11) $4x^2 = -8x - 3$

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

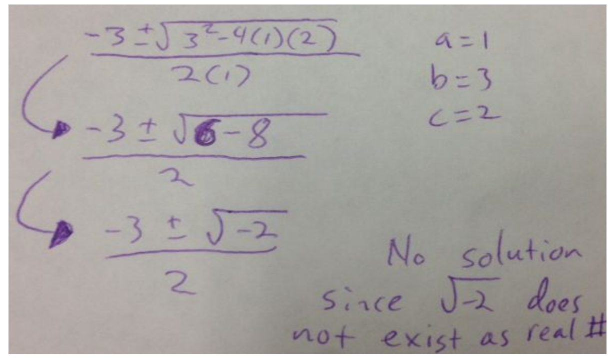
The Quadratic Formula

For each: **Circle the mistake**, **Describe the mistake**, **Correct the mistake**
(this means only fixing where they had an error, not finishing the whole problem).

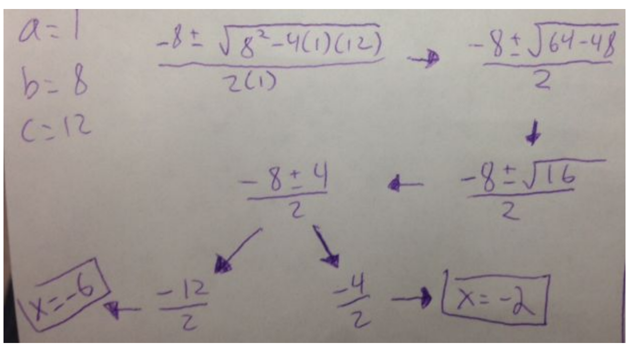
1) $x^2+8x+12 = 0$



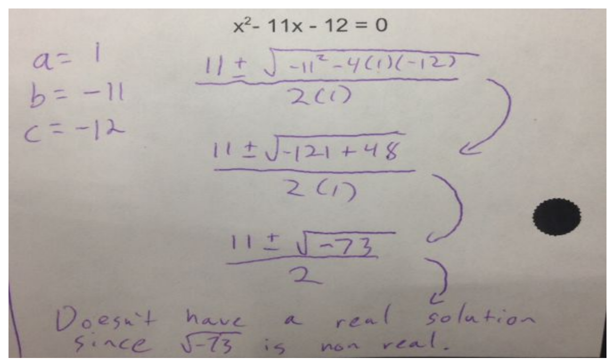
2) $x^2+3x+2 = 0$



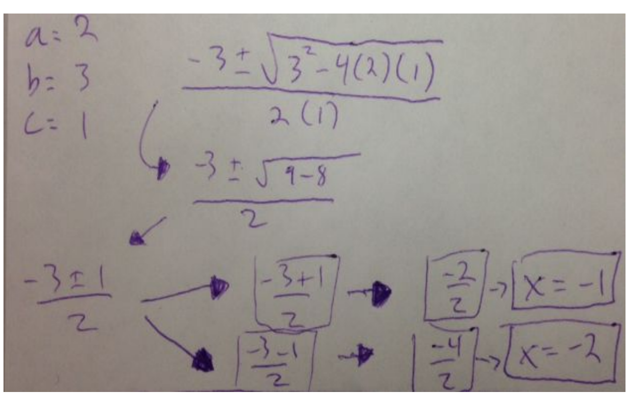
3) $x^2+8x = 12$



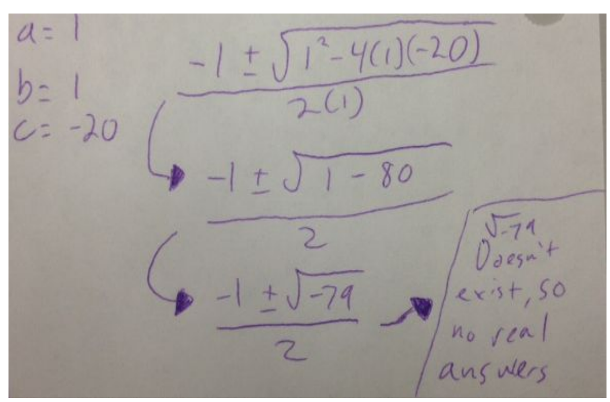
4) $x^2- 11x - 12 = 0$



5) $2x^2+3x+1 = 0$



6) $x^2 + x - 20 = 0$



The Quadratic Formula

Your turn! Solve following problems using the *Quadratic Formula*:

