Unit 6

Part 1

(9.1, 9.3 & 9.2)

Algebra 1

Name:_____

9.1 (intercept form)

Determine the **a)** whether the graph of the function opens up or down, **b)** the x-intercepts and **c)** the axis of symmetry A.o.S.

1) $y = -3(x + 2)(x + 8)$

a)

b)

c) x =

2) $y = \frac{3}{8}(x - 1)(x + 9)$

a)

b)

c) x =

3) $y = 5(x - 5)(x - 7)$

a)

b)

c)

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

a)

b)

c)

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

a)

b)

c)

6) $g(x) = 4x^2 + 12x + 8$

a)

b)

c)

7) $f(x) = -3x^2 - 6x + 9$

a)

b)

c)

8) $h(x) = 2x^2 + 11x - 6$

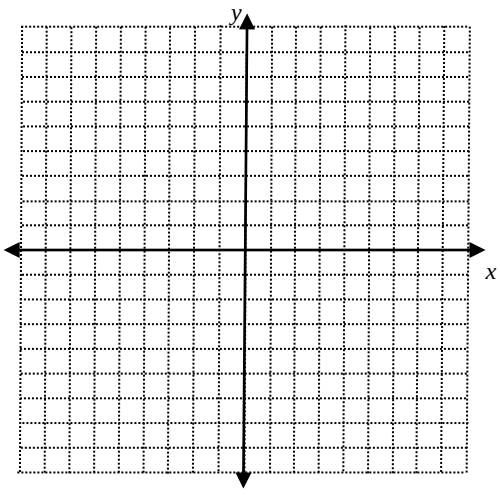
a)

b)

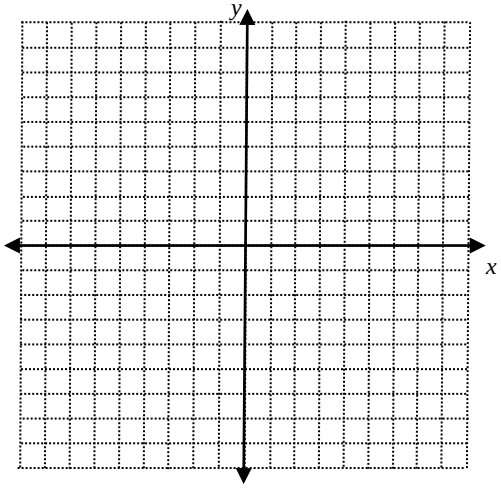
c)

Graph the quadratic function:

9) $y = \frac{1}{2}(x - 5)(x + 3)$

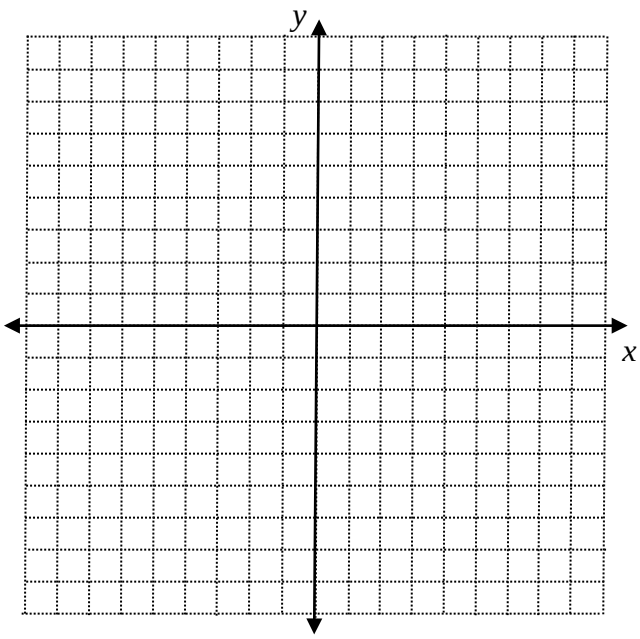


10) $f(x) = -x^2 + 8x - 12$

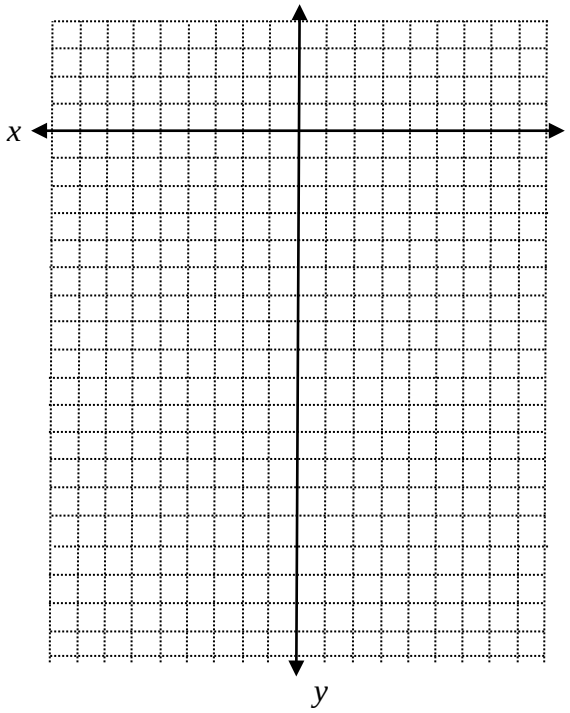


9.1 (day 2) Quadratics in Intercept Form

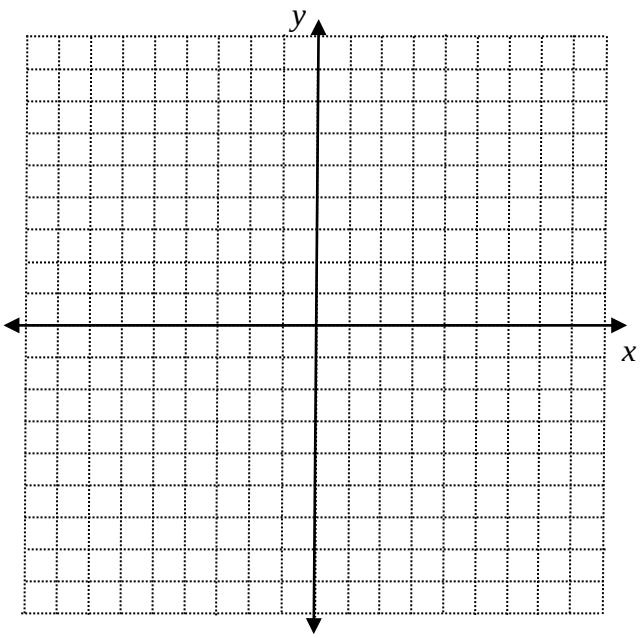
1) $y = -2(x - 3)(x + 1)$



2) $f(x) = x^2 - 2x - 15$

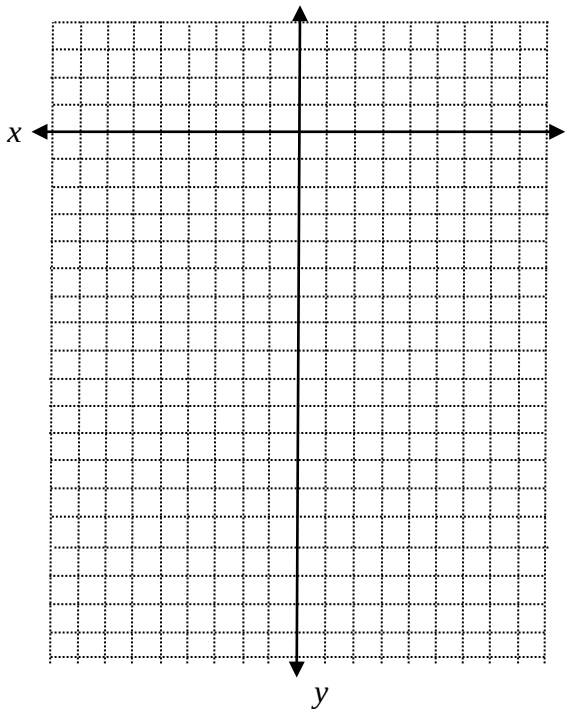


3) $y = (x+4)(x - 1)$



4) $y = 2x^2 + 4x - 30$

HINT: You may need to change the scale of the graph



9.1 Standard Form

1) Sketch a graph of the function $y = x^2 - 6x + 8$.

