ONLINE WORKSHEET PACKAGE

ALGEBRA 1

QUADRATIC FUNCTION

- Quadratic Function Graphs
- Graphing with Chart
- Three Forms of Quadratic Function
- Finding Vertex Point and Intercepts

DR AHN MATH & LEARNING CENTER

YouTube

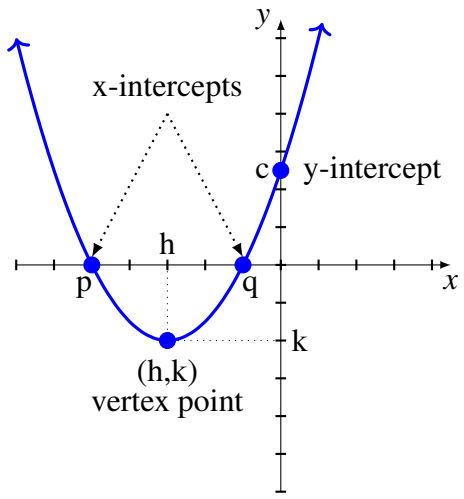
Quadratic Function Graphs

$y = ax^2 + bx + c$: Standard Form

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

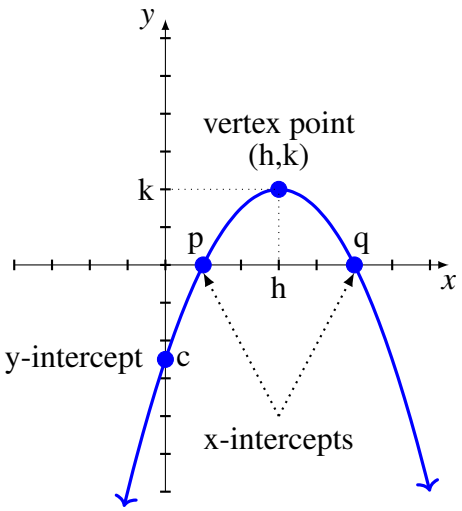
$y = a(x-p)(x-q)$: Factored Form (Intercept Form)

$a > 0$



- Vertex : (h,k)
- X-intercepts : $(p,0),(q,0)$
- Y-intercept : $(0,c)$
- Domain : (-∞, ∞)
- Range : $[k,\infty)$
- Minimum : k
- Axis of Symmetry : $x = h$

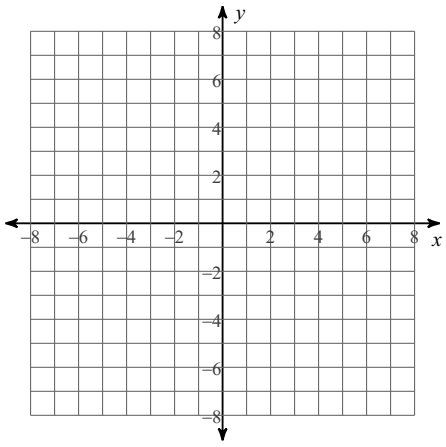
$a < 0$



- Vertex : (h,k)
- X-intercepts : $(p,0),(q,0)$
- Y-intercept : $(0,c)$
- Domain : (-∞, ∞)
- Range : $(-\infty, k]$
- Maximum : k
- Axis of Symmetry : $x = h$