7) $2x^2 - 12x + 16 = 0$

8) $x^2 + 6x - 7 = 0$

9) $2x^2 + 8x = -8$

10) $x^2 + 2x + 18 = -4x + 1$

Graphing Quadratic Functions in
Standard Form, Vertex Form, and Factored Form

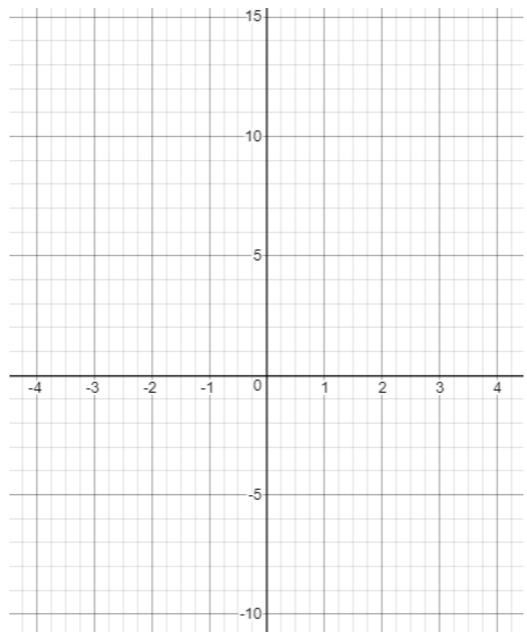
Part 1: Standard Form

Steps: Make a table, make sure you find the vertex so you have some values on either side. Then plot the points.

---

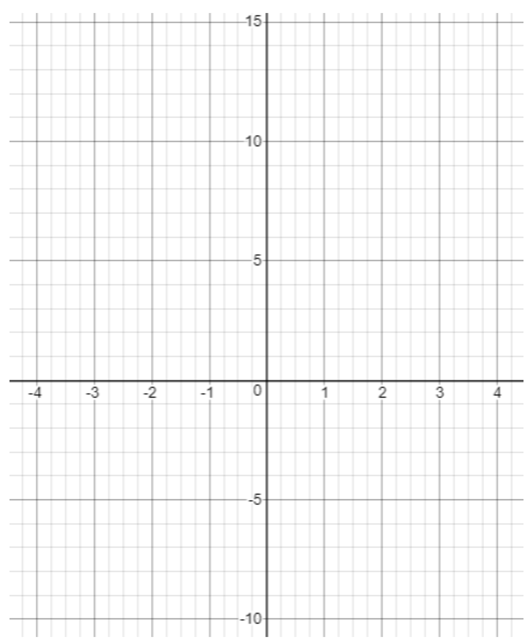
1) $f(x) = 3x^2 - 6x - 4$

x	y



2) $y = -5x^2 - 10x + 9$

x	y

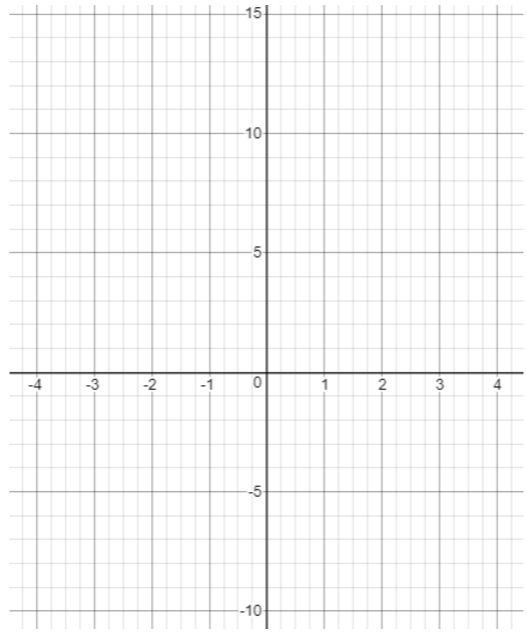


Part 2: Vertex Form

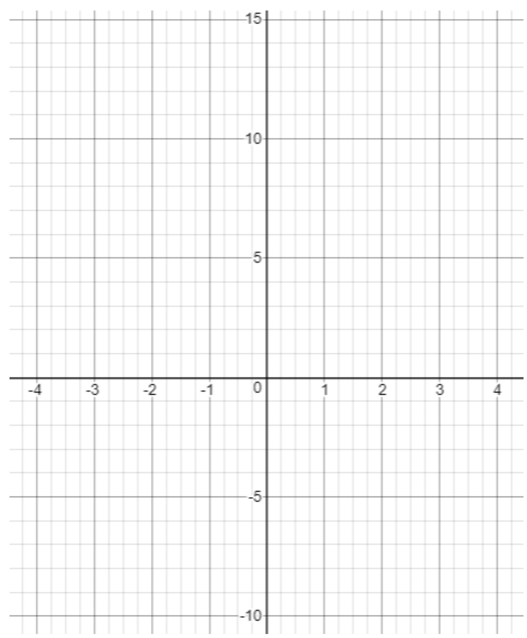
Steps: Find the vertex and plot it. Plug in points on either side to find the shape

---

3) $g(x) = 3(x - 1)^2 + 5$ Vertex = (,   )



4) $P(x) = -3(x + 2)^2 + 5$ Vertex = (,   )



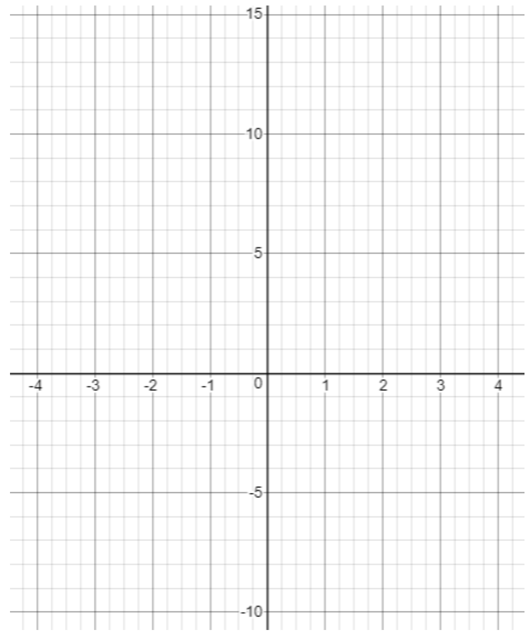
Part 3: Factored Form

Steps: Find the x intercepts and plot them. Plug in points on either side to find the shape

