Pre-Calculus (week of April 20)

For this week, we are reviewing the first unit we did on Transformations. This unit comes from a different source that what we did during the regular school year. The concepts are the same in all transformations. If you can't print the actual assignments where you can make a readable graph, make sure you use words to describe the transformation (ex: left 3, down 4, or flip over x-axis). Then do the best you can to draw the graphs.
On some of these assignments or past assignments, I will consider a participation grade (100 if done) but you must make an effort to complete the assignment to get that 100. Anything less would get you a lower grade.

Sorry the year has to end this way. It would be easier to teach things in the classroom and be able to answer your questions in person. Nevertheless, do the best you can on these assignments of things that you should have seen during the year.

I am going to leave extra hard copies at the office if you want to pick them up and do the assignments. You could then email copies of them to me at: fwilganowski@bremondisd.net. It would be easier to do if you can't print the original at home.

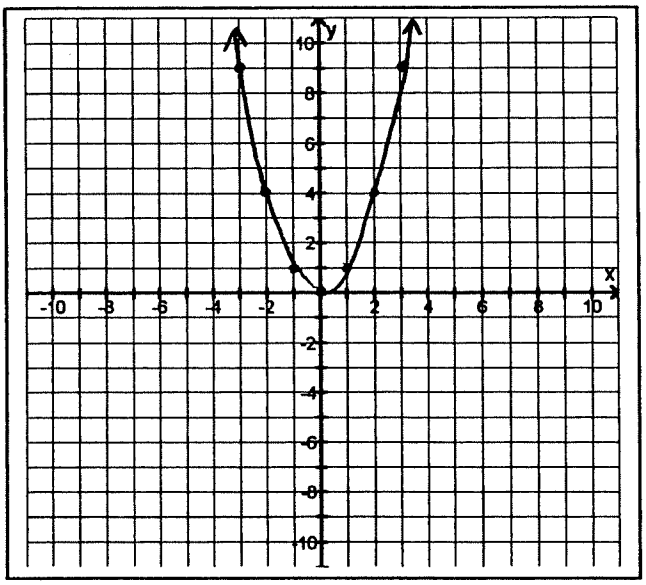
N 3-2

Graphing Quadratic Functions

The Quadratic Parent Function

Graph $f(x) = x^2$

x	y
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9



Domain: $\mathbb{R}$

Range: $[0, \infty)$

Characteristics: Even

Inc: $(0, \infty)$

Dec: $(-\infty, 0)$

Vertex: $(0,0)$

Axis of Symmetry: $x = 0$

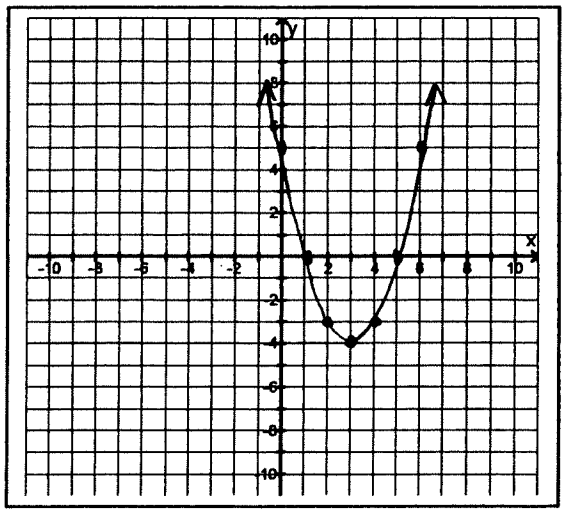
Graph the following transformations of f(x). Check graph on calculator

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

Transformations:

Right 3

Down 4

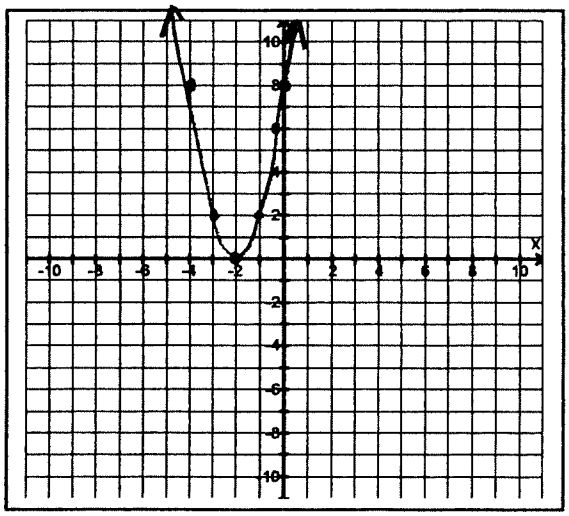


2. $y = 2(x + 2)^2$

Transformations:

Vertical Stretch by 2

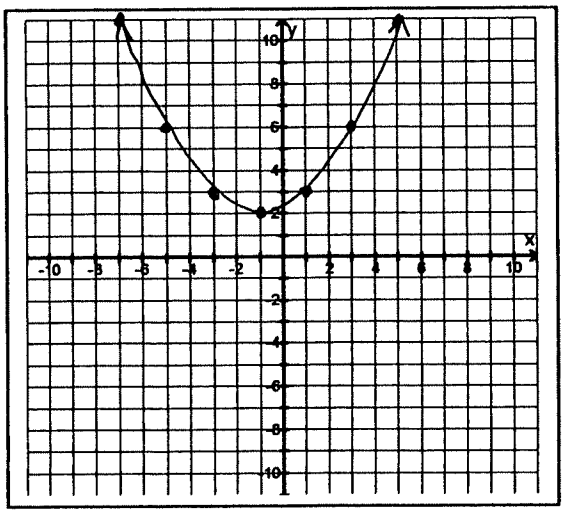
Left 2



N 3-2

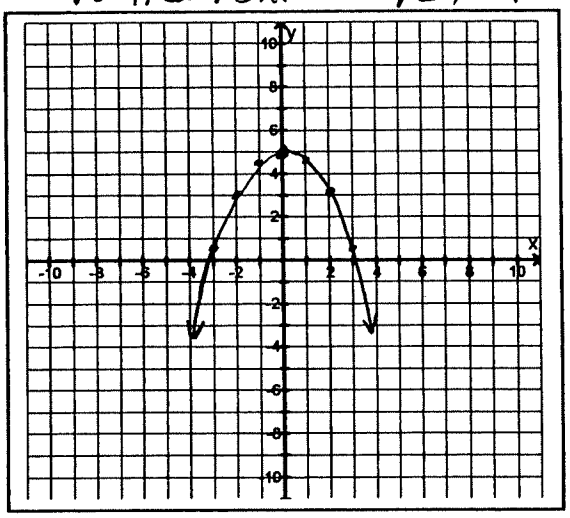
3. $y = \left(\frac{1}{2}(x+1)\right)^2 + 2$