Step 1: Put in S.F. & identify the *a*, *b* and *c*.

a = *b* = *c* =

The parabola:

circle one → opens up / opens down

Step 2: Plug into line of symmetry formula, $x = \frac{-b}{2a}$. (be sure to graph the vertical line)

x = _____

Step 3: Find the vertex (find the *y*).

(___ ,)

plug in *x*

To find *y*, plug *x* into equation and solve.

$y = (\quad)^2 - 6(\quad) + 8$

plug in *y*

Step 4: Plot vertex and create an $x - y$ table. Pick one *x* value to the left and right of the vertex. Specifically choose values to the left and right of the '*x*' value.

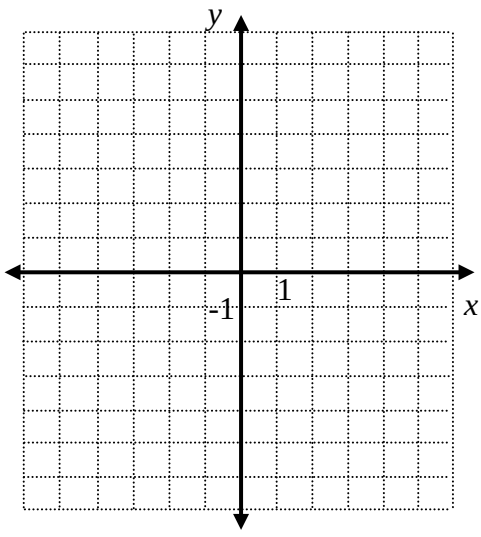
x	*y*

Point 1

$y = (\quad)^2 - 6(\quad) + 8$

Point 2

find on other side of axis of symm.



Step 5: Plot the points you just found and connect the points to make a parabola.

NOTE:
Rewriting the equation in intercept form first may be an easier approach.

9.1 Homework Standard Form (day 2)

Tell whether the graph opens up or down. Write an equation of the axis of symmetry.

1. $y = x^2 + 4x - 1$

2. $y = 3x^2 + 8x - 6$

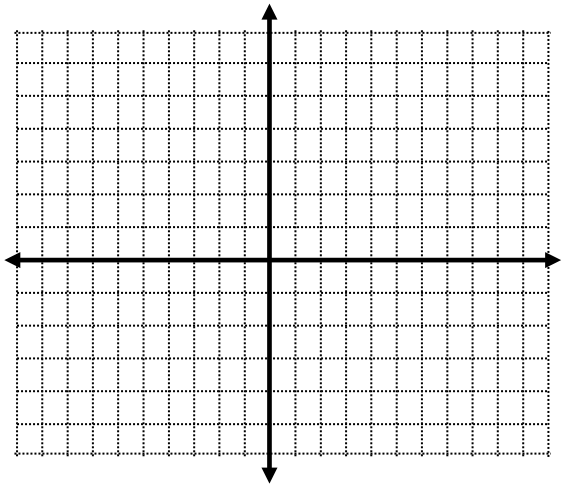
3. $y = -x^2 - 4x + 2$

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

Graph the following functions. Label the vertex.

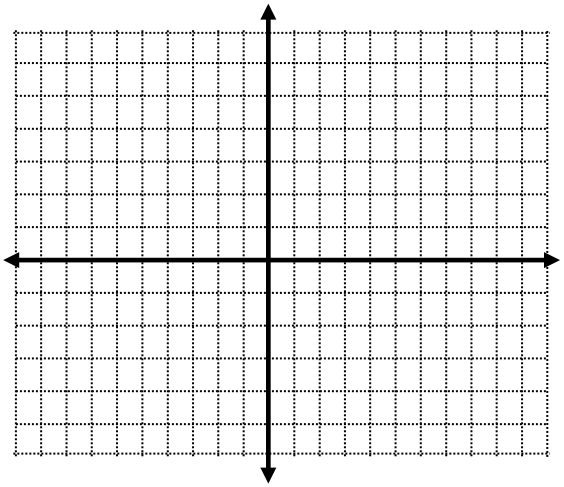
5. $y = -3x^2$

x				
y				



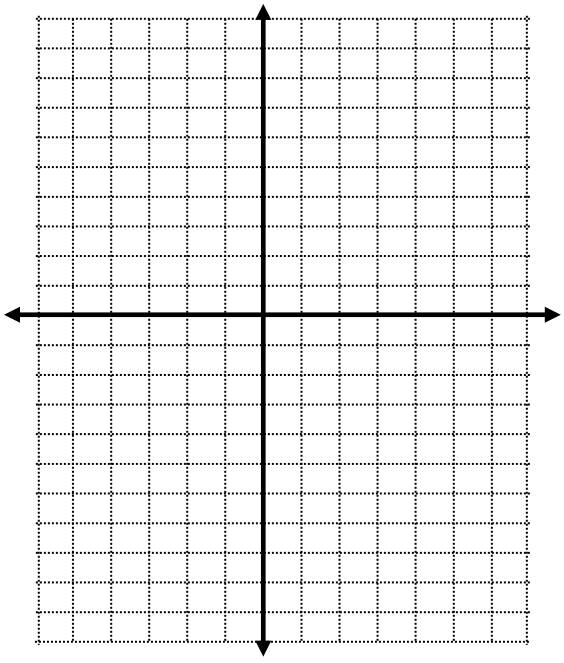
6. $y = -3x^2 + 6x + 2$

x				
y				



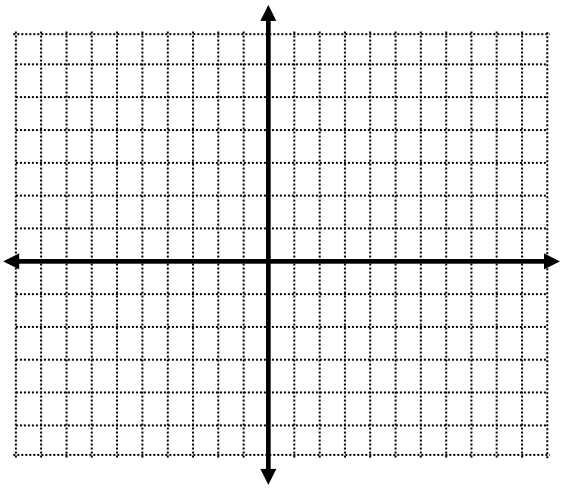
7. $y = x^2 - 2x - 8$

x				
y				



8. $y = 3x^2 - 6x + 1$

x				
y				



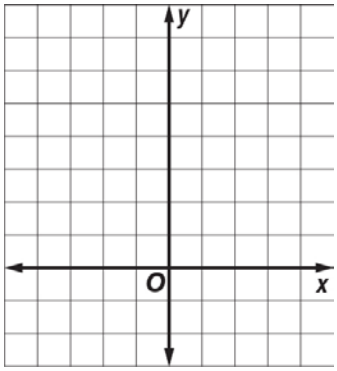
9.1 Standard Form of Quadratics (day 3)

Find the vertex, the equation of the axis of symmetry, and the *y*–intercept of the graph of each function.

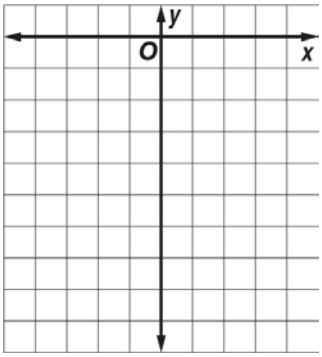
1. $y = 2x^2 - 8x + 6$ **2.** $y = x^2 + 4x + 6$ **3.** $y = -3x^2 - 6x + 3$

Graph the quadratic equations using the standard form approach.