---

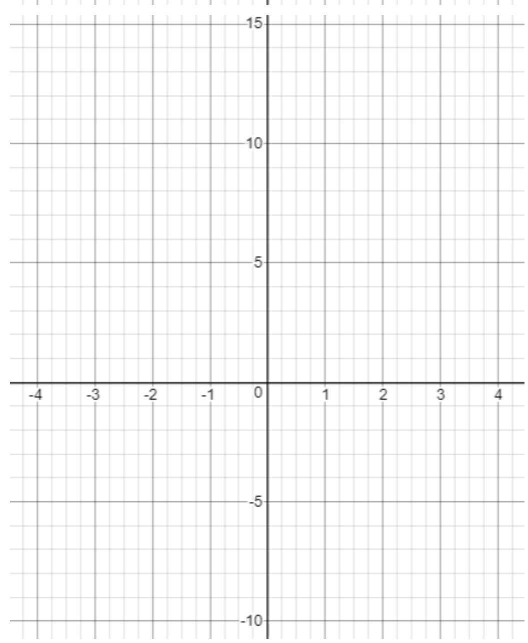
5) $y = \frac{1}{2}(x - 2)(x + 4)$

x-intercepts
(,   ) and (,   )



6) $L(x) = -3(x - 1)(x - 3)$

x-intercepts
(,   ) and (,   )

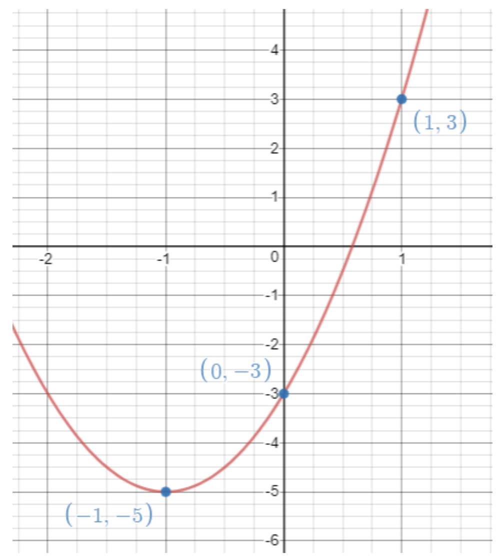


Writing Equations In Different Forms

Part 1: Writing In Vertex Form:

1) What is the equation of the parabola that has a vertex at (9,1) and passes through the point (5,33)

2) What is the equation of the parabola that passes creates this graph.



Writing Equations In Different Forms

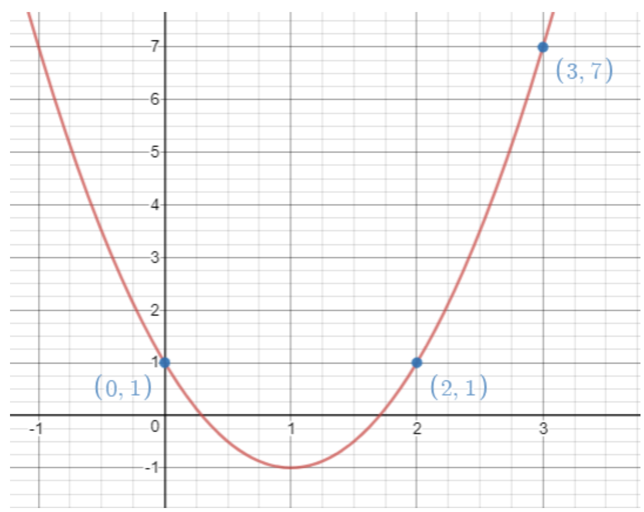
Part 2: Writing In Standard Form:

3) Convert $y = 3(x - 7)(2x + 1)$ to standard form.

4) Convert $p(x) = 5(x + 2)^2 - 9$ to standard form.

5) Write in standard form.

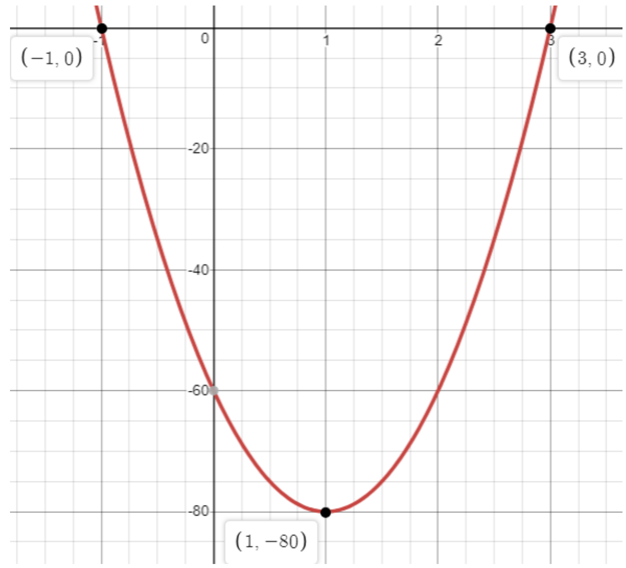
Remember, you will need to find the c value first, then plug in the other two points and solve a systems of equations to find the a and b value.