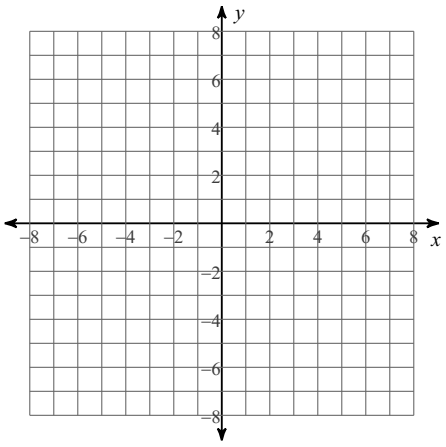
YouTube

1) $y = (x-5)^2 - 4$



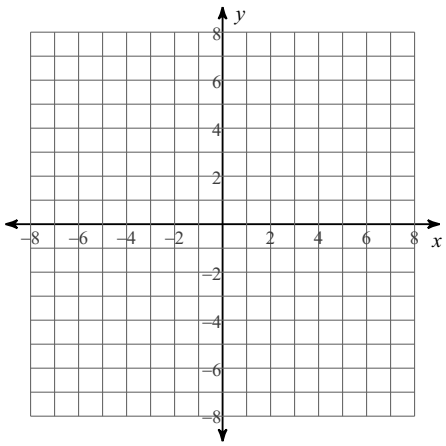
x	y

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



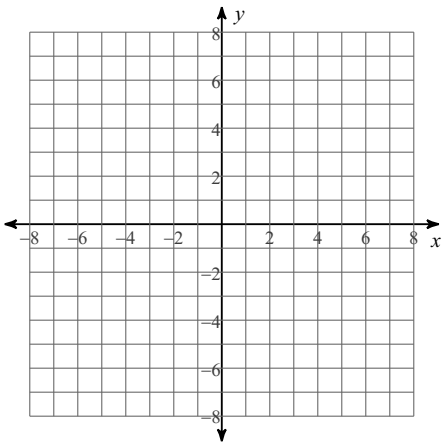
x	y

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



x	y

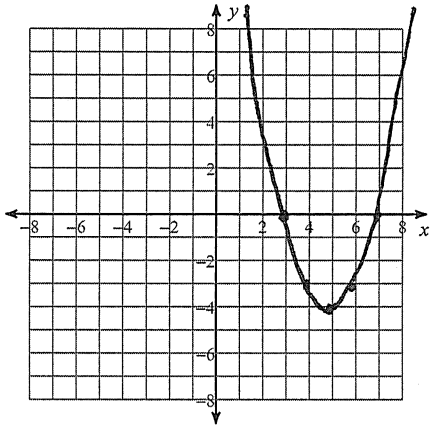
4) $y = (x+1)^2 + 3$



x	y

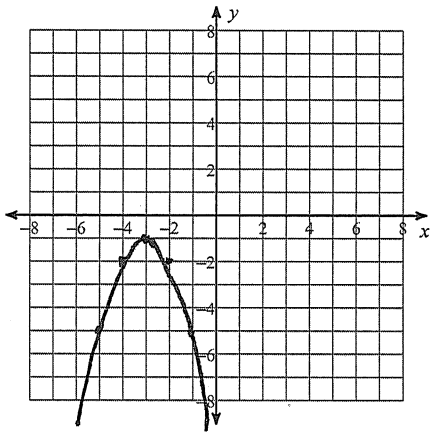
YouTube

1) $y=(x-5)^2-4$



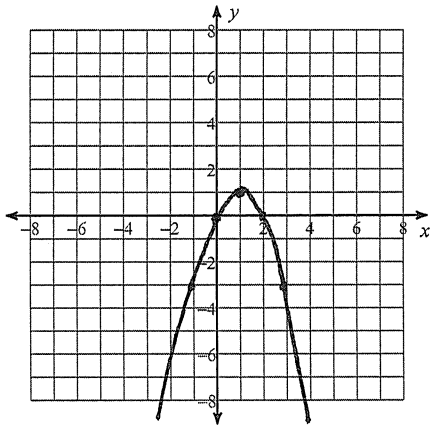
x	y
3	0
4	-3
5	-4
6	-3
7	0

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



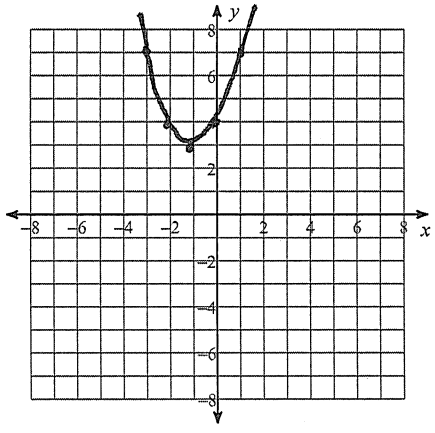
x	y
-5	-5
-4	-2
-3	-1
-2	-2
-1	-5

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



x	y
-1	-3
0	0
1	1
2	0
3	-3

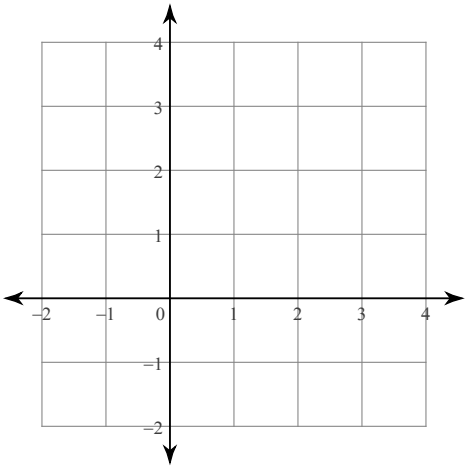
4) $y=(x+1)^2+3$



x	y
-3	7
-2	4
-1	3
0	4
1	7

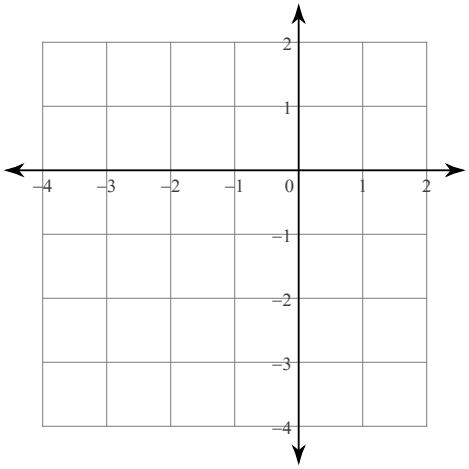
YouTube

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



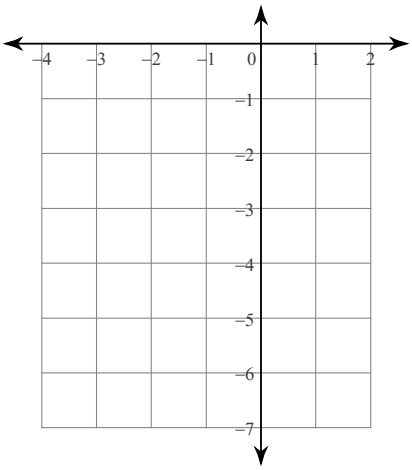
x	y

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



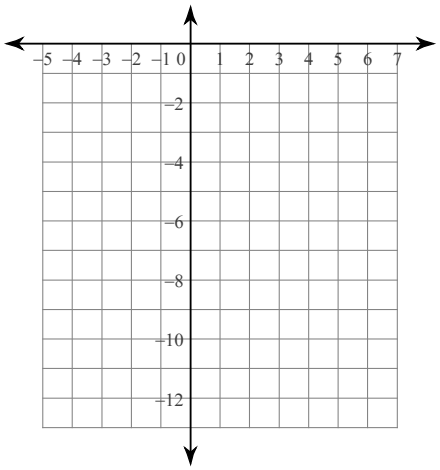
x	y

3) $y = -x^2 - 4x - 6$



x	y

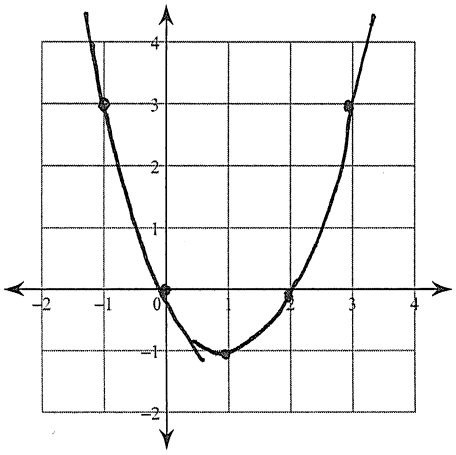
4) $y = -2x^2 + 12x - 22$



x	y

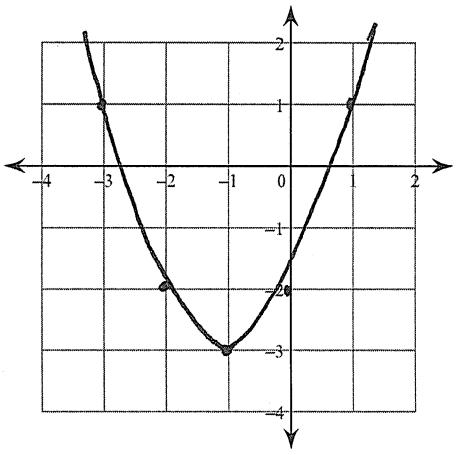
YouTube

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



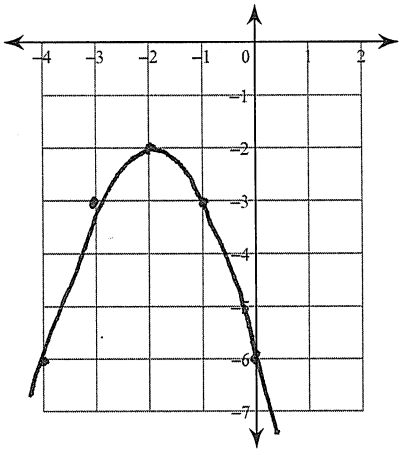
x	y
-1	3
0	0
1	-1
2	0
3	3

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



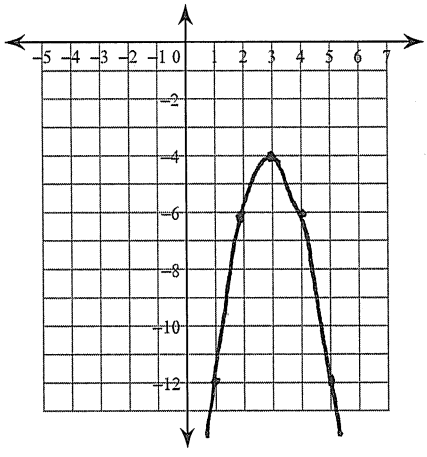
x	y
-3	1
-2	-2
-1	-3
0	-2
1	1

3) $y = -x^2 - 4x - 6$



x	y
-4	-6
-3	-3
-2	-2
-1	-3
0	-6

4) $y = -2x^2 + 12x - 22$



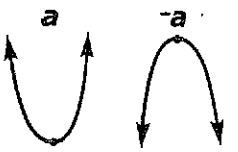
x	y
1	-12
2	-6
3	-4
4	-6
5	-12

Name _____

Graphing Quadratic Functions

Quick Review

1. The standard form of a quadratic function is $y = ax^2 + bx + c$.
2. The graph of a quadratic function is a parabola. If a is positive, the graph opens up. If a is negative, the graph opens down.

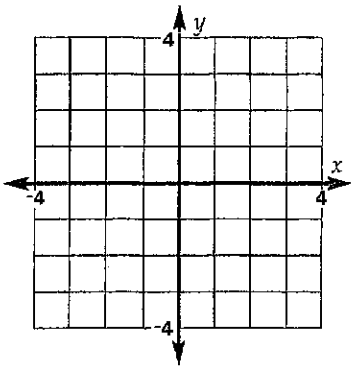


3. The vertex is the lowest point of a parabola that opens up or the highest point of a parabola that opens down. The x-coordinate of the vertex is $\frac{-b}{2a}$.

For each function, find the coordinates of the vertex. Then finish the table of values. Plot the points and connect them to complete the graph.

1. $y = x^2$ Vertex _____

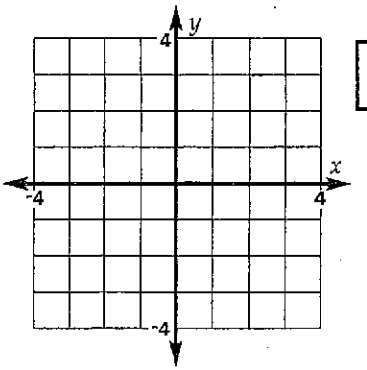
x	y
-2	
-1	
0	
$1\frac{1}{2}$	
2	



T A

2. $y = -x^2 + x - 1$ Vertex _____

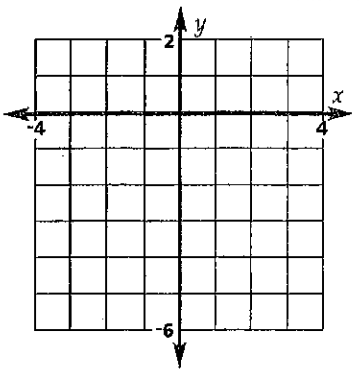
x	y
-1	
0	
$\frac{1}{2}$	
1	
2	



N G !

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

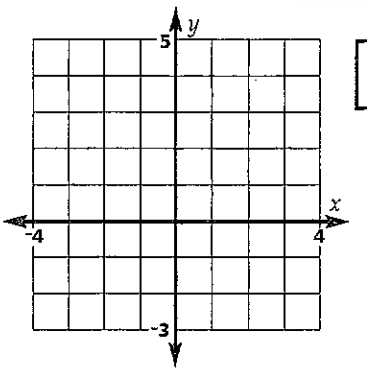
x	y
-2	
$-1\frac{1}{2}$	
-1	
0	
$\frac{1}{2}$	



T S

4. $y = 3x^2 - 6x + 1$ Vertex _____

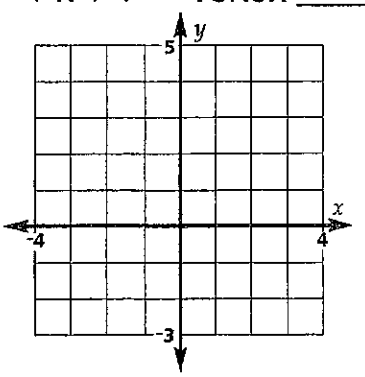
x	y
0	
$\frac{1}{2}$	
1	
2	
$2\frac{1}{2}$	



N D I

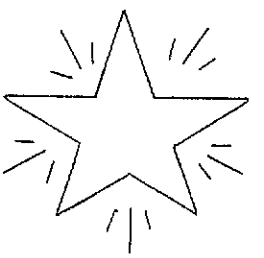
5. $y = \frac{1}{2}x^2 + x + 1$ Vertex _____

x	y
-3	
-2	
-1	
0	
2	



O U

Write the code letters above the matching vertex coordinates to reveal a message.



_____

$(-1, \frac{1}{2})$ $(-1, 0)$ $(0, 0)$ $(1, -2)$ $(\frac{1}{2}, -\frac{3}{4})$

Name _____ **Graphing Quadratic Functions**

Quick Review

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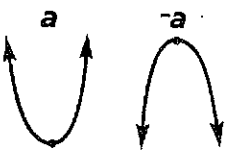
2. The graph of a quadratic function is a parabola. If a is positive, the graph opens up. If a is negative, the graph opens down.

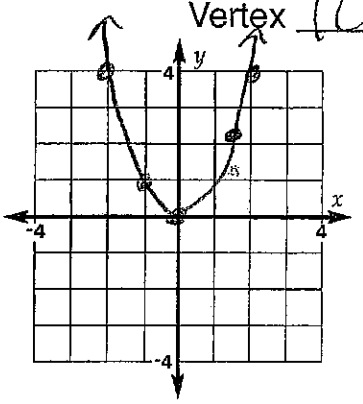


3. The vertex is the lowest point of a parabola that opens up or the highest point of a parabola that opens down. The x-coordinate of the vertex is $\frac{-b}{2a}$.

For each function, find the coordinates of the vertex. Then finish the table of values. Plot the points and connect them to complete the graph.

1. $y = x^2$ Vertex $(0, 0)$

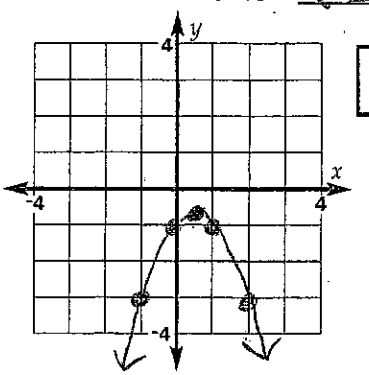
x	y
-2	4
-1	1
0	0
$1\frac{1}{2}$	$\frac{9}{4}$
2	4



T A

2. $y = -x^2 + x - 1$ Vertex $(\frac{1}{2}, -\frac{3}{4})$

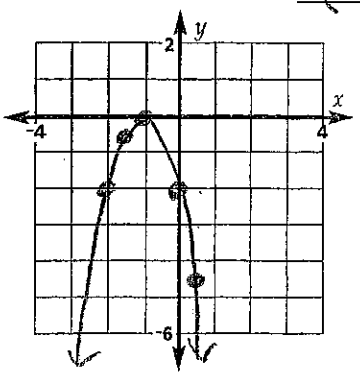
x	y
-1	-3
0	-1
$\frac{1}{2}$	$-\frac{3}{4}$
1	-1
2	-3



N G !