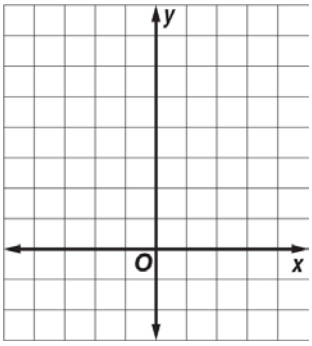
4. $y = x^2 + 2$



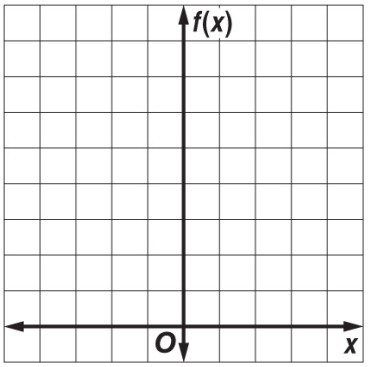
5. $y = -x^2 - 4$



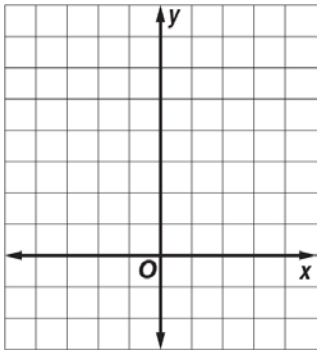
6. $y = x^2 - 3x + 2$



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

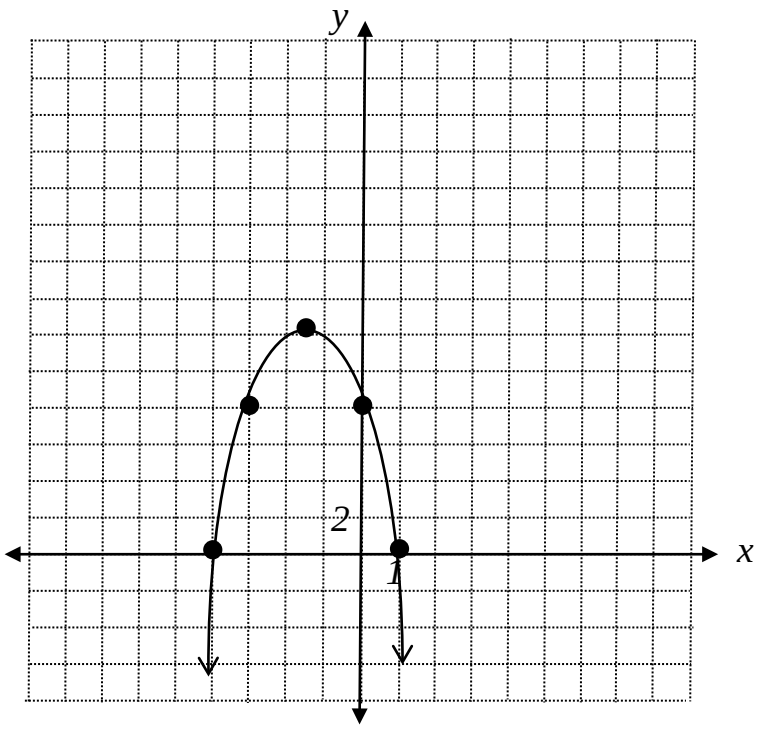


8. Rewrite the following quadratic function from standard form to intercept form. Then, graph the function. $y = x^2 - 3x + 2$



9. How do you distinguish between intercept form and standard form for quadratic functions?

Use the graph below to answer the following questions:



10. Which of the following is the Axis of Symmetry?

a) $x = -4$ b) $x = -2$ c) $x = -1.5$ d) $x = 1$ e) $x = 2$

11. True or False: The parabola has a maximum, not a minimum.

12. Which of the following is the y-intercept of the function?

a) -4 b) 1 c) 2 d) 4 e) 8

13. What is the vertex of this quadratic?

a) (-2,6) b) (-2, 12) c) (-2, 12.5) d) (-1.5, 12.5) e) (-1.5, 6.25)

14. Which equation below *could* be the quadratic graphed?

a) $y = a(x + 1)(x – 4)$ b) $y = a(x – 1)(x + 4)$ c) $y = x^2 + 5x + 10$

d) $y = -3x^2 + 2x + 6$ e) none of these

9.1 Graphing using Vertex Form

For problems 1-3, identify the **a)** whether the parabola opens up or down, **b)** vertex and **c)** axis of symmetry.

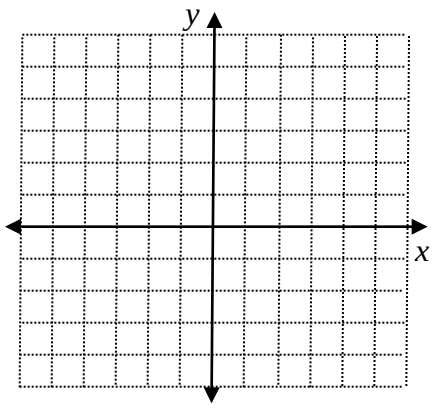
1) $y = 3(x - 2)^2 + 1$

2) $y = (x + 16)^2 + 20$

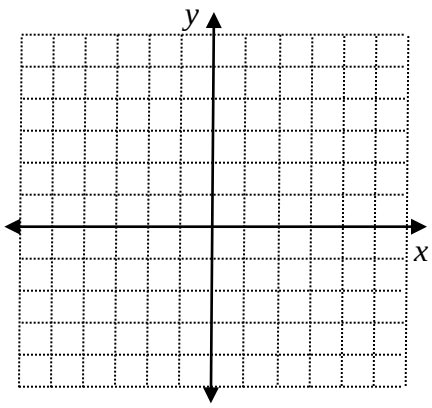
3) $y = -2(x + 3)^2 - 6$

Graph the quadratic functions below using vertex form.

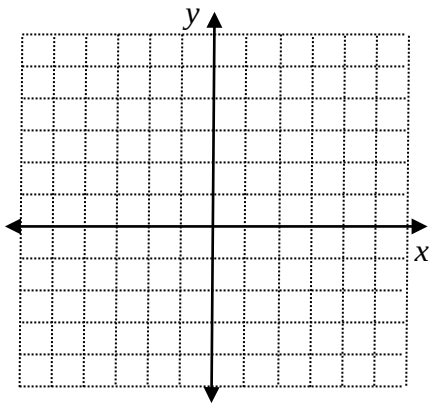
4) $y = (x - 1)^2 + 3$



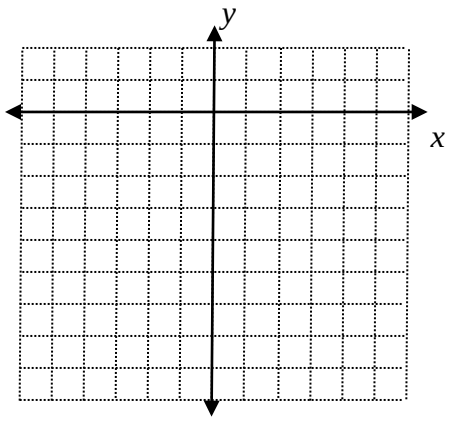
5) $y = (x + 2)^2 - 1$



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



7) $y = -3(x - 1)^2 - 4$



9.1 Graphing ALL forms of quadratics

Given the equations below, identify **a)** which form it is in, **b)** whether it opens up or down **c)** the Axis of Symmetry, **d)** the vertex.

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

a)

b)

c)

d)

2. $y = -x^2 + 5$

a)

b)

c)

d)

3. $h(x) = (x + 3)(x - 7)$

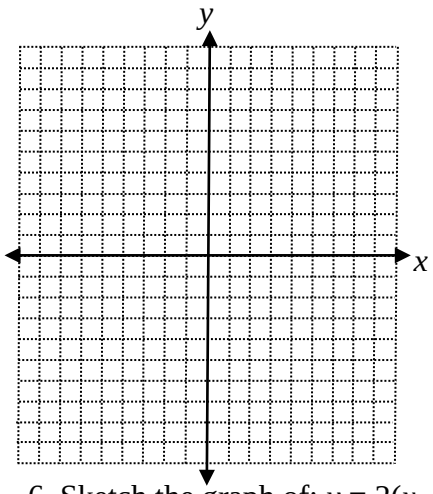
a)

b)

c)

d)

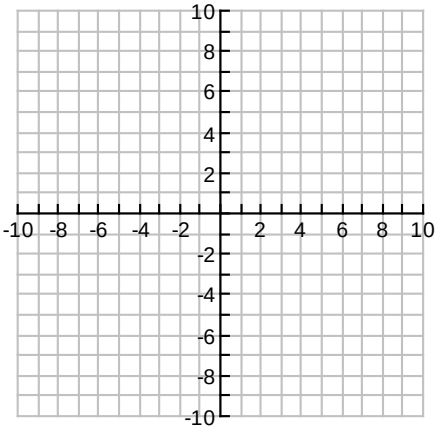
4. Sketch the graph of $g(x) = x^2 + 4x - 5$