Writing Equations In Different Forms

Part 3: Writing In Factored Form:

6) What is this equation in factored form?



7) Convert $g(x) = x^2 - 4x - 5$ to factored form.

8) Convert $y = 4x^2 + 4x - 24$ to factored form.

Projectile Packet

Part I:

If Frank jumps on Earth it is modeled by the following equation: $y= -16x^2 + 15x + 10$ where the -16 is the power of Earth, 15 is the power of his jump (in feet per second), and 10 is his starting height (like a ten foot ladder).

1) If someone jumped according to this equation $y = -16x^2 + 15x + 0$ what changed from Frank's jump? Describe what those changes mean.

2) Sarah decides to go on her trampoline and test her hang time. She times how long it takes her between jumps and creates an equation: $y = -16x^2 + 32x + 0$.

    a) Find the <u>Axis of Symmetry</u> of her jump. Show work leading to your answer.

    b) Find the <u>Vertex</u>. Show work leading to your answer.

    c) What does the <u>Vertex</u> mean in this problem?

3) The record base jump is from 4,000 feet off the ground from Burj Khalifa (the tallest building in the world). What if Sarah jumped from there instead of from the ground?

    a) What would change about her jump from the original equation of $y= -16x^2 + 32x + 0$

    b) How long before she hits the ground? Use your calculator to find an estimate.

Projectile Packet

Part II:

The B value is important in determining how long an object is in the air because it is the speed the object was shot in feet per second. See how good of a jumper you by jumping recording how long you are in the air. Then match it to the most appropriate “b” value.

<u>HINT:</u>
Use a stopwatch to get an accurate measurement.

Hang Time (seconds)	B value for the equation
.25	4
.375	6
.5	8
.625	10
.75	12
.875	14
1	16

1) The equation that models our group member jumping is $y= -16x^2 + \_\_x+ 0$

Now, pick one of the following planets (or moon) and replace the a value in your equation.

Planet/Moon	“a” value
Moon	-1.6
Pluto	-0.7
Mars	-6.2

2) Our new equation is $y = \_\_\_\_x^2 + \_\_\_\_x + 0$
   a) Take a guess: Our “a” value decreased, how do you expect our max height to change? Why do you think that?
   b) Find the <u>Axis of Symmetry</u>. Show work leading to your answer.
   c) Find the <u>Vertex</u> (How high you could actually jump on that planet). Show work leading to your answer.

Projectile Packet

Part III:

NASA shoots of a rocket that is modeled by the function $y = -16x^2 + 500x + 10$.

1) What do you think the 10 means in this situation?

2) If you found your x-intercepts in this situation what would they mean in terms of the rocket?

3) Which equation is correct for finding the x- intercepts:

   $0 = -16x^2 + 500x + 10$ or $y = -16(0)^2 + 500(0) + 10$.

4) Solve using the quadratic formula (show work).

The Prequel To The Practice Test: The Skills You Need

Foil the following expressions

1. $(3x - 1)(x + 5)$

2. $(2x - 5)(2x + 5)$

Factor the following quadratic expressions

3. $x^2 - 15x + 36$

4. $x^2 - x - 56$

5. $x^2 - 121$

6. $8x^2 + 10x - 3$

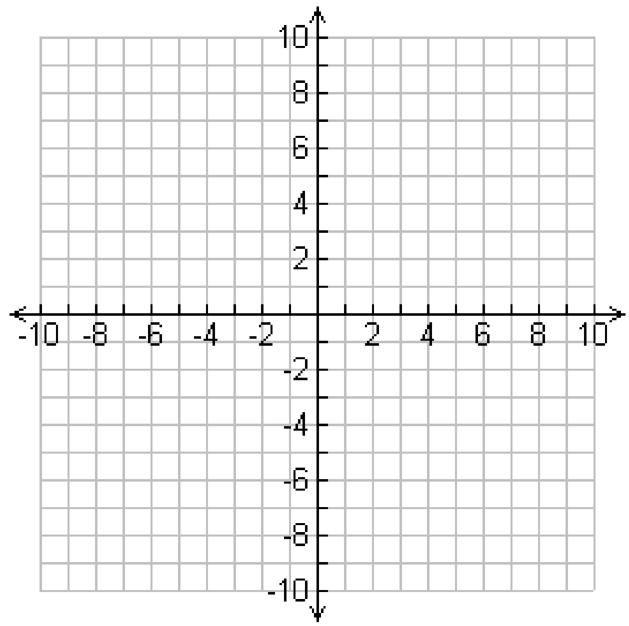
7. Solve the following equation by factoring: $x^2 + 16x - 6 = 5x - 30$

Solve the following equations with the Quadratic Formula.