3. $y = -2x^2 - 4x - 2$ Vertex $(-1, 0)$

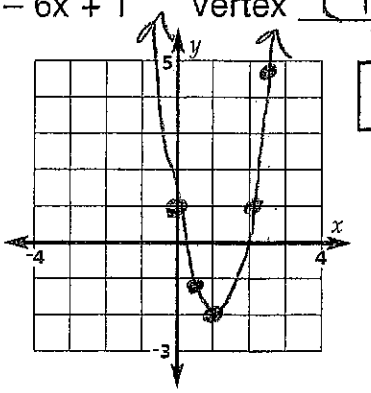
x	y
-2	-2
$-1\frac{1}{2}$	$-\frac{1}{2}$
-1	0
0	-2
$\frac{1}{2}$	$-\frac{9}{2}$



T S

4. $y = 3x^2 - 6x + 1$ Vertex $(1, -2)$

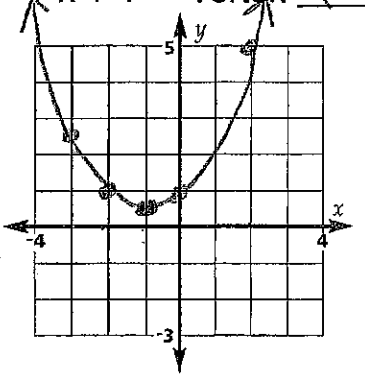
x	y
0	1
$\frac{1}{2}$	$-\frac{5}{4}$
1	-2
2	1
$2\frac{1}{2}$	$\frac{5}{4}$



N D I

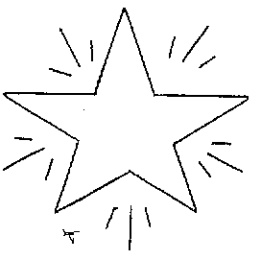
5. $y = \frac{1}{2}x^2 + x + 1$ Vertex $(-1, \frac{1}{2})$

x	y
-3	$\frac{5}{2}$
-2	1
-1	$\frac{1}{2}$
0	1
2	5



O U

Write the code letters above the matching vertex coordinates to reveal a message.



OU TS TA NDING!

$(-1, \frac{1}{2})$ $(-1, 0)$ $(0, 0)$ $(1, -2)$ $(\frac{1}{2}, -\frac{3}{4})$

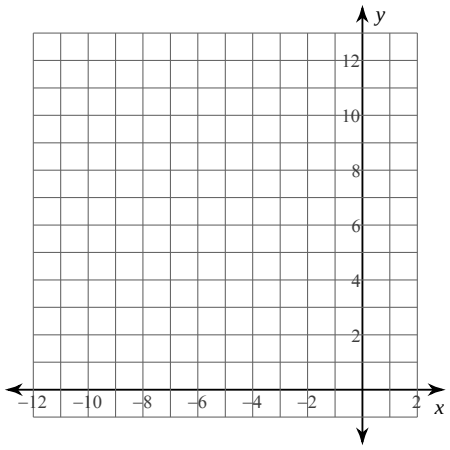
Name_____

Graphing Quadratic Functions

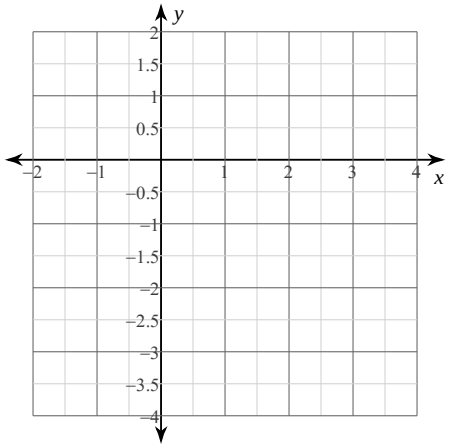
Date_____ Period____

Sketch the graph of each function.

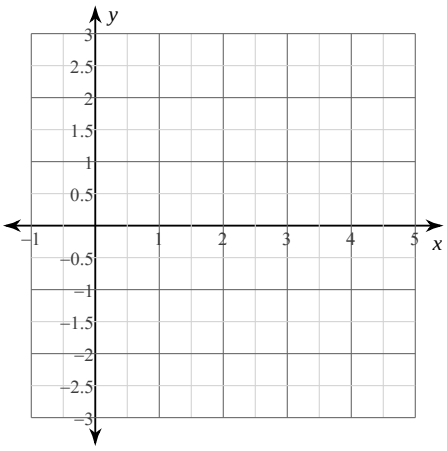
1) $y = 3x^2$



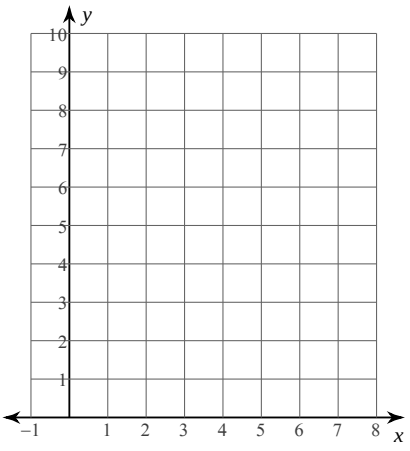
2) $y = -\frac{1}{2}x^2$



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



4) $y = 2x^2 - 16x + 33$



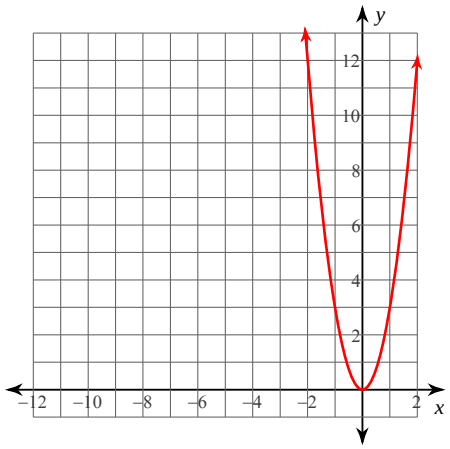
Kuta Software - Infinite Algebra 1 Name_____

Graphing Quadratic Functions

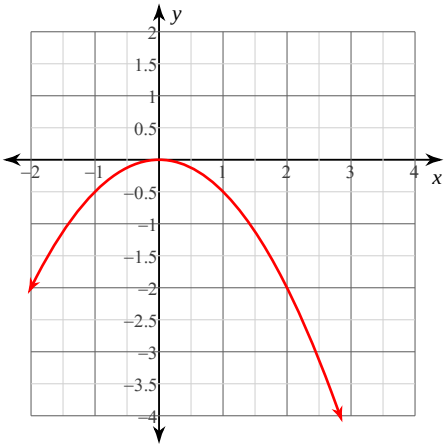
Date_____ Period____

Sketch the graph of each function.

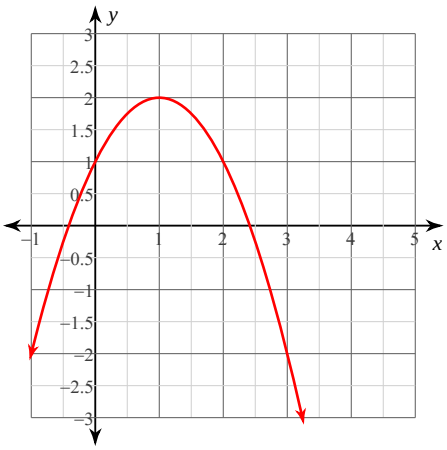
1) $y = 3x^2$



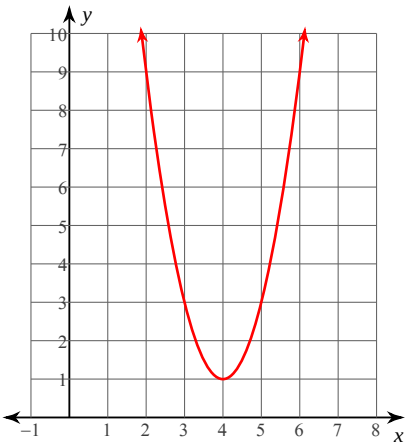
2) $y = -\frac{1}{2}x^2$



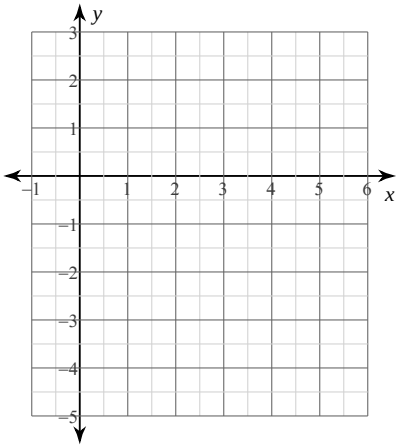
3) $y = -x^2 + 2x + 1$



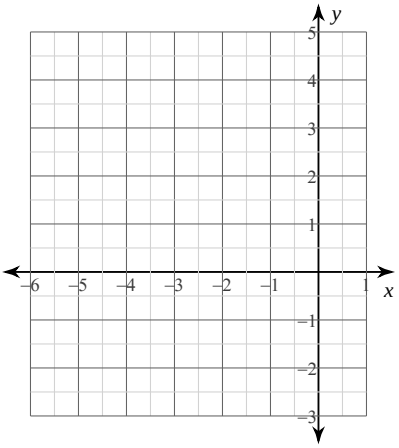
4) $y = 2x^2 - 16x + 33$



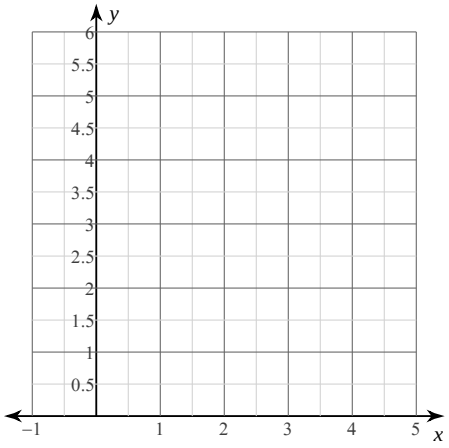
5) $y = x^2 - 8x + 13$



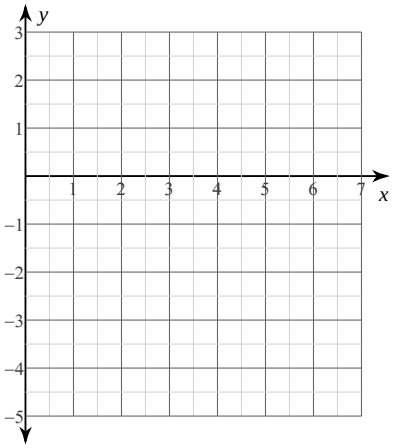
6) $y = -x^2 - 8x - 13$



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



8) $y = \frac{1}{2}(x-4)^2 - 2$



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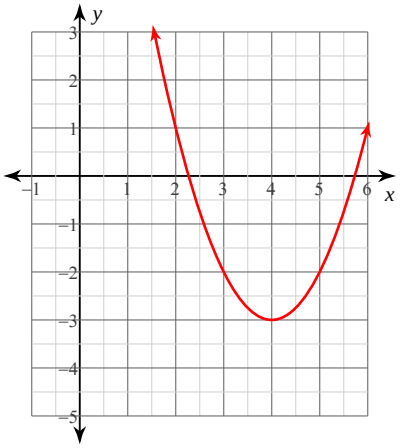
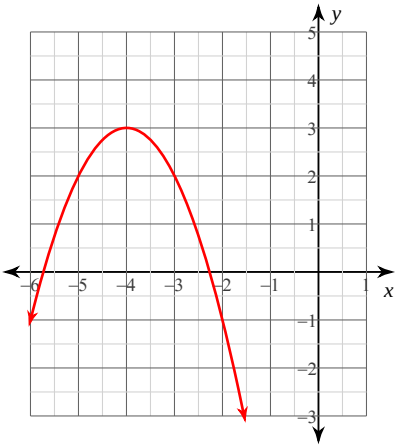
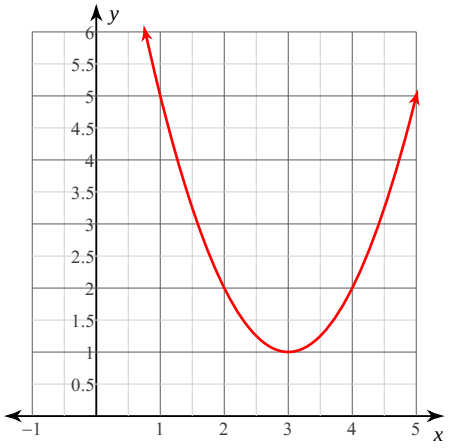