Transformations:
Horizontal Stretch by 2
Left 1, Up 2



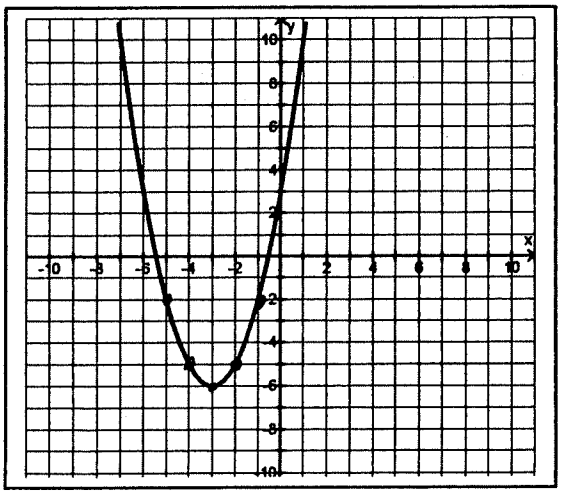
4. $y = -\frac{1}{2}(x)^2 + 5$

Transformations:
y-axis Reflection
Vertical Shrink by $\frac{1}{2}$, Up 5



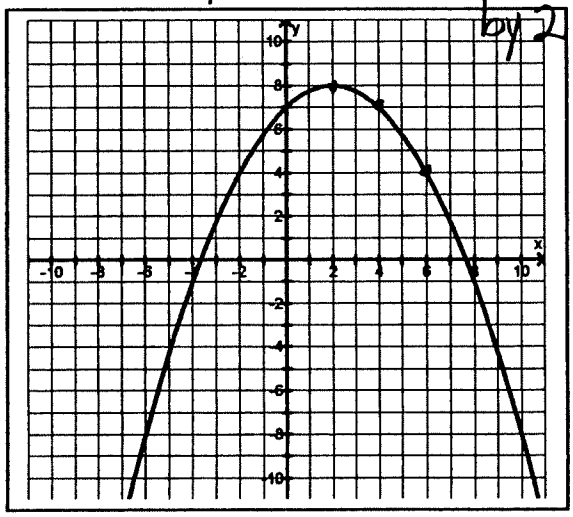
Write the equation of the following functions.

5. Left 3, Down 6



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

6. y-Axis Reflection, Rt 2, Up 8, Horizontal Stretch by 2

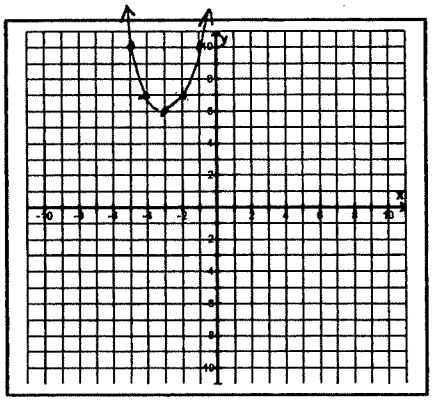


$y = -\left(\frac{1}{2}(x-2)\right)^2 + 8$

N
~~A~~ 3-2

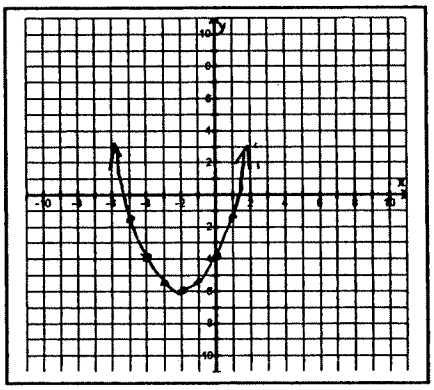
7. $f(x) = (x + 3)^2 + 6$

Left 3
Up 6



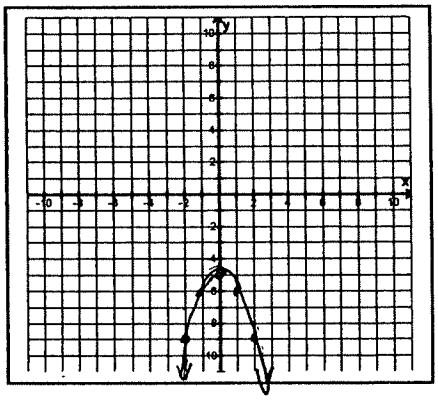
8. $f(x) = \frac{1}{2}(x + 2)^2 - 6$

Vertical Shrink by $\frac{1}{2}$
Left 2
Down 6



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

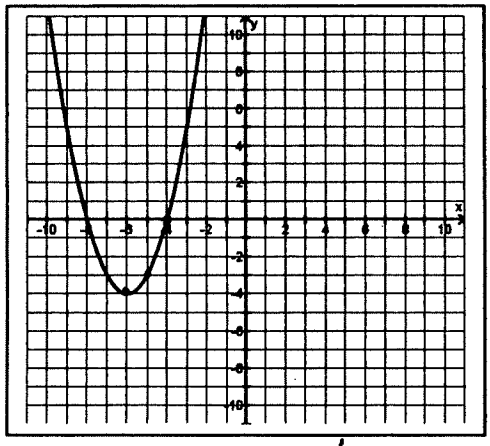
y-axis reflection
Down 5



Write the equation for each transformation of $f(x) = x^2$.