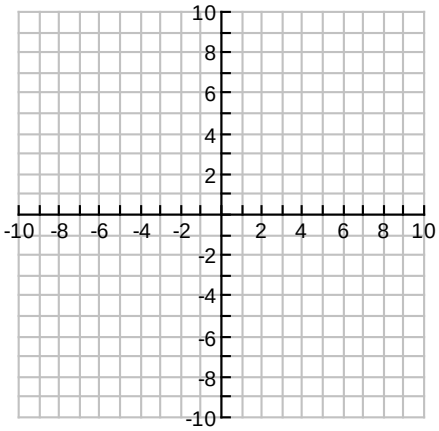
x	y

5. Sketch the graph of: $y = -2x^2 + 4x - 1$

x	y

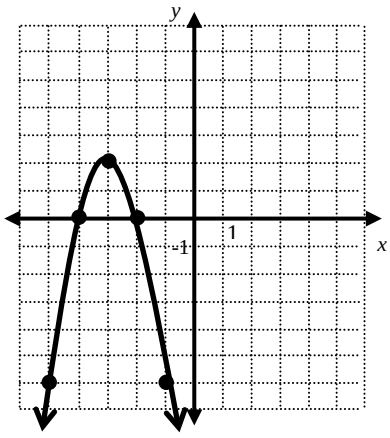


6. Sketch the graph of: $y = 2(x - 2)^2 + 4$



x						
y						

7. What is the equation of the graph below?



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

b) $y = -2x^2 - 12x - 16$

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

d) All (answers a-c)

e) none of these

Graphing Quadratics Review

Write the quadratic function in standard form. Determine whether the graph of the function opens up or down.

1. $y = 3 - 2x - x^2$

2. $y = 3x + 3x^2 - 4$

3. $y = -5 - 4x^2$

y

Find the vertex and axis of symmetry of the parabola.

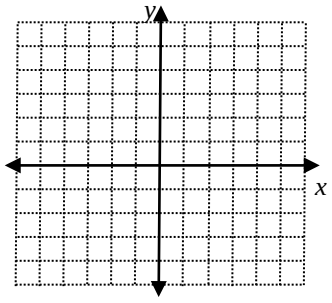
4. $y = (x - 4)^2 + 8$

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

6. $y = (x + 6)(x + 1)$

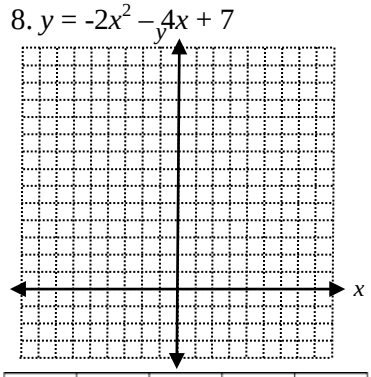
For 7 -15, graph the quadratic function.

7. $y = x^2 + 6x + 5$



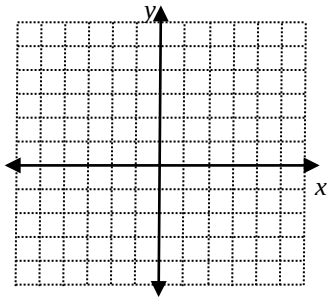
x				
y				

8. $y = -2x^2 - 4x + 7$



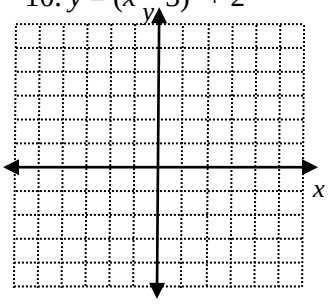
x				
y				

9. $y = x^2 + 1$



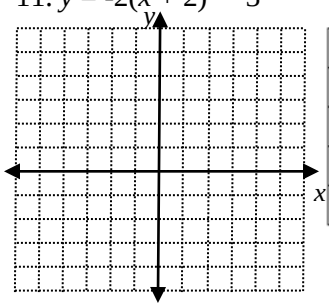
x				
y				

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



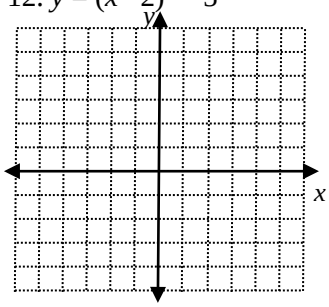
x	*y*

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



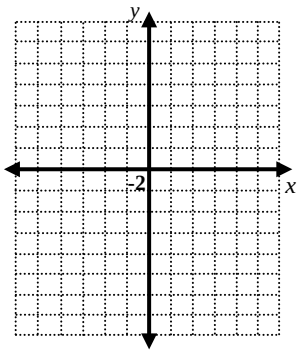
x	*y*

12. $y = (x - 2)^2 - 5$



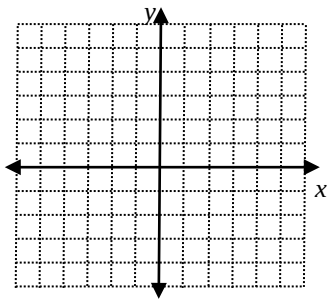
x	*y*

13. $y = (x + 3)(x - 5)$



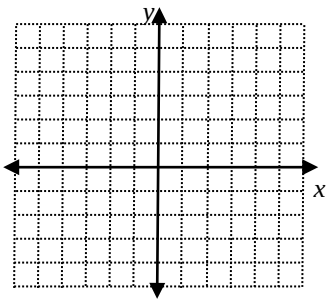
x	y

14. $y = -2(x - 2)(x - 4)$



x	y

15. $y = -3x(x + 2)$



x	y

Factoring review!

16. Factor: $x^2 + 4x - 21$

17. Factor: $x^2 - 10x + 24$

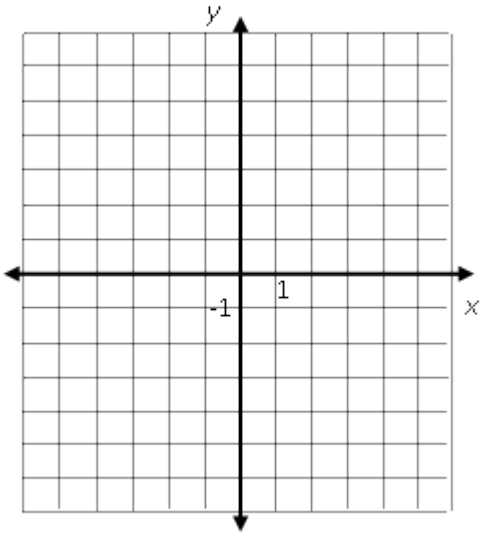
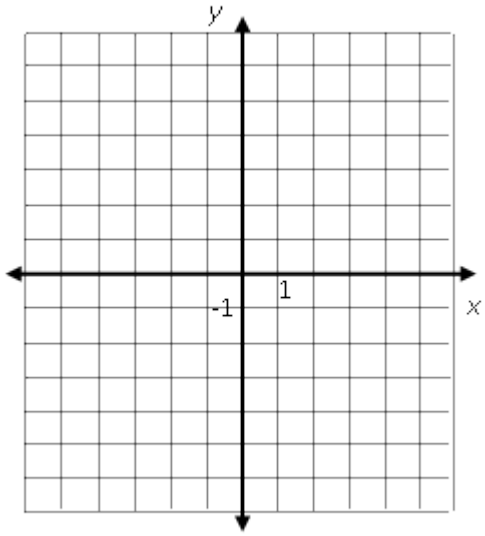
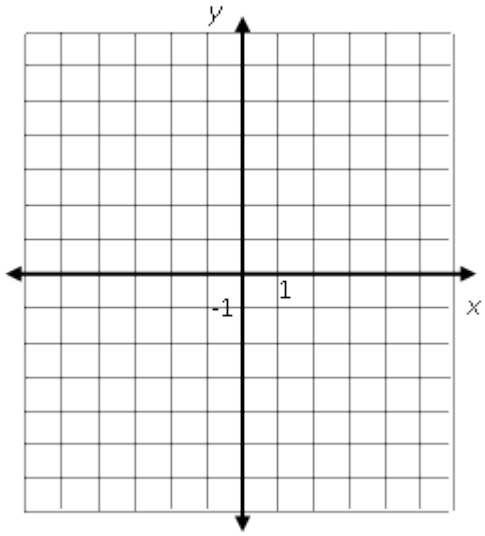
18. Solve: $r^2 - 49 = 0$