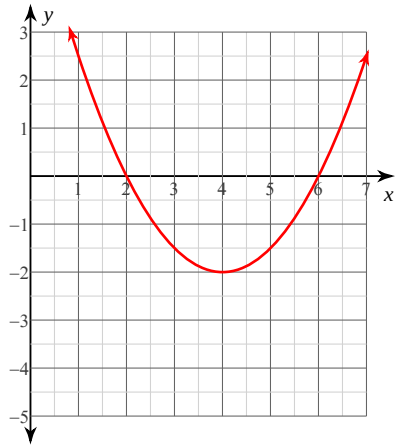
6) $y = -x^2 - 8x - 13$



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



8) $y = \frac{1}{2}(x - 4)^2 - 2$

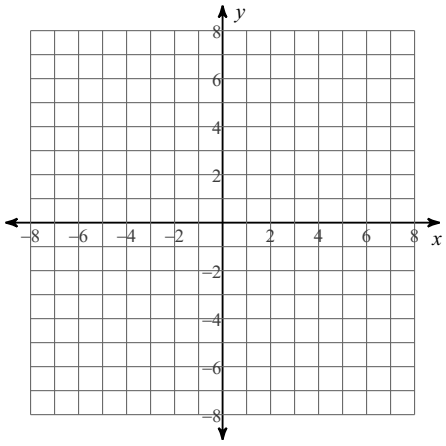


Graphs of Parabolas - Vertex Form

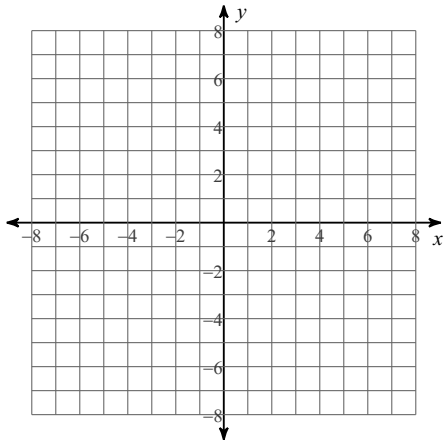
Date_____ Period____

Identify the vertex, axis of symmetry, direction of opening, min/max value, y-intercept, and x-intercepts of each. Then sketch the graph.

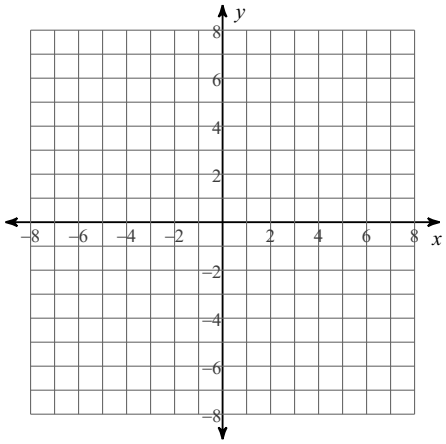
1) $y = -(x - 4)^2 - 1$



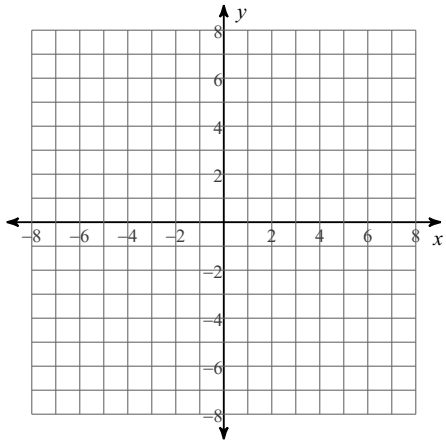
2) $y = -(x + 3)^2 - 1$



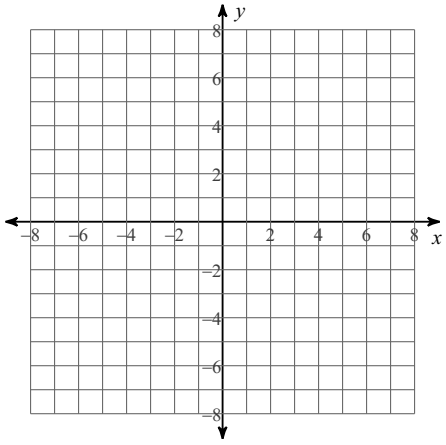
3) $y = -(x + 3)^2 + 4$



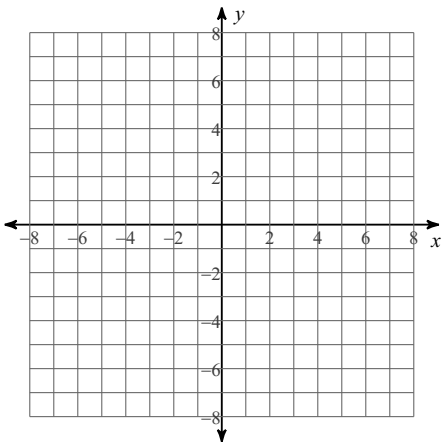
4) $y = -(x + 3)^2$



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

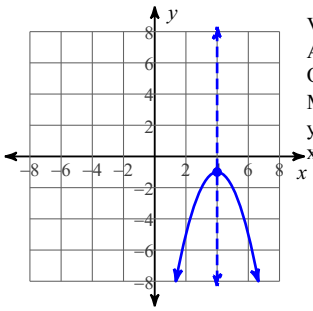


6) $y = (x - 5)^2 + 1$



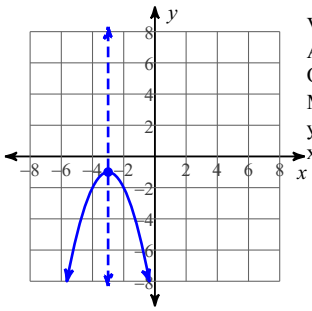
Answers to Graphs of Parabolas - Vertex Form (ID: 2)

1)



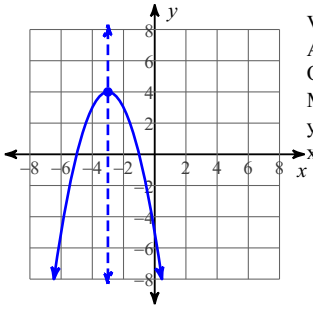
Vertex: $(4, -1)$
Axis of Sym.: $x = 4$
Opens: Down
Max value = -1
y-int: -17
x-int: None

2)



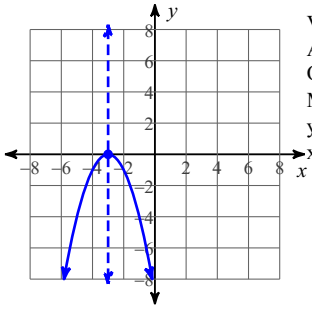
Vertex: $(-3, -1)$
Axis of Sym.: $x = -3$
Opens: Down
Max value = -1
y-int: -10
x-int: None

3)



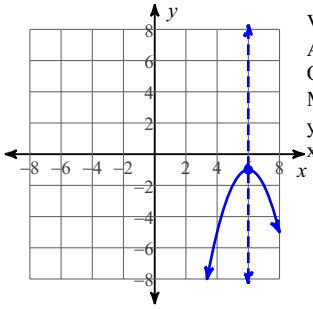
Vertex: $(-3, 4)$
Axis of Sym.: $x = -3$
Opens: Down
Max value = 4
y-int: -5
x-int: -5 and -1

4)



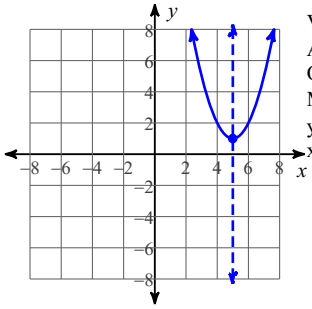
Vertex: $(-3, 0)$
Axis of Sym.: $x = -3$
Opens: Down
Max value = 0
y-int: -9
x-int: -3

5)



Vertex: $(6, -1)$
Axis of Sym.: $x = 6$
Opens: Down
Max value = -1
y-int: -37
x-int: None

6)



Vertex: $(5, 1)$
Axis of Sym.: $x = 5$
Opens: Up
Min value = 1
y-int: 26
x-int: None

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Standard Form $y = ax^2 + bx + c$ $\qquad y = 2x^2 - 4x - 6$

- Vertex : $h = -\dfrac{b}{2a}$
  $k = ah^2 + bh + c$
- X-intercepts : roots of $ax^2 + bx + c = 0$
- **Y-intercept** : $(0, c)$

Vertex Form $y = a(x-h)^2 + k$ $\qquad y = 2(x-1)^2 - 8$

- **Vertex** : (h, k)
- X-intercepts : roots of $a(x-h)^2 + k = 0$
- Y-intercept : $c = ah^2 + k$

Factored Form $y = a(x-p)(x-q)$ $\qquad y = 2(x-3)(x+1)$

- Vertex : $h = \dfrac{p+q}{2}$
  $k = a(h-p)(h-q)$
- **X-intercepts** : $(p, 0), (q, 0)$
- Y-intercept : $c = a(-p)(-q)$

Standard Form $y = ax^2 + bx + c$

- Vertex : $h = -\dfrac{b}{2a}$
  $k = ah^2 + bh + c$
- X-intercepts : roots of $ax^2 + bx + c = 0$
- **Y-intercept** : $(0, c)$

$y = 2x^2 - 4x - 6$

- Vertex : $h = -\frac{4}{2 \cdot 2} = 1$
  $k = 2 \cdot 2^2 - 4 \cdot 2 - 6 = -8$
  $\Rightarrow (1, -8)$
- X-intercepts : $2x^2 - 4x - 6 = 0$
  $2(x^2 - 2x - 3) = 0$
  $2(x-3)(x+1) = 0$
  $\Rightarrow (3,0), (-1,0)$
- Y-intercept : $(0, -6)$

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

- **Vertex** : (h, k)
- X-intercepts : roots of $a(x-h)^2 + k = 0$
- Y-intercept : $c = ah^2 + k$