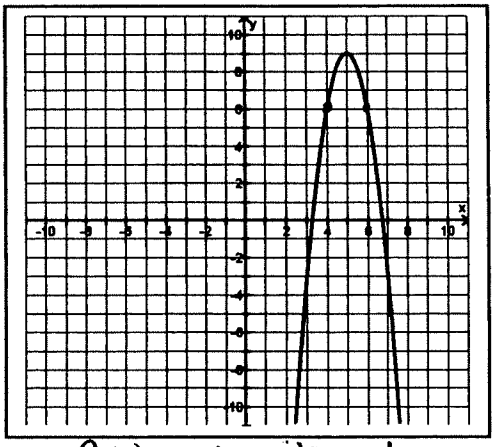
10. $f(x) = (x+6)^2 - 4$

L 6
D 4

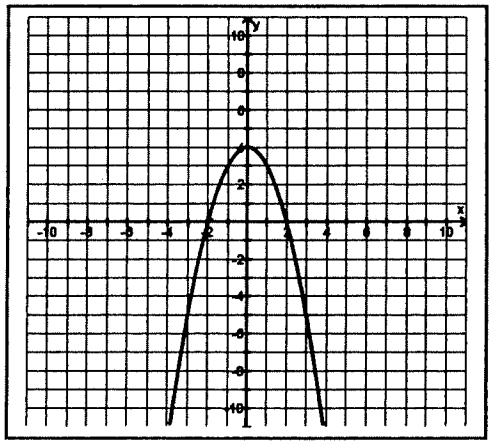


11. $f(x) = -3(x-5)^2 + 9$

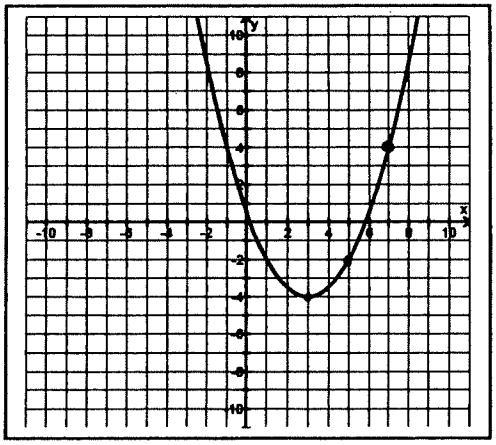
R 5
U 9
Vert. Stretch by 3
y-axis reflec



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



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



N 3-3

Writing Quadratic Functions

Forms of the Quadratic Function

Standard Form: $f(x) = ax^2 + bx + c$

Vertex: $\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$

Y-Intercept: (0, c)

Vertex Form: $f(x) = a(x - h)^2 + k$

Vertex: (h, k)

Axis of Symmetry: $x = h$

Root Form: $f(x) = a(x - r_1)(x - r_2)$

Roots: r_1 and r_2

1. For the function $f(x) = -2x^2 - 12x - 10$, find the following:

Vertex (-3, 8)

Roots (-5, 0), (-1, 0)

Axis of symmetry $x = -3$

y-intercept (0, -10)