19. Solve: $-15 = x^2 + 8x$

20. Factor: $3x^2 - 8x + 5 = 0$

21. Solve: $8m^2 + 8m + 2 = 0$

Graphing Quadratic Functions

Intercept Form	Standard Form	Vertex Form
$y = a(x - p)(x - q)$	$y = ax^2 + bx + c$	$y = a(x - h)^2 + k$
<u>Obtaining Ordered Pairs</u> • The x-intercepts are p and q. • The axis of symmetry is half-way between (p, 0) and (q, 0). • Plug back in for y value (the vertex!)	<u>Obtaining Ordered Pairs</u> • Use a.o.s. for x value • Plug back in for y value (the vertex!) • Make a table to graph {Go L & R} • y-intercept is c	<u>Obtaining Ordered Pairs</u> • The vertex is (h, k). {opposite, same} • The axis of symmetry is x = h. {opposite}
$y = \frac{1}{2}(x - 3)(x + 1)$ 	$y = 2x^2 - 8x + 6$ 	$y = 2(x - 1)^2 + 3$ 
<u>NOTES:</u>	<u>NOTES:</u>	<u>NOTES:</u>

9.3 Transformations of Quadratic Functions

Describe how the graph of each function is related to the graph of $\boldsymbol{f(x) = x^2}$ **{translations, reflections, dilations}**

1. $g(x) = (10 + x)^2$

2. $g(x) = -\frac{2}{5} + x^2$

3. $g(x) = 9 - x^2$

4. $g(x) = 2x^2 + 2$

5. $g(x) = -\frac{3}{4}x^2 - \frac{1}{2}$

6. $g(x) = -3(x + 4)^2$

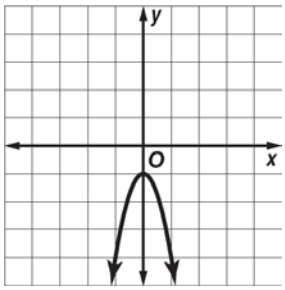
Match each equation to its graph.

7. $y = -3x^2 - 1$

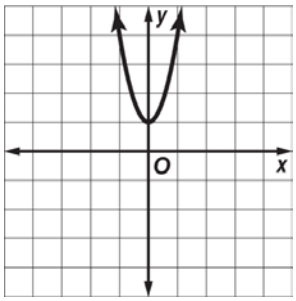
8. $y = \frac{1}{3}x^2 - 1$

9. $y = 3x^2 + 1$

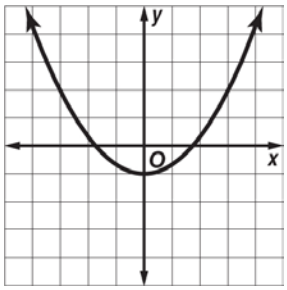
A.



B.



C.



List the functions in order from the most vertically stretched to the least vertically stretched graph.

10. $f(x) = 3x^2$, $g(x) = \frac{1}{2}x^2$, $h(x) = -2x^2$

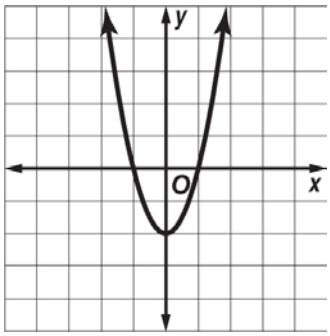
11. $f(x) = \frac{1}{2}x^2$, $g(x) = -\frac{1}{6}x^2$, $h(x) = 4x^2$

Find the domain and range.

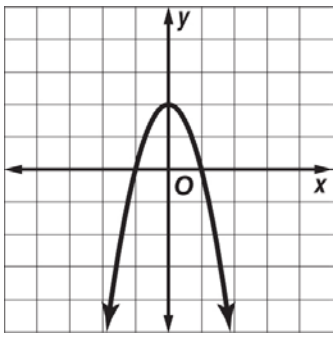
12. $g(x) = -x^2 + 3$

13. $g(x) = 4(x - 1)^2$

14.



15.



9.3Application Example

1) Suppose that a group of high school students conducted an experiment to determine the number of hours of studying that leads to the highest score on a comprehensive year-end exam. The exam score y for each student who studied for x hours can be modeled by:

$y = -0.853x^2 + 17.48x + 6.923$

Which amount of studying produced the highest score on the exam?

What is the highest score the model predicts?

2) Jason jumped off of a cliff into the ocean in Acapulco while vacationing with some friends. His height as a function of time could be modeled by the function $h(t) = -16\left(t - \frac{1}{2}\right)^2 + 484$. Jason hit the water after how many seconds?

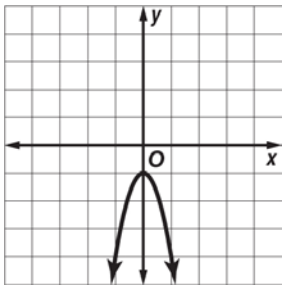
9.3 Quadratic Practice

1. For the following quadratics, describe all shifts/transformations from the parent graph of $y = x^2$

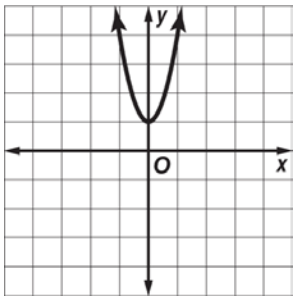
a) $y = 4(x-4)^2 + 4$ b) $y = -3(x+3)^2 - 3$ c) $y = -\frac{1}{5}(x-5)^2 - 5$

2. Match each equation to its graph.

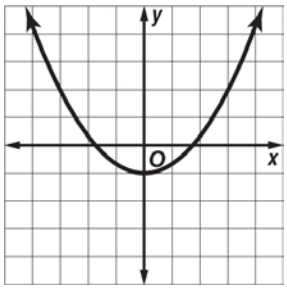
A.



B.



C.

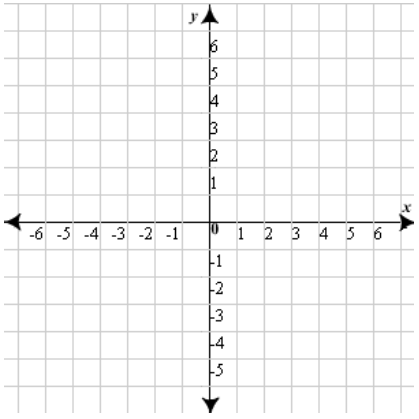


1. $y = -3x^2 - 1$ **2.** $y = \frac{1}{3}x^2 - 1$ **3.** $y = 3x^2 + 1$

3. Graph the following and then answer

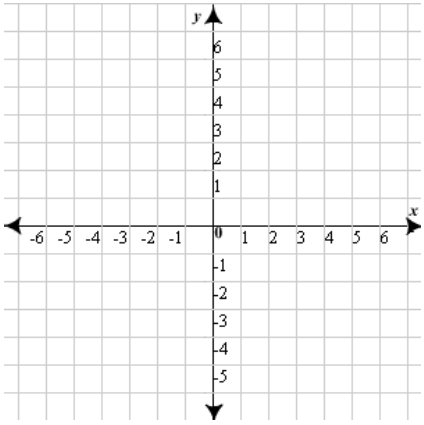
a) Vertex
b) Axis of Symmetry
c) Domain and Range
d) *y*-intercept

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



x			
y			

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



x			
y			

4. Given the equations in vertex form, write the equations in both standard form and factored form

a) $y = 2(x+2)^2 - 2$ b) $y = -(x+3)^2 + 1$

5. Find the coordinates of the vertex, the axis of symmetry, roots, and state which form the equation is in for the following:

a. $y = -2x^2 + 3x - 1$ b. $y = (x-3)(x+5)$ c. $y = (x-5)^2 + 1$

6. Determine the range of the following:

a) $y = 3x^2 - 12x + 1$ b) $y = -2(x+1)(x+2)$ c) $y = -\frac{2}{3}(x+3)^2 - 4$

7. The flight of a basketball is given by the equation $h(t) = -3t^2 + 7t + 6$, where $h(t)$ represents the height of the ball and t represents seconds.

a) How high does this shot go?

b) How long will the ball be in the air?