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

- Vertex : $(1, -8)$
- X-intercepts : $2(x-1)^2 - 8 = 0$
  $2(x-1)^2 = 8$
  $(x-1)^2 = 4$
  $x - 1 = \pm 2$
  $x = \pm 2 + 1$
  $\Rightarrow (3,0), (-1,0)$
- Y-intercept : $c = 2 \cdot (-1)^2 - 8$
  $\Rightarrow (0, -6)$

Factored Form $y = a(x-p)(x-q)$

- Vertex : $h = \dfrac{p+q}{2}$
  $k = a(h-p)(h-q)$
- **X-intercepts** : $(p, 0), (q, 0)$
- Y-intercept : $c = a(-p)(-q)$

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

- Vertex : $h = \frac{3-1}{2} = 1$
  $k = 2(-2)(2) = -8$
  $\Rightarrow (1, -8)$
- X-intercepts : $(3,0), (-1,0)$
- Y-intercept : $c = 2(-3)(1)$
  $\Rightarrow (0, -6)$

YouTube

Finding Vertex Point

- Vertex Form

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

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

- Standard Form

$y = x^2 - 4x + 5$ $y = 2x^2 - 8x + 3$ $y = -x^2 + 6x + 10$

$y = 2x^2 - 6x + 1$ $y = -2x^2 + 10x + 1$ $y = \frac{1}{2}x^2 - 2x + 4$

- Factored Form

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

$y = 4x(x-4)$ $y = 3(x+2)(x-10)$ $y = -(x-1)(x-5)$

< Finding Vertex Point >

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

$(-2, 3)$

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

$(1, 1)$

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

$(1, 0)$

$y = 3x^2-4$

$(0, -4)$

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

$(1, 3)$

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

$(1, -2)$

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

$(2, 1)$

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

$(2, -5)$

$y = -x^2+6x+10$

$(3, 19)$

$y = 2x^2-6x+1$

$\left(\frac{3}{2}, -\frac{7}{2}\right)$

$y = -2x^2+10x+1$

$\left(\frac{5}{2}, \frac{21}{2}\right)$

$y = \frac{1}{2}x^2-2x+4$

$(2, 2)$

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

$(2, -2)$

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

$(1, -27)$

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

$(3, -2)$

$y = 4x(x-4)$

$(2, -16)$

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

$(4, -108)$

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

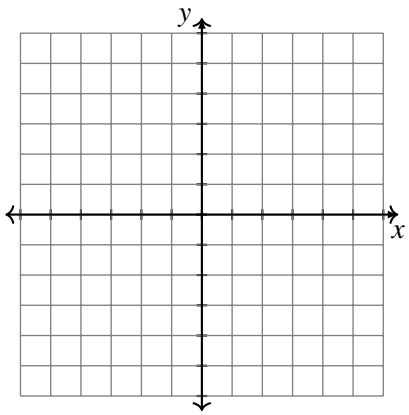
$(3, 4)$

YouTube

Vertex Form : *Finding Vertex and Intercepts*

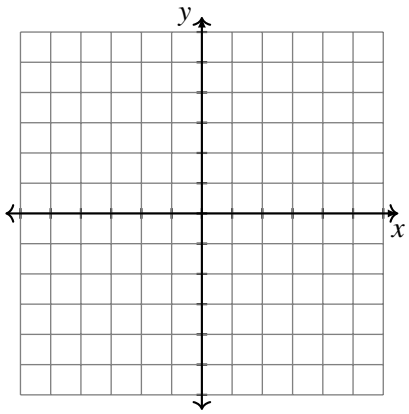
$y = 2(x+1)^2 - 5$

- *Vertex*
- $x-$ *intercepts*
- $y-$ *intercept*



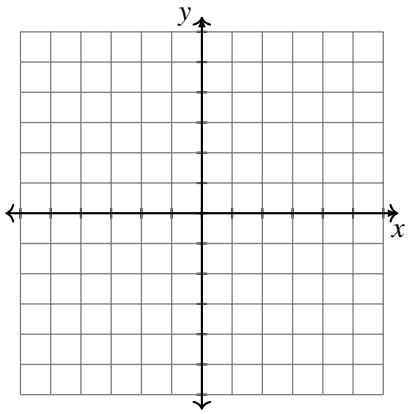
$y = -(x+2)^2 - 1$

- *Vertex*
- $x-$ *intercepts*
- $y-$ *intercept*



$y = -\frac{1}{3}x^2 + 4$

- *Vertex*
- $x-$ *intercepts*
- $y-$ *intercept*



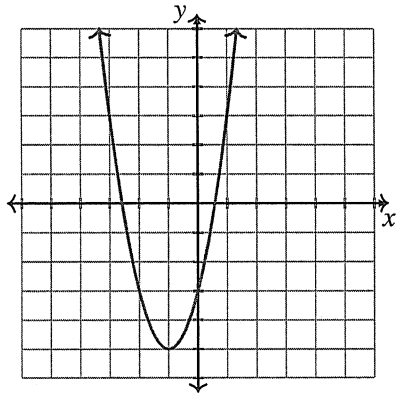
Vertex Form : Finding Intercepts and Vertex Points

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

- *Vertex* $(-1, -5)$
- *x – intercepts* $2(x+1)^2 - 5 = 0 \quad (x+1)^2 = \frac{5}{2}$

  $x+1 = \pm\frac{\sqrt{5}}{\sqrt{2}} \quad x = -1 \pm \frac{\sqrt{10}}{2}$
- *y – intercept*

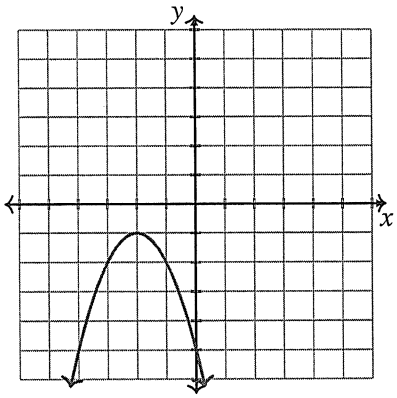
  $2(1)^2 - 5 = -3$



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

- *Vertex* $(-2, -1)$
- *x – intercepts* $-(x+2)^2 - 1 = 0$

  $(x+2)^2 = -1$ No roots
- *y – intercept* $-(2)^2 - 1 = -5$



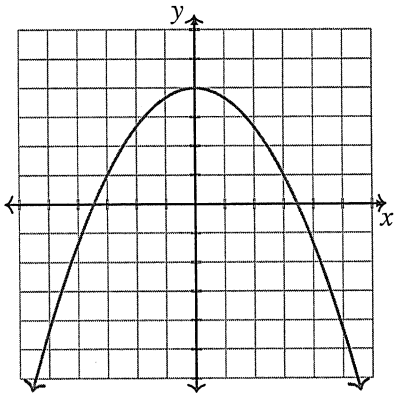
$y = -\frac{1}{3}x^2 + 4$

- *Vertex* $(0, 4)$
- *x – intercepts* $-\frac{1}{3}x^2 + 4 = 0$

  $x^2 = 12$

  $x = \pm 2\sqrt{3}$
- *y – intercept*

  4



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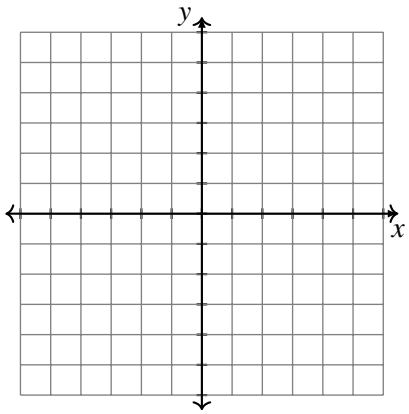
Standard Form :*Finding Vertex and Intercepts*

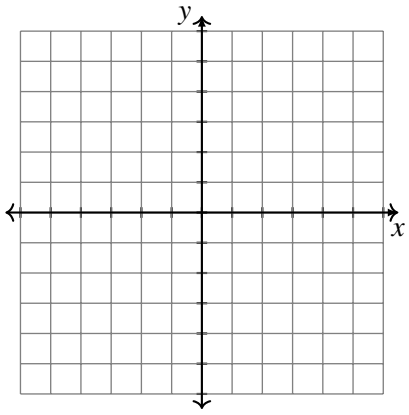
$y = 2x^2 - 3x - 4$

- *Vertex*
- $x-intercepts$
- $y-intercept$



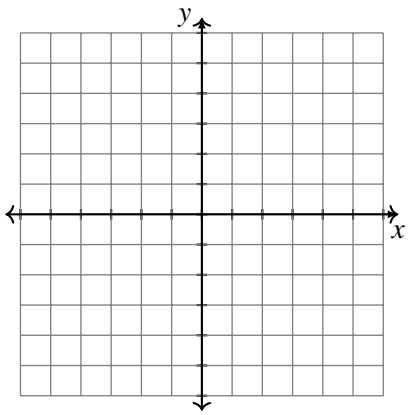
$y = -x^2 - 4x - 5$

- *Vertex*
- $x-intercepts$
- $y-intercept$



$y = \frac{1}{2}x^2 - 3x + \frac{9}{2}$

- *Vertex*
- $x-intercepts$
- $y-intercept$



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

- *Vertex* $h = \frac{3}{4}$ $\left(\frac{3}{4}, -\frac{41}{8}\right)$

  $k = 2\left(\frac{3}{4}\right)^2 - 3\left(\frac{3}{4}\right) - 4 = -\frac{41}{8}$

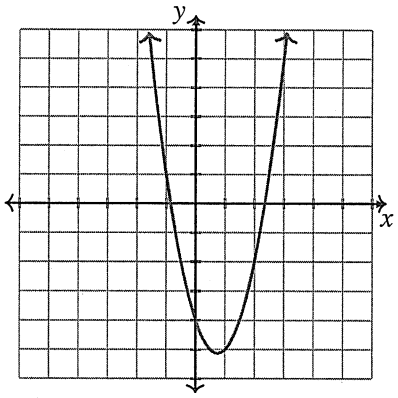
- *x – intercepts* $2x^2 - 3x - 4 = 0$

  $x = \frac{3 \pm \sqrt{9 - 4(-8)}}{4}$

  $= \frac{3 \pm \sqrt{41}}{4}$

- *y – intercept*

  -4



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

- *Vertex* $h = \frac{4}{-2} = -2$ $(-2, -1)$

  $k = -(-2)^2 - 4(-2) - 5 = -1$

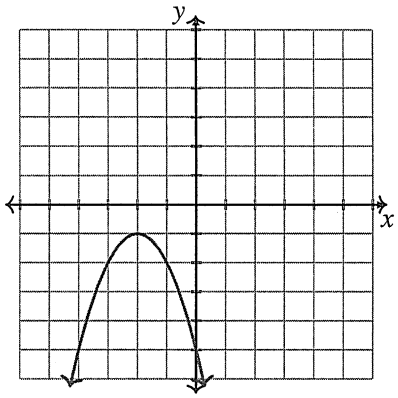
- *x – intercepts* $-x^2 - 4x - 5 = 0$

  $x^2 + 4x + 5 = 0$ No roots

  $D = 16 - 4 \cdot 5 < 0$

- *y – intercept*

  -5



$y = \frac{1}{2}x^2 - 3x + \frac{9}{2}$

- *Vertex* $h = \frac{3}{1} = 3$ $(3, 0)$

  $k = \frac{1}{2}(3)^2 - 3(3) + \frac{9}{2} = 0$

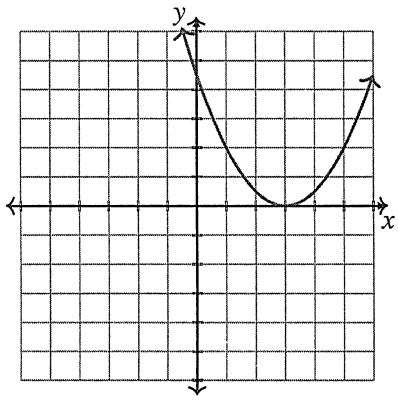
- *x – intercepts* $\frac{1}{2}x^2 - 3x + \frac{9}{2} = 0$