8. $x^2 - 3x + 1 = 11$

9. $2x^2 + 5x + 12 = 9x$

10. Graph the following parabola, $y = \frac{1}{2} x^2 - 3x + 4$



Make sure to label the:

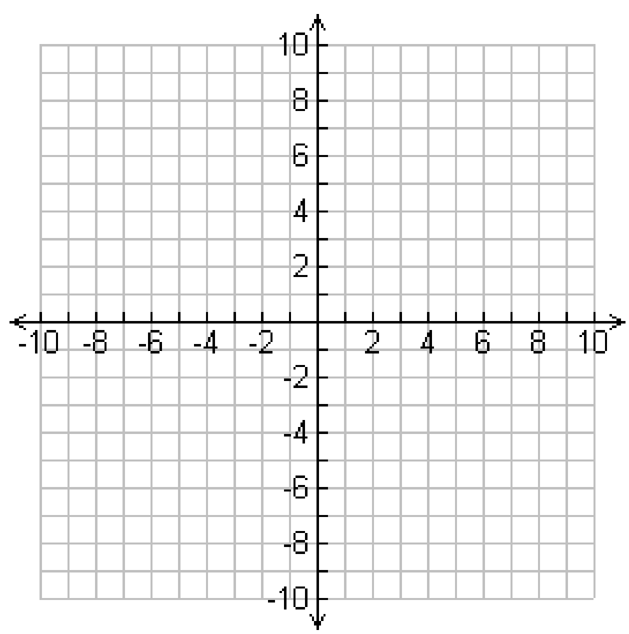
a. Vertex

b. Axis of symmetry

c. Y-intercept

d. X-intercepts.

11. Graph the following parabola, $y = -2(x-1)(x+3)$



Make sure to label the:

b. Vertex

c. Axis of symmetry

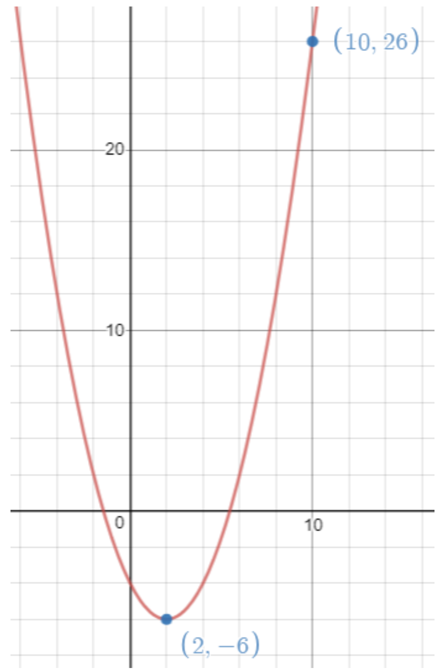
d. Y-intercept

e. X-intercepts.

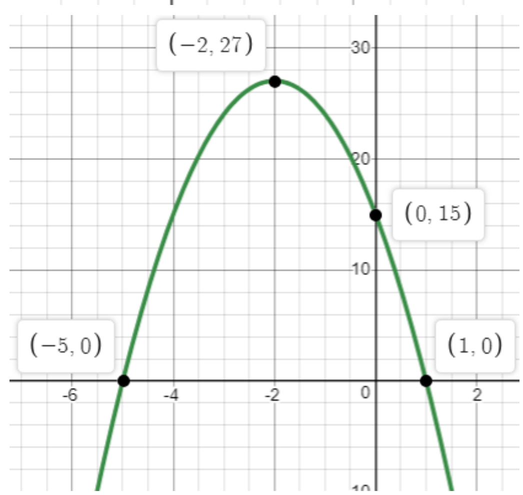
Quadratics Practice Test

Target A: I can write quadratic functions in standard, vertex, or factored form to model real world and mathematical situations

1) What is the equation of the quadratic function that made this graph in *vertex form*?



2) What is the equation of the quadratic function that made this graph in *factored form*?