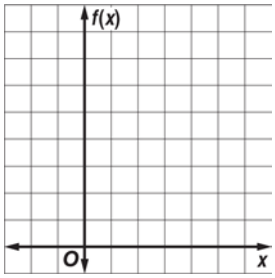
Practice

9-2 *Solving Quadratic Equations by Graphing*

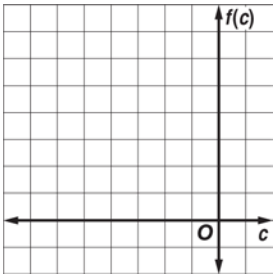
Follow this QR code for videos on how to perform each one of these problems.

Solve each equation by graphing.

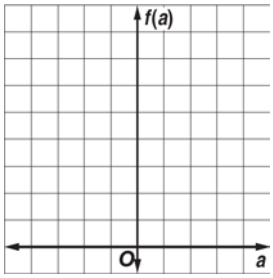
1. $x^2 - 2x + 3 = 0$



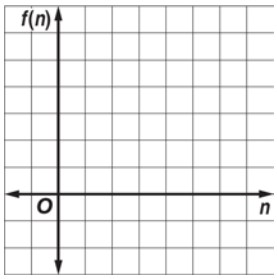
2. $c^2 + 6c + 8 = 0$



3. $a^2 - 2a = -1$

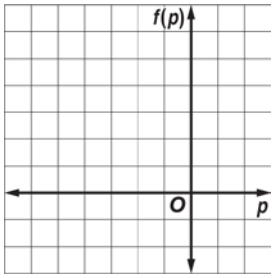


4. $n^2 - 7n = -10$

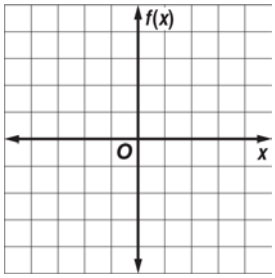


Solve each equation by graphing. If integral roots cannot be found, estimate the roots to the nearest tenth.

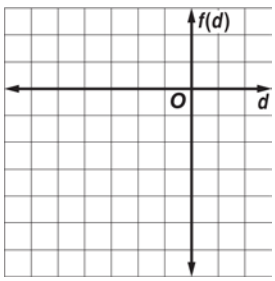
5. $p^2 + 4p + 2 = 0$



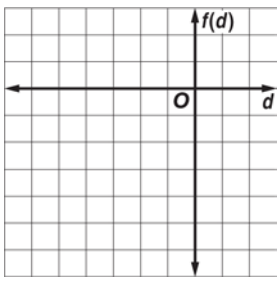
6. $x^2 + x - 3 = 0$



7. $d^2 + 6d = -3$



8. $h^2 + 1 = 4h$

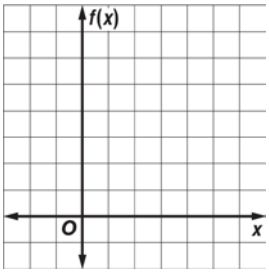


Homework

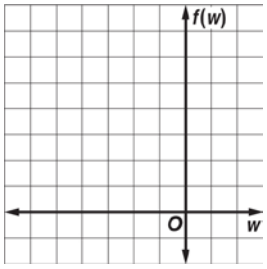
9-2 *Solving Quadratic Equations by Graphing*

Solve each equation by graphing.

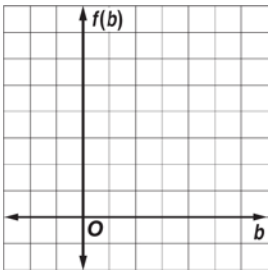
1. $x^2 - 5x + 6 = 0$



2. $w^2 + 6w + 9 = 0$

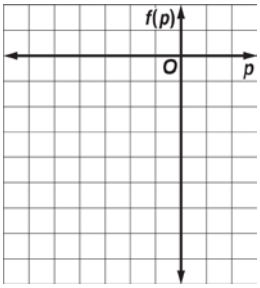


3. $b^2 - 3b + 4 = 0$

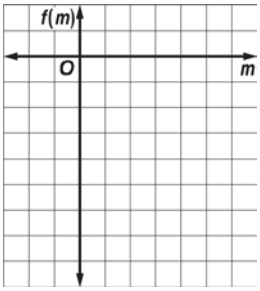


Solve each equation by graphing. If integral roots cannot be found, estimate the roots to the nearest tenth.

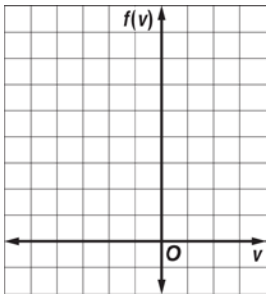
4. $p^2 + 4p = 3$



5. $2m^2 + 5 = 10m$



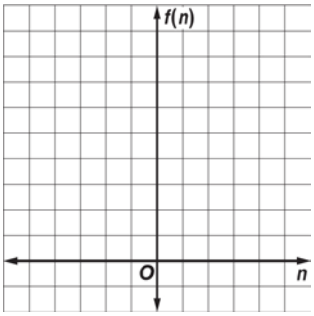
6. $2v^2 + 8v = -7$



7. Two numbers have a sum of 2 and a product of –8. The quadratic equation $-n^2 + 2n + 8 = 0$ can be used to determine the two numbers.

a. Graph the related function $f(n) = -n^2 + 2n + 8$ and determine its x-intercepts.

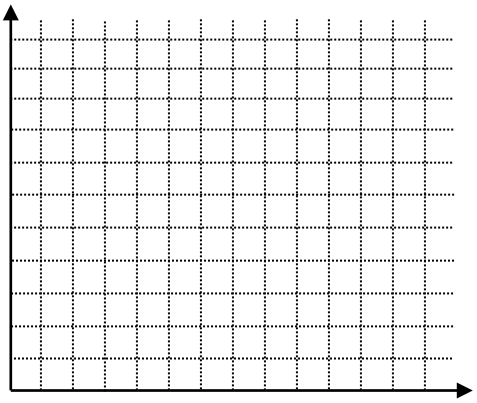
b. What are the two numbers?



9.2 Application Example

1) Suppose that a group of high school students conducted an experiment to determine the number of hours of studying that leads to the highest score on a comprehensive year-end exam. The exam score y for each student who studied for x hours can be modeled by:

$y = -0.853x^2 + 17.48x + 6.923$



a) Which amount of studying produced the highest score on the exam?

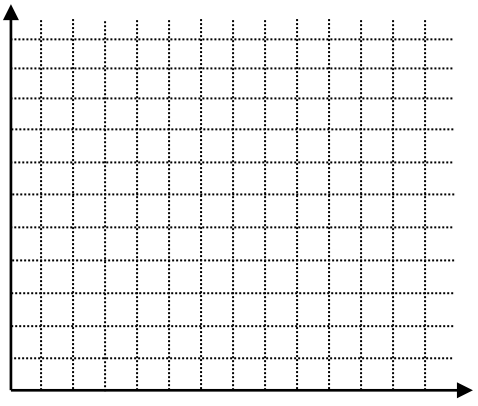
b) What is the highest score the model predicts?

c) According to the model, how many hours would yield a score of 0?

2) Jason jumped off of a cliff into the ocean in Acapulco while vacationing with some friends. His height as a function of time could be modeled by the function $h(t) = -16\left(t - \frac{1}{2}\right)^2 + 484$.

a) At what height did Jason jump from?

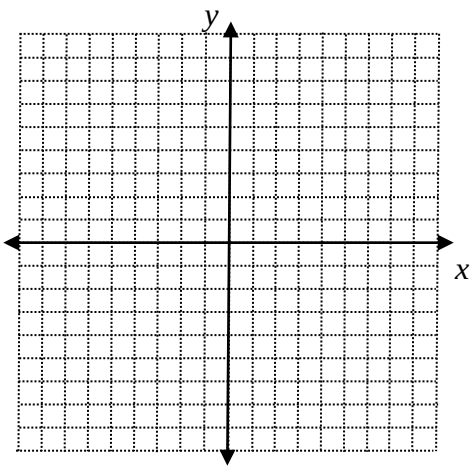
b) Jason hit the water after how many seconds?