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

  $(x-3)^2 = 0 \quad x = 3$

- *y – intercept*

  $\frac{9}{2}$

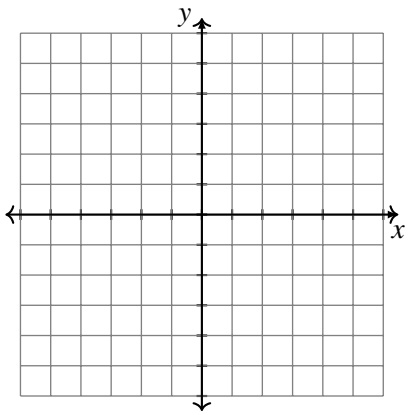


YouTube

Factored Form : *Finding Vertex and Intercepts*

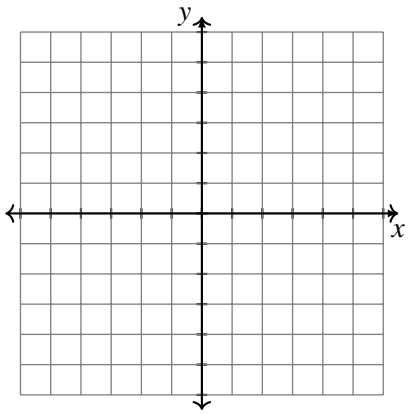
$$y = -\frac{1}{2}(x+1)(x-5)$$

- *Vertex*
- $x-intercepts$
- $y-intercept$



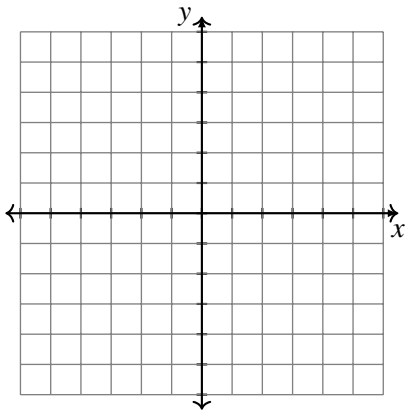
$$y = 2x(x-3)$$

- *Vertex*
- $x-intercepts$
- $y-intercept$



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

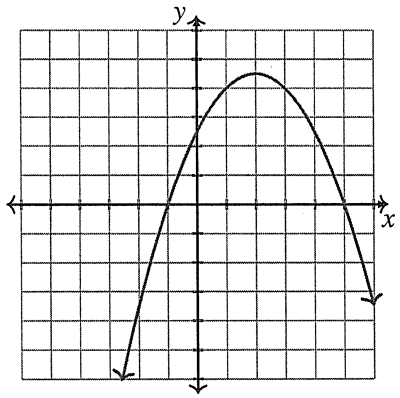
- *Vertex*
- $x-intercepts$
- $y-intercept$



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

- *Vertex* $h = \frac{-1+5}{2} = 2 \quad (2, \frac{9}{2})$

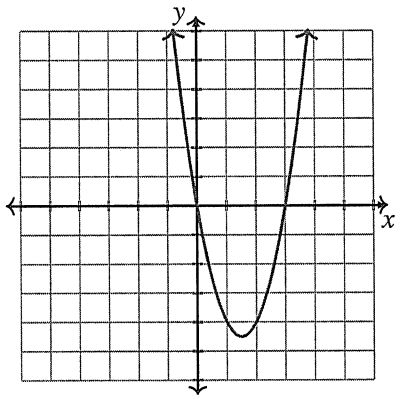
  $k = -\frac{1}{2}(3)(-3) = \frac{9}{2}$
- $x-$*intercepts* $-1, 5$
- $y-$*intercept* $-\frac{1}{2}(1)(-5) = \frac{5}{2}$



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

- *Vertex* $h = \frac{0+3}{2} = \frac{3}{2} \quad (\frac{3}{2}, -\frac{9}{2})$

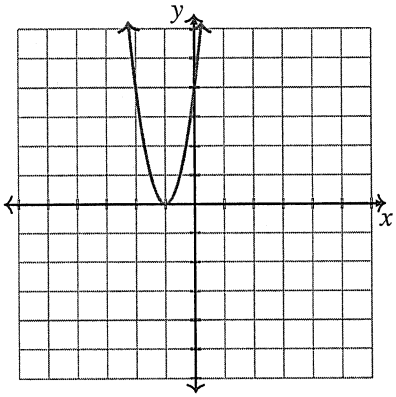
  $k = 2 \cdot \frac{3}{2}(-\frac{3}{2}) = -\frac{9}{2}$
- $x-$*intercepts* $0, 3$
- $y-$*intercept* $2 \cdot 0(-3) = 0$



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

- *Vertex* $h = -1$

  $k = 0 \quad (-1, 0)$
- $x-$*intercepts* -1
- $y-$*intercept* $4(1)^2 = 4$



Algebra I Name _____

Standard Form WS Date _____ Period _____

Determine the following information and then sketch a graph for each.

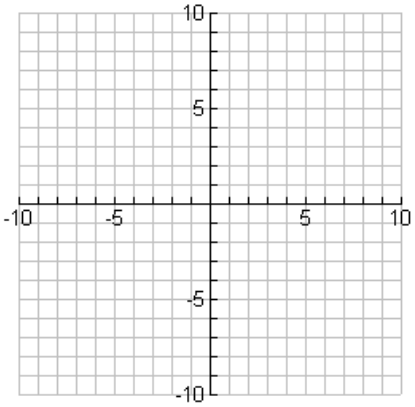
1. $y = x^2 - 2x + 6$

AOS: _____

Vertex: _____

Y - Intercept: _____

Direction open: _____



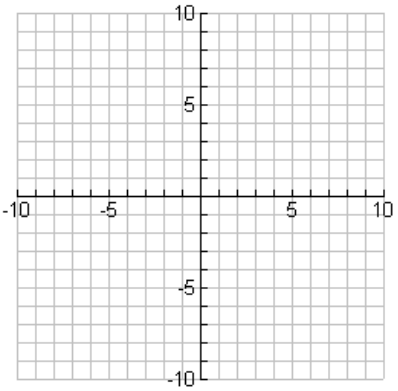
2. $y = -0.5x^2 - 4x - 8$

AOS: _____

Vertex: _____

Y - Intercept: _____

Direction open: _____



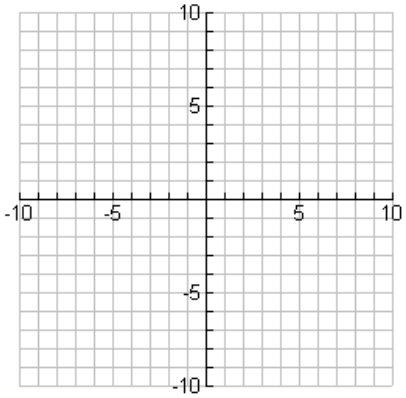
3. $y = -x^2 - 4x - 8$

AOS: _____

Vertex: _____

Y - Intercept: _____

Direction open: _____



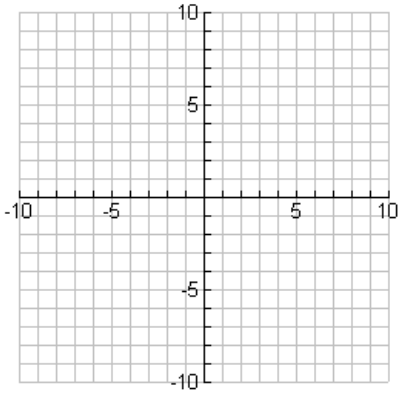
4. $y = 2x^2 - 4x + 5$

AOS: _____

Vertex: _____

Y - Intercept: _____

Direction open: _____



Geometry

Name Key

Standard Form WS

Date _____ Period _____

Determine the following information and then sketch a graph for each.

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

$\frac{-b}{2a}$

AOS: $X = 1$ $\frac{2}{2(1)} = 1$

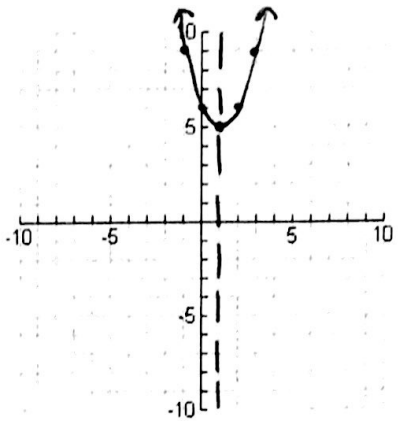
Vertex: $(1, 5)$ $(1)^2 - 2(1) + 6 = 5$

Y - Intercept: 6

Point: $x = 3$

Direction open: up $(3)^2 - 2(3) + 6 = 9$

$(3, 9)$



2. $y = -0.5x^2 - 4x - 8$

AOS: $X = -4$ $\frac{4}{2(-.5)} = -4$

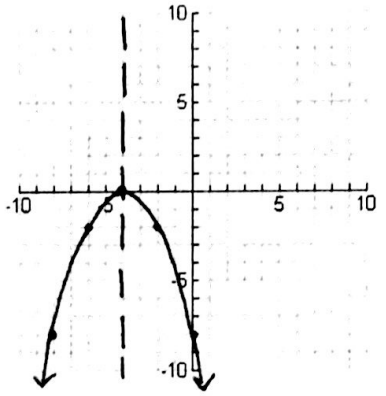
Vertex: $(-4, 0)$ $-.5(-4)^2 - 4(-4) - 8 = 0$