Vertex: $x = \frac{12}{2(-2)} = -3$

$f(-3) = -2(-3)^2 - 12(-3) - 10$

$= -18 + 36 - 10 = 8$

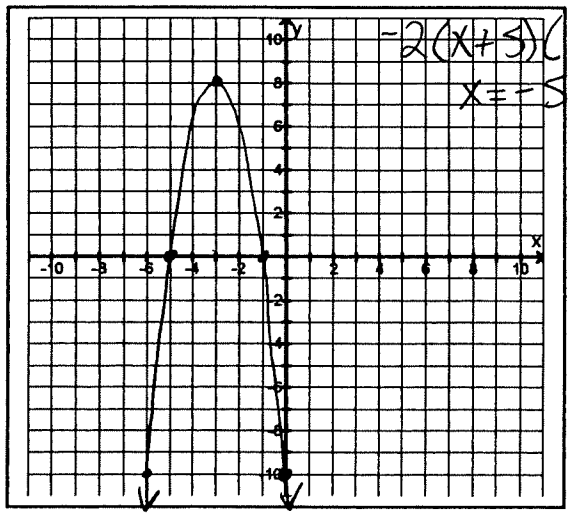
Roots: $-2x^2 - 12x - 10 = 0$

$-2(x^2 + 6x + 5) = 0$

$-2(x+5)(x+1) = 0$

$x = -5 \quad x = -1$

Graph the function.



Write f(x) in all three forms:

Standard: $f(x) = -2x^2 - 12x - 10$

Vertex: $f(x) = -2(x+3)^2 + 8$

Root: $f(x) = -2(x+5)(x+1)$

N 3-3

Use the given information to write an equation for each quadratic function. ~~Leave answers in standard form.~~

1. Write the equation of a quadratic function with roots of (–2, 0) and (3,0) and a y-intercept of –12.

$r_1=-2, r_2=3, (0,-12)$

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

$-12=a(0+2)(0-3)$

$-12=-6a \quad a=2$

$\boxed{y=2(x+2)(x-3)}$

2. Write the equation of a quadratic function with f(-1) = -7 and a maximum value at f(2) = -1. Vertex $(2,-1)$, through $(-1,-7)$

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

$-7=a(-1-2)^2-1$

$-7=9a-1$

$-6=9a \quad a=\frac{-2}{3}$

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

3. Write the equation of a quadratic function with a minimum point at f(3) = -5 and f(1) = 2. Vertex $(3,-5)$, through $(1,2)$

$y=a(x-3)^2-5$

$2=a(1-3)^2-5$

$2=4a-5$

$7=4a \quad a=\frac{7}{4}$

$\boxed{y=\frac{7}{4}(x-3)^2-5}$

4. Write the equation of a quadratic function with zeros at (–1,0) and (3,0) and a maximum value of 8. $r_1=-1, r_2=3$ Vertex $(?,8)$

$x=\frac{-1+3}{2}=1$

Vertex $=(1,8)$

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

$8=a(1+1)(1-3)$

$8=-4a$

$\boxed{y=-2(x+1)(x-3)}$

A 3-2

Name _____ Date_____ Period_____

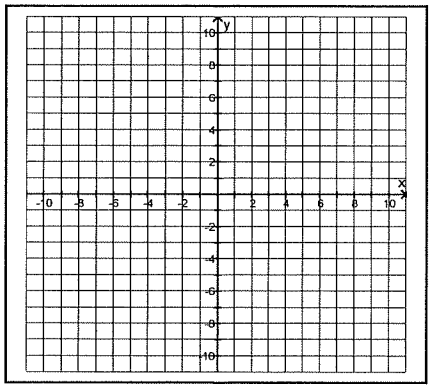
Graphing Quadratic Functions

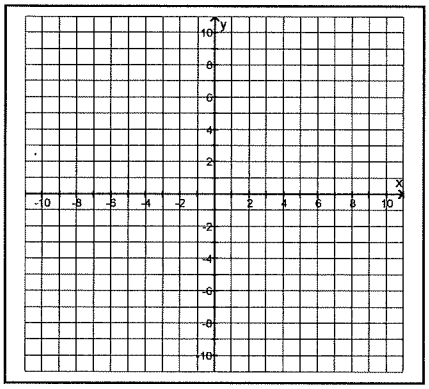
Describe and graph each transformation of $f(x) = x^2$.