Unit 6-part 1 (chapter 9) mini review

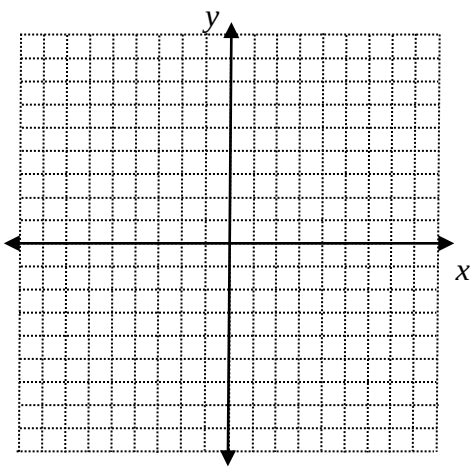
For 1-3, solve by graphing:

1) $y = -2x^2 + 8x - 5$



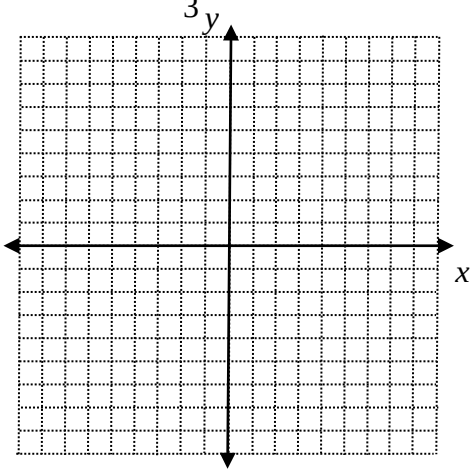
Solution(s):_____

2) $y = (x + 3)^2 + 1$



Solution(s):_____

3) $y = -\frac{1}{3}(x+1)(x-5)$



Solution(s):_____

For problems 4-6, use the graphs that correspond above. Determine the transformations.

4) see #1 above

R:

T:

D:

Domain:

Range:

5) see #2 above

R:

T:

D:

Domain:

Range:

6) see #3 above

R:

T:

D:

Domain:

Range:

For 7 – 9, factor the expression:

7) $x^2 - x - 20$

8) $9x^2 + 6x + 1$

9) $3u^2 - 108$

Unit 6 (Chapter 9) Part 1 Review

1) What is the vertex of the graph of $y = \frac{1}{4}(x-2)^2 + 6$?

a) (0,7) b) (2,6) c) (-2,-6) d) (4,7) e) (-2,6)

2) What are the domain and range of the function in problem 1?

a) D: All real #s R: $y > 7$ b) D: All real #s R: $y \geq 6$ c) D: All real #s R: $y \leq -6$ d) D: $x > 4$ R: $y > 7$ e) D: $x > -2$ R: $y > 6$

3) What is the vertex of the graph of $y = -4(x-1)(x+5)$?

a) Maximum at (-2, 36) b) Maximum at (2,-28) c) Minimum at (-1,5)

d) Minimum (-2, 36) e) Minimum (3,16)

4) What are the zeros of the function in problem 3?

a) -5 & 1 b) -1 & 5 c) -4, -1, 5 d) 0, -5, 2 e) -2

5) What is the vertex of the graph of $y = 3x^2 - 12x + 13$?

a) (-2,1) b) (2,1) c) (-2,-1) d) (0,13) e) (2, -1)

6) Which best describes the dilation from the function in problem 5?

a) Vertical stretch b) Vertical compression c) No change d) Horizontal stretch e) Reflection

7) What is the *y*-intercept of the function in problem 5?

a) (0,-12) b) (0, -2) c) (0, 2) d) (0, 3) e) (0, 13)

8) What is the axis of symmetry of the graph of $y = \frac{1}{2}(x+2)(x-6)$?

a) $x = 6$ b) $x = -2$ c) $x = 2$ d) $x = -6$ e) $x = -12$

9) What is the translation that occurs in the function in problem 8?

a) Right 2
Down 8

b) Left 2
Down 8

c) Right 2
Up 8

d) Left 2

e) Left 6

10) What is the standard form of the quadratic function: $y = -5(x + 2)^2 + 18$?

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

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

c) $y = -5x^2 - 20x + 2$

d) $y = -5x^2 + 20x - 2$

e) $y = -5x^2 + 20x + 2$

11) A golf ball is hit from ground level into the air following the path of the equation $y = -0.1x^2 + 10x$ (Assume the x-axis is ground level.)

a) If you assume the point at which the golf ball is hit is (0,0) at what point does the ball come down and hit the ground?

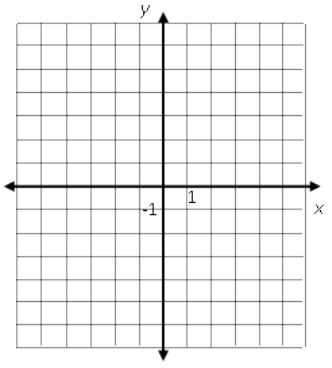
b) If you assume all points to be in terms of yards, how far was the ball from the golfer when it hit the ground?

c) At what point did the golf ball reach its maximum height?

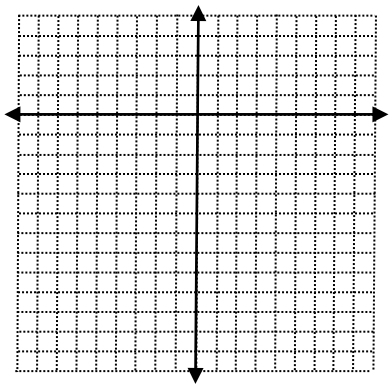
d) What was the maximum height of the golf ball in terms of yards?

For 12 – 14, solve by graphing.

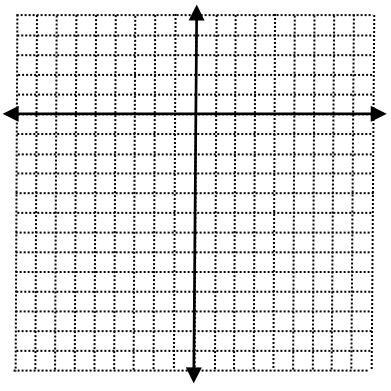
12) $y = -\frac{1}{2}(x+3)^2 + 2$



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



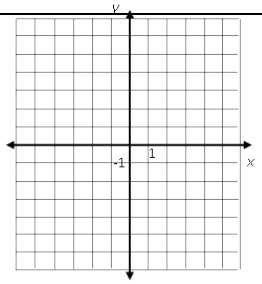
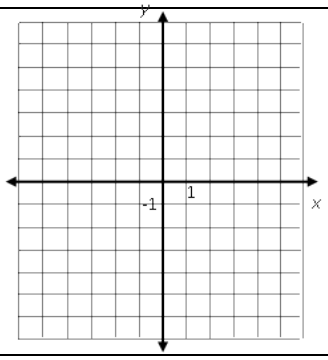
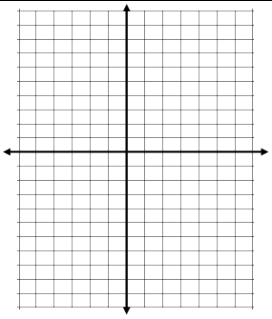
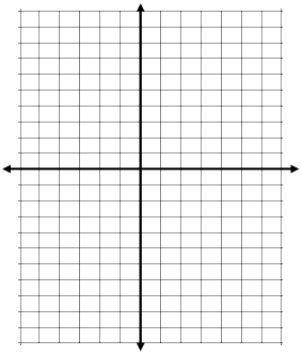
14) $y = (x+5)(x-1)$



GRAPHING CALCULATOR-Basic Functions

Question	Response	Calc function purpose
1. Add: -20 + 60.75	1.	- Vs –
2. Subtract: -50.6 – 30.4 – 70.001	2.	- Vs –
3. Multiply: $20 \cdot 120$	3.	X vs ·
4. Divide $168 \div 40$	4.	÷ vs. /
5. Convert your answer from # 4 to a fraction	5.	Frac
6. Add $\frac{1}{3}$ to your solution from #5. Write it as a fraction.	6.	Ans
7. Add $-\frac{3}{4}+\frac{21}{24}$. Answer with a fraction	7.	Parenthesis
8. Go back to your key strokes for #2 and insert a positive instead of a negative for 30.4. What is the result?	8.	Entry button
9. Take your answer and square it.	9.	Ans & ^{2}
10. Whoops, I meant to say cube it. Use entry to fix it!	10.	^
11. Add π and $\frac{1}{3}$ to that answer.	11.	π