Y - Intercept: -8

Point: $x = -2$

Direction open: down $-.5(-2)^2 - 4(-2) - 8 = -2$

$(-2, -2)$



3. $y = -x^2 - 4x - 8$

AOS: $X = -2$ $\frac{4}{2(-1)} = -2$

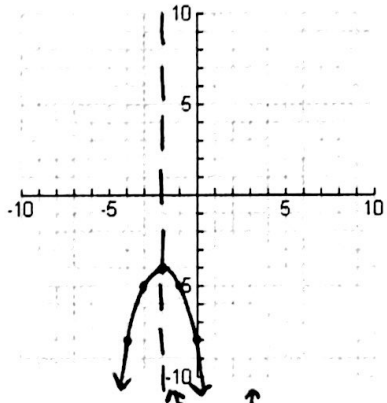
Vertex: $(-2, -4)$ $-(-2)^2 - 4(-2) - 8 = -4$

Y - Intercept: -8

Point: $x = -1$

Direction open: down $-(-1)^2 - 4(-1) - 8 = -5$

$(-1, -5)$



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

AOS: $X = 1$ $\frac{4}{2(2)} = 1$

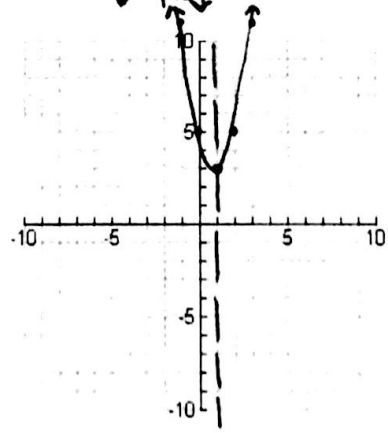
Vertex: $(1, 3)$ $2(1)^2 - 4(1) + 5 = 3$

Y - Intercept: 5

Point: $x = 3$

Direction open: up $2(3)^2 - 4(3) + 5 = 11$

$(3, 11)$



Complete the chart by identifying whether it opens up or down and find the vertex.

Equation	Opens up or down?	Vertex
$f(x) = -3(x+2)^2 - 5$		
$d(x) = 2(x-4)^2$		
$g(x) = -(x-3)^2 - 2$		
$w(x) = \frac{1}{2}(x+1)^2 + 6$		
$b(x) = 4(x+7)^2 + 8$		

Complete the chart by identifying whether it opens up or down and find the vertex.

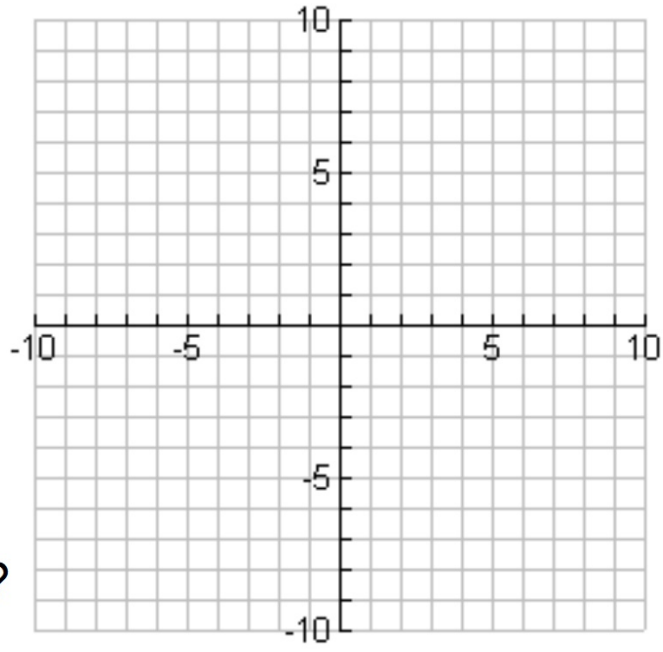
Equation	Opens up or down?	Vertex
$f(x) = -3(x+2)^2 - 5$	down	$(-2, -5)$
$d(x) = 2(x-4)^2$	up	$(4, 0)$
$g(x) = -(x-3)^2 - 2$	down	$(3, -2)$
$w(x) = \frac{1}{2}(x+1)^2 + 6$	up	$(-1, 6)$
$b(x) = 4(x+7)^2 + 8$	up	$(-7, 8)$

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

What are the x-intercepts?

Where would the AOS be?

How would we find the vertex?



These all mean the same thing:

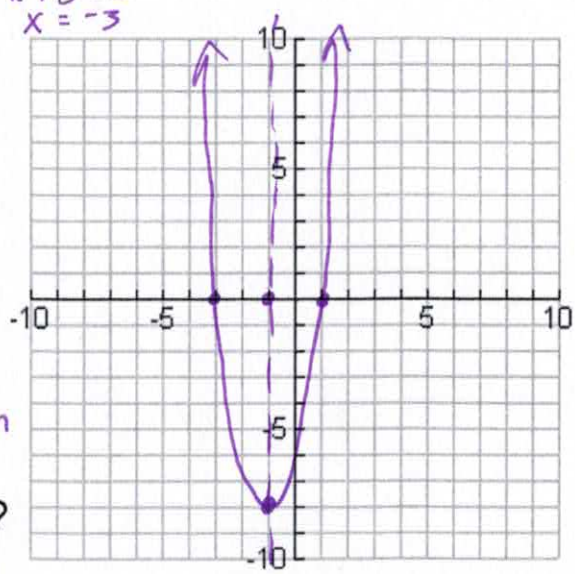
Solutions = x-intercepts = zeros = roots

Graph $f(x) = 2(x - 1)(x + 3)$ → a positive a means it opens up.

$x - 1 = 0$, $x = 1$ $\quad$ $x + 3 = 0$, $x = -3$

What are the x-intercepts?

1 and -3



Where would the AOS be?

half way between the two!

$\frac{p+q}{2} = \frac{1+3}{2}$ $x = -1$ is half way between the x-intercepts

How would we find the vertex?

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

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

$f(-1) = 2(-2)(2)$

$f(-1) = -4(2)$

$f(-1) = -8$

$(-1, -8)$

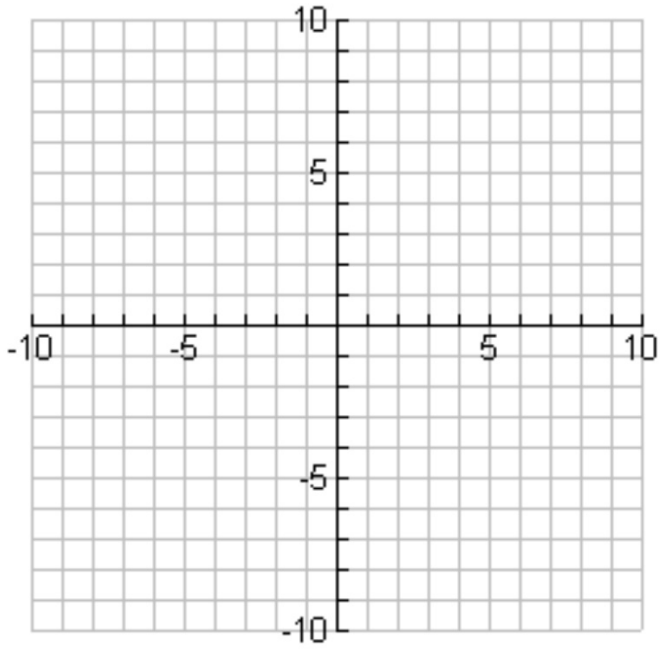
Identify the following parts about the function and graph.

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

Intercepts/Zeros:

Axis of Symmetry:

Vertex:



Identify the following parts about the function and graph.

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

Set each factor =0 and solve

Intercepts/Zeros: $x = 4$, $x = -2$

half way between

Axis of Symmetry: $\frac{p+q}{2} = \frac{4 + -2}{2} = \frac{2}{2} = 1$ → $x = 1$

Vertex: $f(x) = .5(x-4)(x+2)$

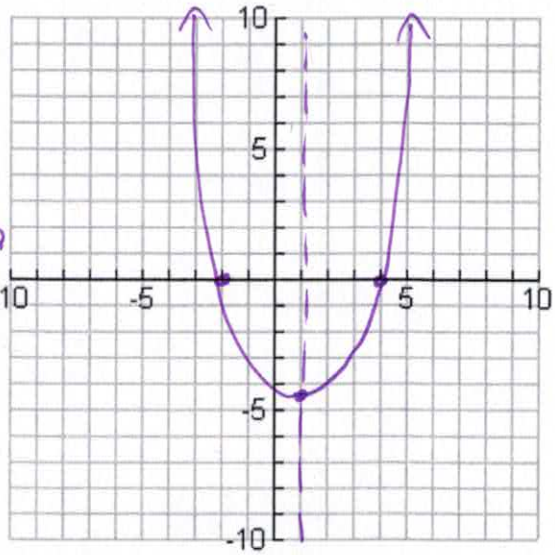
$f(1) = .5(1-4)(1+2)$

$f(1) = .5(-3)(3)$

$f(1) = .5(-9)$

$f(1) = -4.5$

Vertex: $(1, -4.5)$



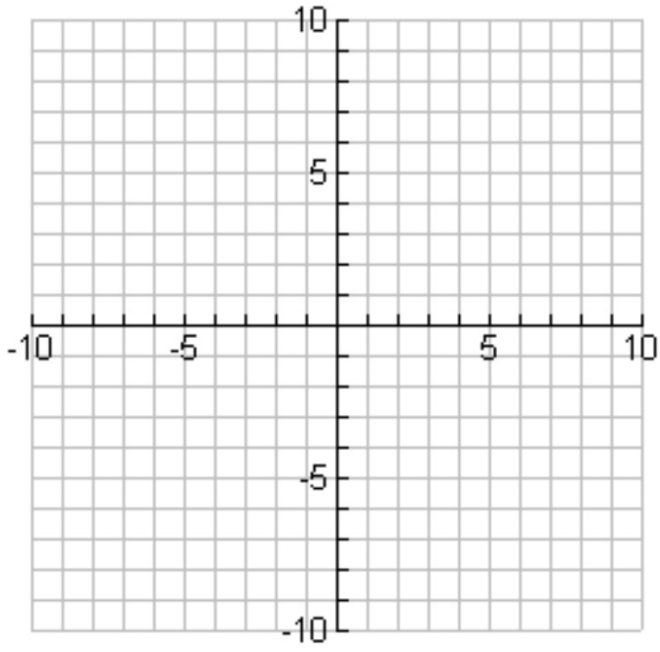
Identify the following parts about the function and graph.

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

Intercepts/Zeros:

Axis of Symmetry:

Vertex:



Identify the following parts about the function and graph.