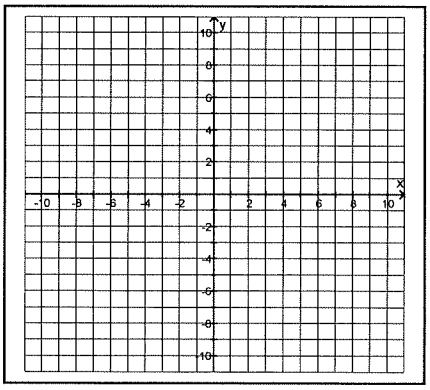
1. $f(x) = 2x^2 - 3$

2. $f(x) = (x - 2)^2 - 7$

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



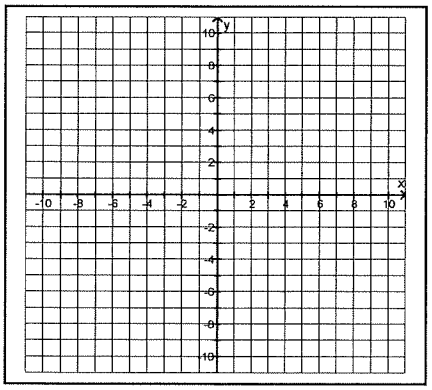


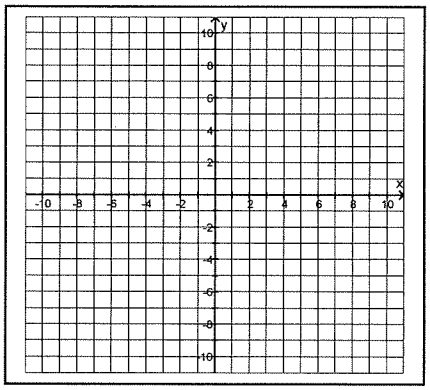


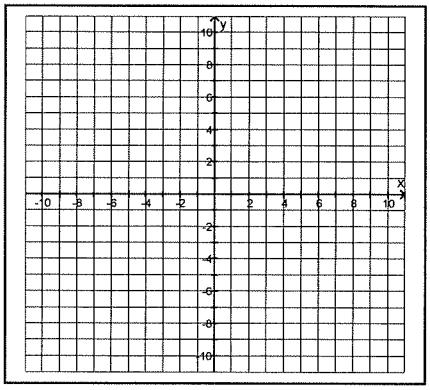
4. $f(x) = -2(x - 1)^2 + 7$

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

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





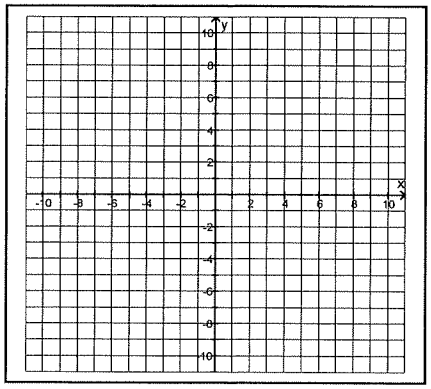


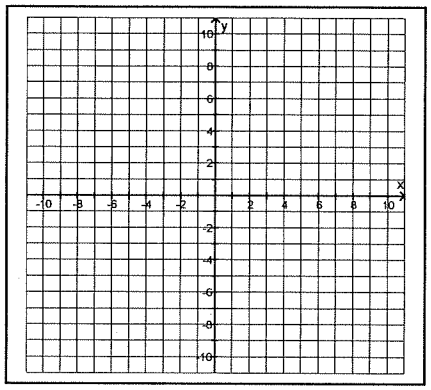
A 3-2

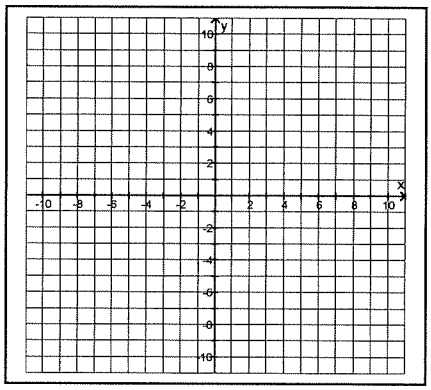
7. $f(x) = (x + 3)^2 + 6$

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

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

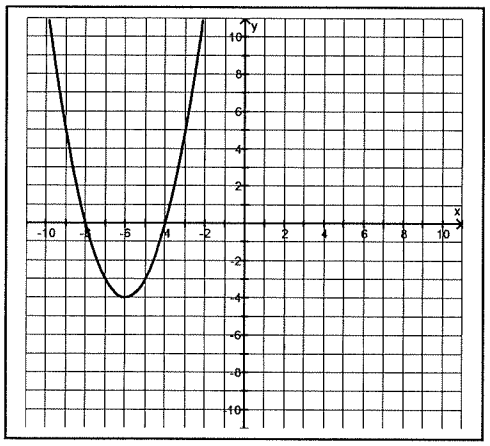






Write the equation for each transformation of $f(x) = x^2$.

10. _____



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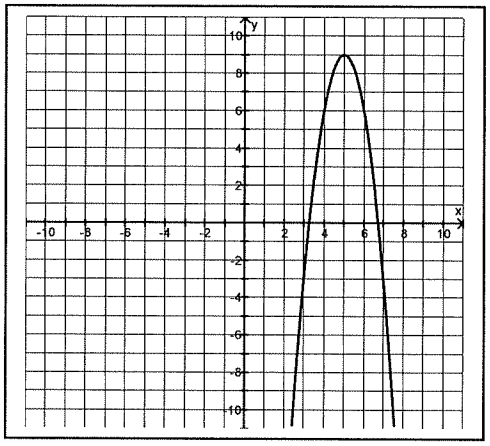

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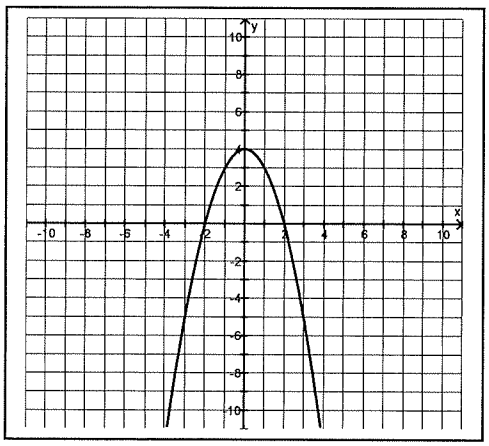