GRAPHING CALCULATOR -Graphing

Reset your graph		
1. Graph: $y = -3x - 2$	1. 	y = & x,t,Θ,n
2. What is the output if $x = 10$?	2.	table
3. Graph: $y = -3x^2 - 2$	3. 	More input
4. What is the output if $x = 10$?	4.	table
5. Graph them at the same time. What points do they have in common?	5.	Y_1 & Y_2
6. Graph: $y = 4(x - 8)(x + 12)$.	6. 	Zoom
7. Graph: $y + 8 = 50x^2 + 6x$	7. 	Zoom

Cornell Notes Lecture, reading/chapter/novel/article during class, power point, movies (if need to collect info.) **Topic:**_____ _____	**Name:** _____ **Class:** _____ **Period:** _____ **Date:** _____

Essential Question:

Questions/Main Ideas:	**Notes:**

Summary:

Cornell Notes Lecture, reading/chapter/novel/article during class, power point, movies (if need to collect info.) **Topic:**_____ _____	**Name:** _____ **Class:** _____ **Period:** _____ **Date:** _____
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Essential Question:	
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Summary:	

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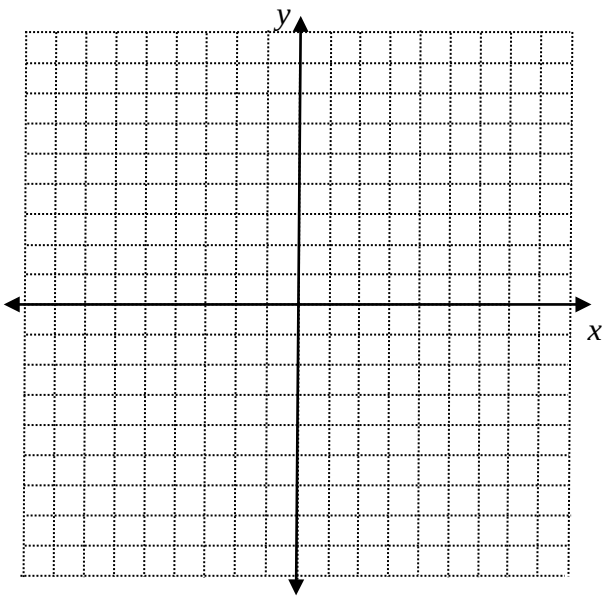
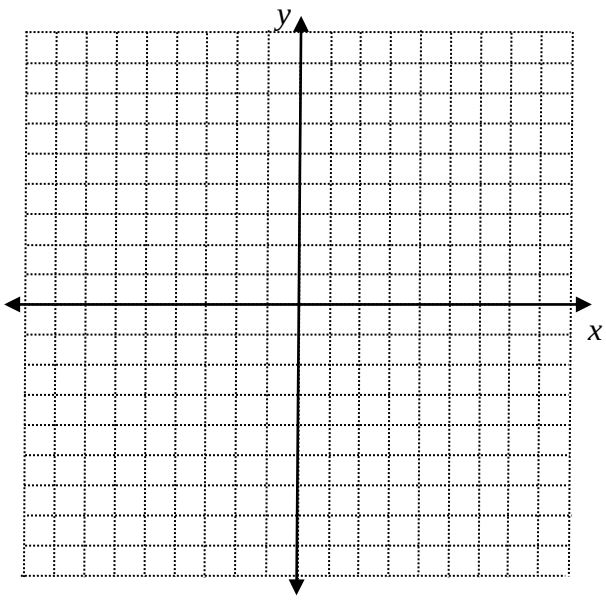
Essential Question:

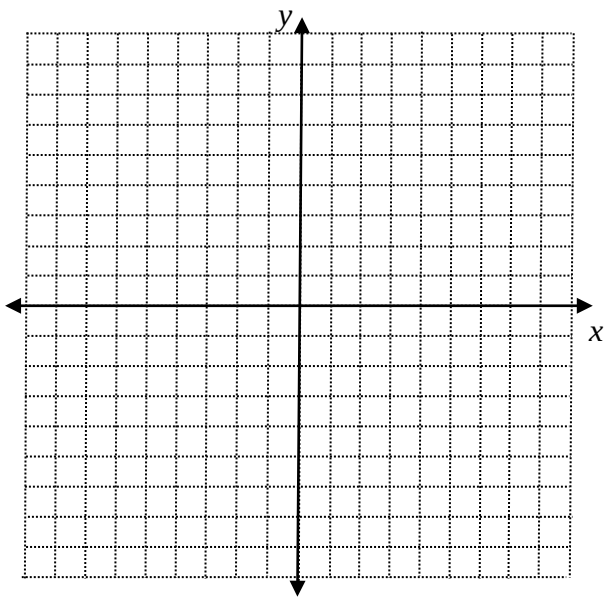
Questions/Main Ideas:	**Notes:**

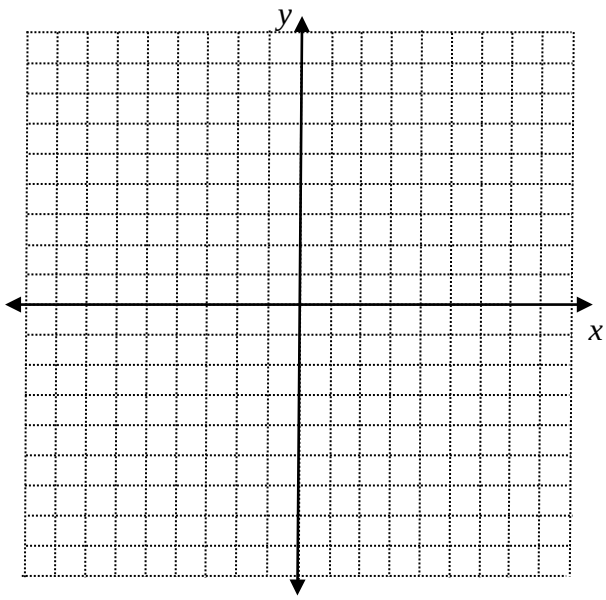
Summary:

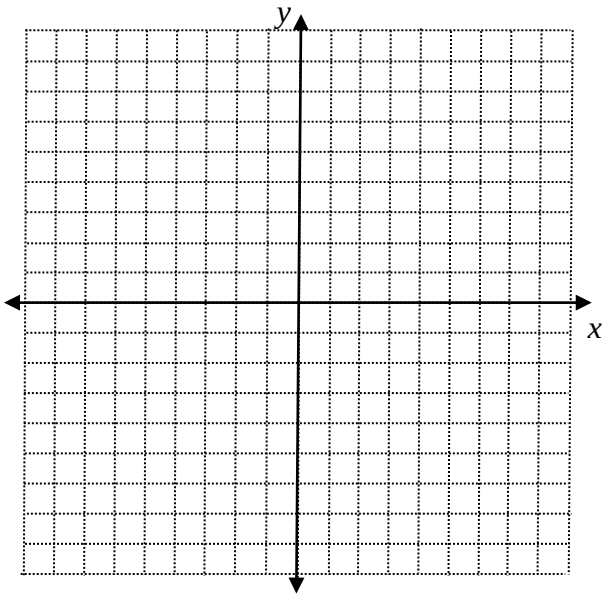
Extra Graphs

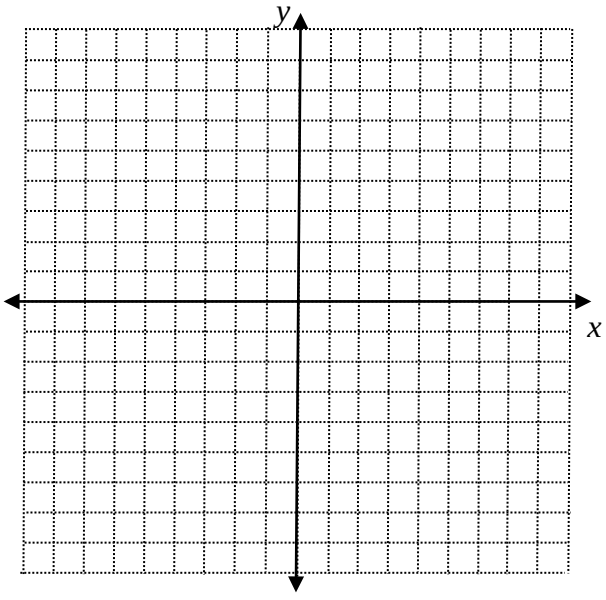












Add on problems or addition examples:

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