3) Convert $y = 15(x-3)(2x+3)$ to *standard form.*

4) Convert $y = -2(x-3)^2 + 9$ to *standard form.*

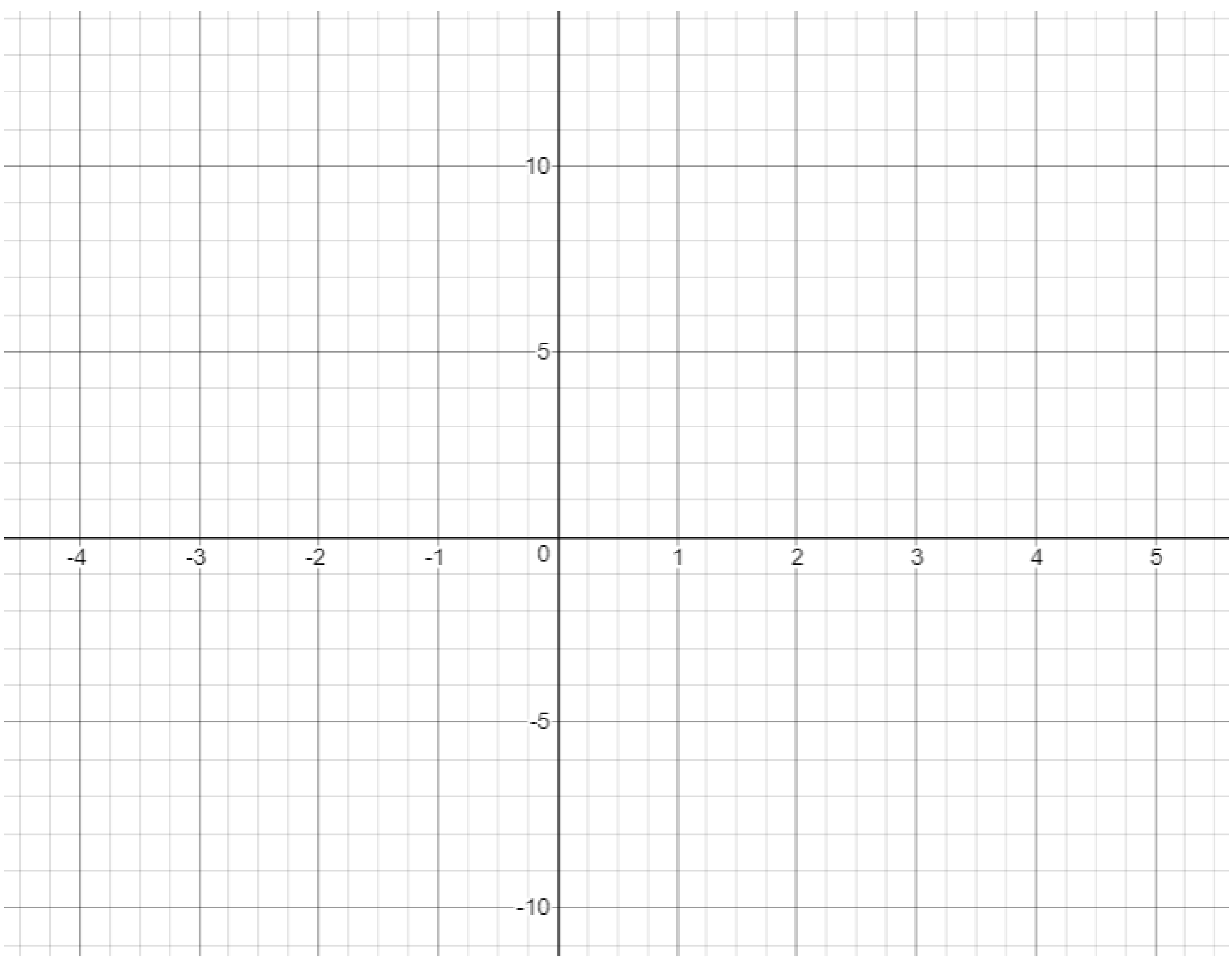
Target B: I can graph quadratic functions given a table or equation in any form

Graph the following quadratic functions and label each of them:

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

6) $y = -5(x-1)^2 + 10$

7) $t(x) = -2x^2 - 6x - 3$



Target C: I can solve quadratic equations algebraically or graphically

Solve the following equations with the Quadratic Formula

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

9) $x^2 - 5x + 15 = 3 + 2x$

10) Solve the following equation by factoring: $2x^2 = x + 3$

11) Solve the following equation by factoring: $3x^2 + 16x - 100 = 2x^2 + 15x + 10$

Quadratic Unit: Challenge Problems

#1) Multiply $(x^2+3x-2)(x^2+4x+1)$

#2) Factor (Hint this can be factored more than once!) $x^4 - 81$

#3) Give me an equation that has an axis of symmetry at $x = 10$

#4) What is the equation of the parabola that has an axis of symmetry at $x = 5$ and a vertex at (5,10)

#5) If you multiply the following expression ( - 3)(2x ) you get $8x^2 - 2x -$ 

What is underneath those boxes?

#6) If you graph y = (x + 6)(x - 4) what do you notice about the y-intercept? Try replacing the 6 and the -4 with other numbers; do you notice a pattern? Can you tell me what the y-intercept of y = (x + a)(x + b) are if “a” and “b” are real numbers?

#7) What is the sum of the numbers 1 to 10? What about 1 to 100? What about 1 to ‘n’ where ‘n’ is a positive integer?

#8) Can you find the equation of a parabola that models the growth of this sequence? How many tiles in the 100th figure?

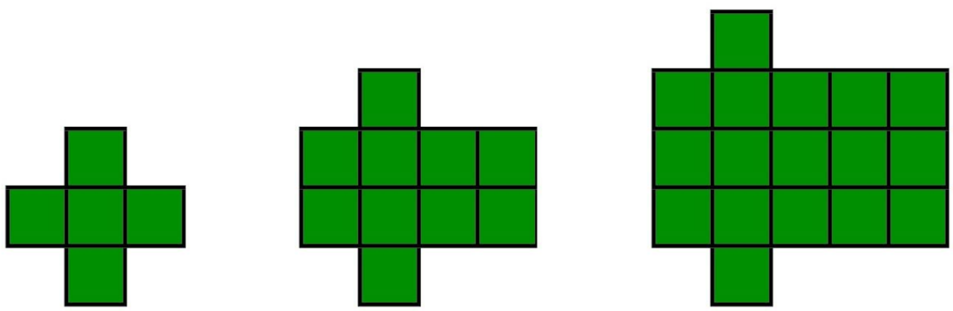


Figure 1 Figure 2 Figure 3

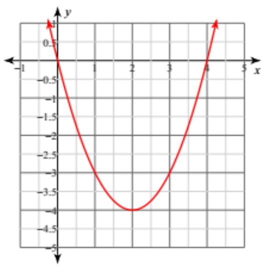
Quadratics Answer Key

Assignment #1: Adams Brothers:

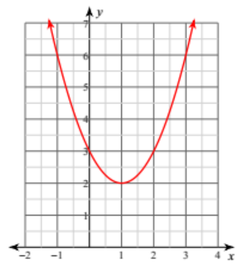
Answers given in class

Assignment #2: Graphing Quadratics:

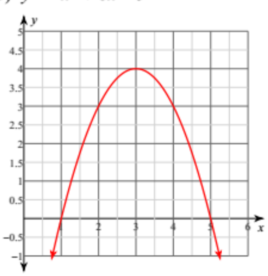
1) $y = x^2 - 4x$



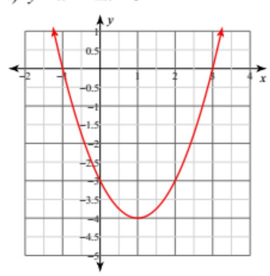
2) $y = x^2 - 2x + 3$



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



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



Assignment #3: Bungee Profits:

Answers given in class

Assignment #4: Danger Dan

2a) 110 feet 2b) Between 5-6 seconds 2c) .5 and 4.5 seconds 2d) Between .5 and 4.5 seconds. 2e) 0 to 1.5 seconds and 3.5 seconds and on. 2f) 100, he is 100 feet above the ground.

Assignment #5: Foiling and Factoring:

1) $21x^2 - 80x + 64$	2) $36x^2 - 42x + 10$	3) $7a^2 - 35a + 28$	4) $25v^2 + 50v + 21$
5) $42b^2 + 27b + 3$	6) $6r^2 - 29r + 35$	7) $48v^2 + 32v - 16$	8) $4x^2 - 4x - 48$
9) D	10) A	11) (x+5)(x+1)	12) (x+6)(x+9)
13) (m-9)(m+4)	14) (k-2)(k+5)	15) (k-1)(k-8)	16) (k+4)(k-8)

Quadratics Answer Key

Assignment #6: Factoring when "a" doesn't equal 1:

1) $3r^2 + 3r - 6$ 2) $24m^2 + 44m + 20$ 3) (x-3)(x-1) 4) (x-5)(x+6)
5) (x+10)(x-7) 6) (x-1)(x+9) 7) (5x-1)(x+3) 8) (2x-3)(x+2)
9) (2x-5)(x-1) 10) (3x+5)(x-1)

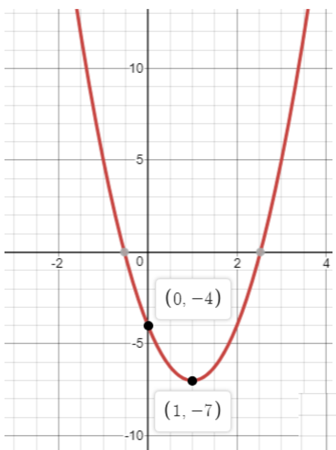
Assignment #7: Solving By Factoring:

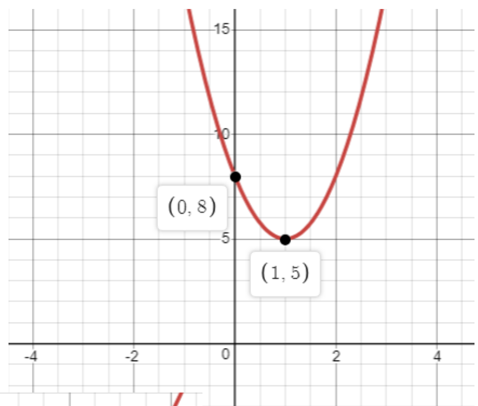
1) $\{-3, 1\}$ 2) $\{-1\}$ 3) $\{2, 4\}$ 4) $\{-7, 1\}$
5) $\{3, 4\}$ 6) $\{7, -3\}$ 7) $\{-2, -7\}$ 8) $\{-3\}$
9) $\{\frac{3}{2}, -2\}$ 10) $\{\frac{1}{2}, 1\}$ 11) $\left\{-\frac{3}{2}, -\frac{1}{2}\right\}$ 12) $\{-\frac{1}{2}, 3\}$

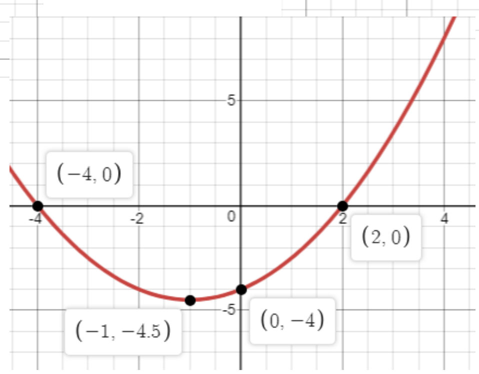
Assignment #8: The Quadratic Formula:

7) x = 2 and x = 4 8) x = -7 and x = 1 9) x = -2 10) No solution

Assignment #9: Graphing Quadratic Functions in standard form, Vertex Form and Factored Form:

1)


3)


5)


Quadratics Answer Key

Assignment #10: Writing Equations In Different Forms:

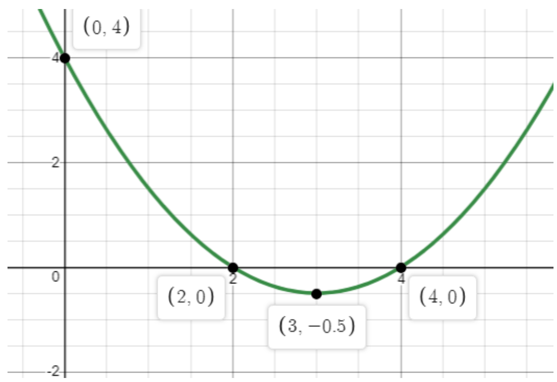
1) $y = 2(x-9)^2 + 1$
2) $y = 2(x+1)^2 - 5$
3) $y = 6x^2 - 39x - 21$
4) $p(x) = 5x^2 + 20x + 11$
5) $y = 2x^2 - 4x + 1$
6) $y = 20(x+1)(x-3)$
7) $g(x) = (x-5)(x+1)$
8) $y = 4(x+3)(x-2)$

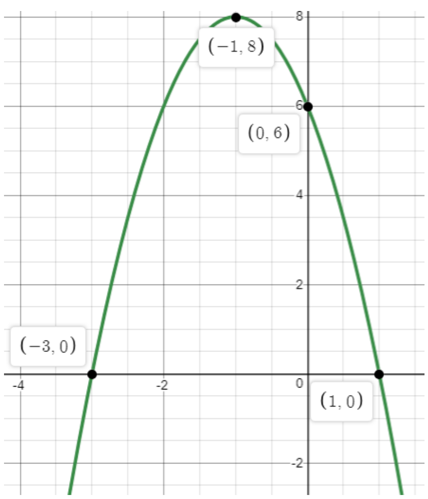
Assignment #11: Projectile Packet:

Answers given in class

Assignment #12: The Prequel To The Practice Test: The Skills You Need

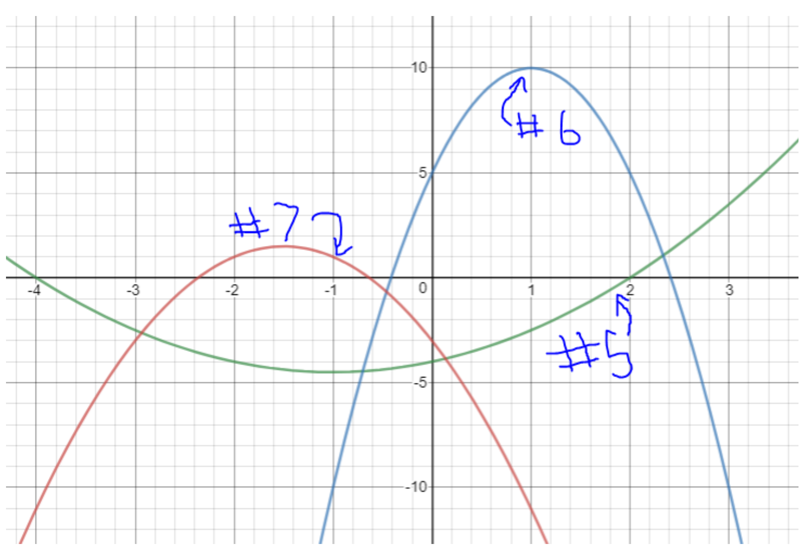
1) $3x^2 + 14x - 5$
2) $4x^2 - 25$
3) $(x-12)(x-3)$
4) $(x-8)(x+7)$
5) $(x-11)(x+11)$
6) $(2x+3)(4x-5)$
7) $x = -8$ and $x = -3$
8) $x = 5$ and $x = -2$
9) No Solutions
10) See right
11) See below





Assignment #13: Practice Test

1) $y = \frac{1}{2}(x-2)^2 - 6$
2) $y = -3(x+5)(x-1)$
3) $y = 30x^2 - 45x - 135$
4) $y = -2x^2 + 12x - 9$
5) See Graph
6) See Graph
7) See Graph
8) $x = 1, x = 2$
9) $x = 3, x = 4$
10) $x = -1, x = -1.5$
11) $x = 10, x = 11$



The four color theorem is just ridiculous. Here is the mathematical definition: *The **four color theorem**, or the **four color** map **theorem**, states that, given any separation of a plane into contiguous regions, producing a figure called a map, no more than **four colors** are required to **color** the regions of the map so that no two adjacent regions have the same **color**.*

Basically, given any map you can use just 4 colors to fill it in and none of those four colors will touch. I have included four practice problems. See if you can color them in so no colors share a border.