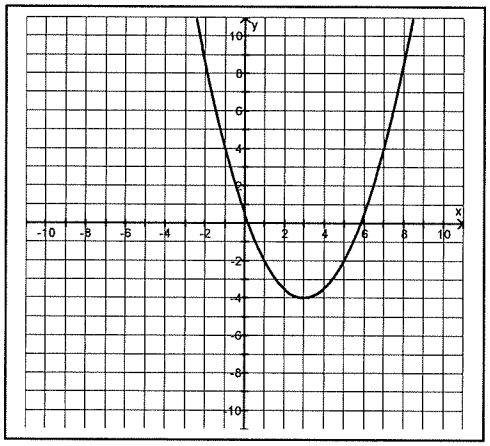


13. _____



A 3-3

Name _____ Date_____ Period_____

Writing Quadratic Functions

Analyze the function algebraically.

1. $f(x) = -4x^2 + 32x - 48$

a) Vertex _____

b) X-Intercepts _____

c) Y-Intercept _____

d) Does f(x) have a maximum or minimum? _____

e) Where does the max or min occur? _____

f) What is the max or min? _____

g) Domain _____

h) Range _____

i) Axis of Symmetry _____

Use the given information to write the equation of each quadratic function.

2. Its graph is a parabola with x-intercepts (2, 0) and (–1, 0) and y-intercept (0, 6).

equation: _____

3. The function has zeros (5, 0) and (1, 0) and f(0) = 1.

equation: _____

4. Its graph is a parabola with vertex (4, 8) and passes through the origin.

equation: _____

5. The maximum value of g is g(-1) = 6, and g(-3) = 4.

equation: _____

6. The vertex is (4, -1) and contains the point (2, 3).

equation: _____

7. The intercepts of the parabola are (-1, 0), (5, 0), and (0, 15).

equation: _____