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

opens down

Intercepts/Zeros: $x = -2$, $x = 3$

$\frac{p+q}{2} = \frac{-2+3}{2} = \frac{1}{2}$ Axis of Symmetry: $x = \frac{1}{2}$

Vertex:

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

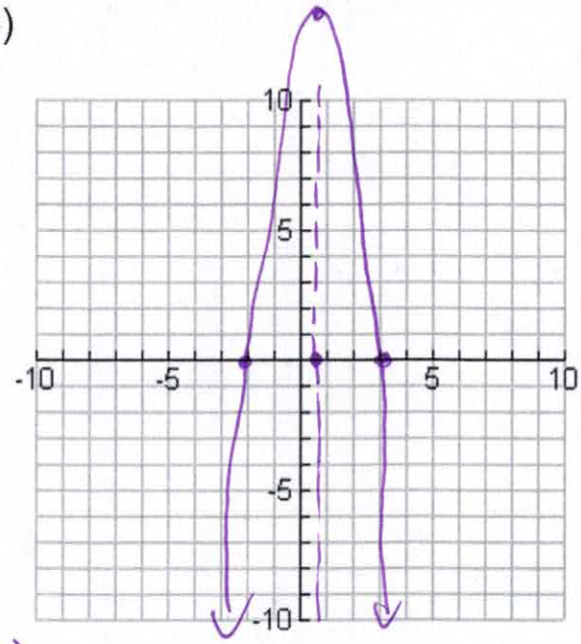
$f(\frac{1}{2}) = -(\frac{1}{2}+2)(\frac{1}{2}-3)$

$f(\frac{1}{2}) = -(\frac{5}{2})(-\frac{5}{2})$

$f(\frac{1}{2}) = \frac{25}{2}$

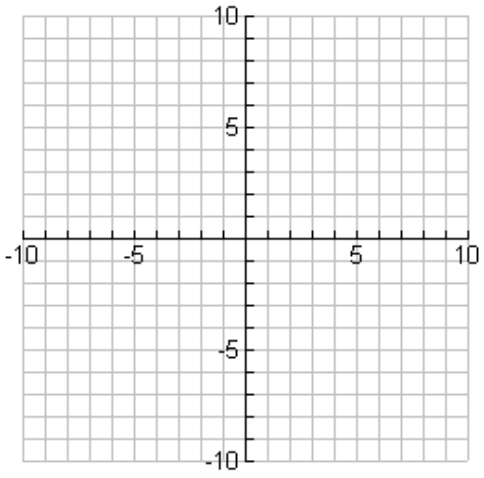
$f(\frac{1}{2}) = 14\frac{1}{2}$

$(\frac{1}{2}, 14\frac{1}{2})$ vertex



Graph the following:

21) Standard Form: $y = x^2 - 2x + 6$



AOS: _____

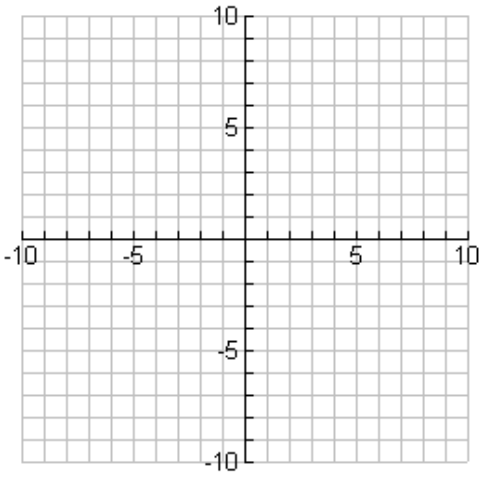
Vertex: _____

y - intercept: _____

Direction open: _____

---

22) Vertex Form: $y = (x - 2)^2 + 4$



Vertex: _____

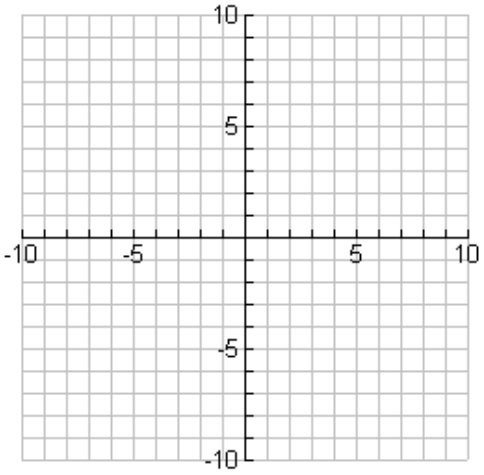
AOS: _____

y – intercept: _____

Direction open: _____

---

23) Intercept Form: $y = -(x + 4)(x - 2)$



x – intercepts: _____

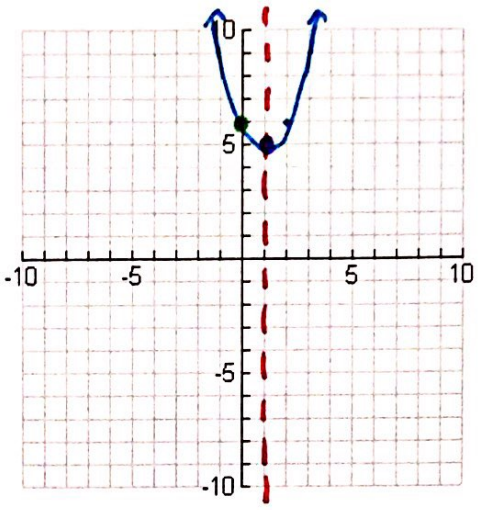
AOS: _____

Vertex: _____

Direction open: _____

Graph the following:

21) Standard Form: $y = x^2 - 2x + 6$



AOS: $x = 1$ $\quad \frac{-b}{2a} = \frac{2}{2(1)} = \frac{2}{2}$

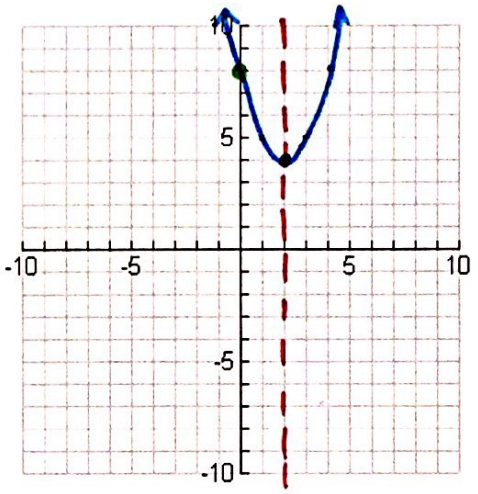
Vertex: $(1, 5)$ $\quad y = (1)^2 - 2(1) + 6 = 5$

y - intercept: 6

Direction open: Up

---

22) Vertex Form: $y = (x - 2)^2 + 4$



Vertex: $(2, 4)$

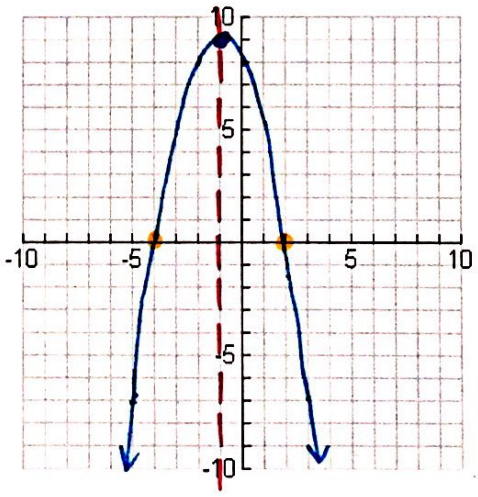
AOS: $x = 2$

y – intercept: 8 $\quad y = (0-2)^2 + 4 = 8$

Direction open: Up

---

23) Intercept Form: $y = -(x + 4)(x - 2)$



x – intercepts: -4 and 2

AOS: $x = -1$ $\quad \frac{-4+2}{2} = \frac{-2}{2}$

Vertex: $(-1, 9)$ $\quad y = -(-1+4)(-1-2) = 9$

Direction open: down

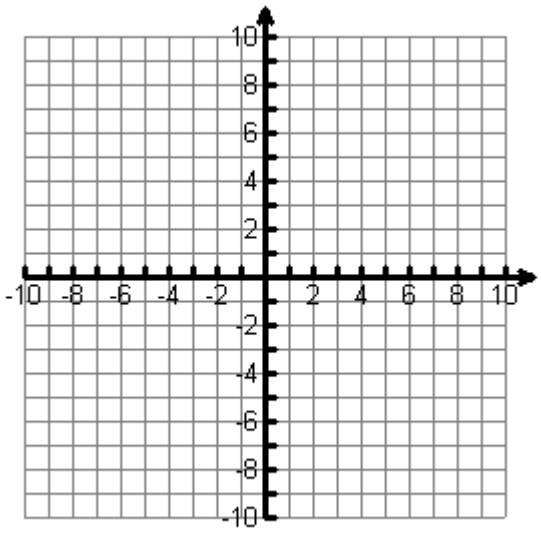
Characteristics of Quadratic Functions (pp. 2 of 5)

Sample Problems

Find the characteristic parts of each function. Use this information to produce the graph.

A) $y = -x^2 + 6x - 2$

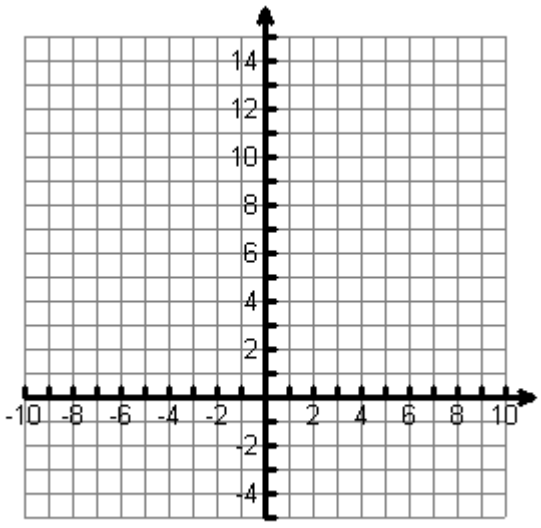
Characteristic	Value
Vertex	
Axis of Symmetry	
y-intercept	
Point symmetric to *y*-intercept	
x-intercept(s)	



x	*y*

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

Characteristic	Value
Vertex	
Axis of Symmetry	
y-intercept	
Point symmetric to *y*-intercept	
x-intercept(s)	



x	*y*

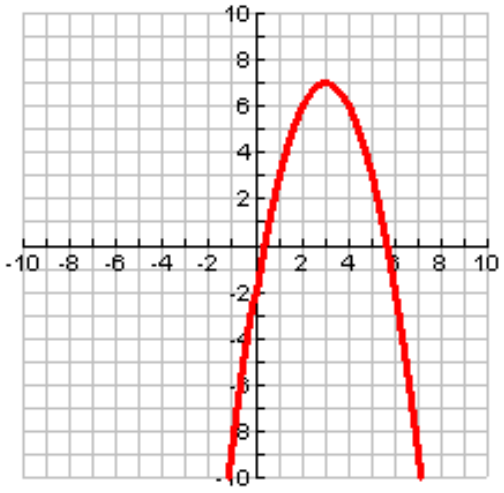
Characteristics of Quadratic Functions (pp. 2 of 5) KEY

Sample Problems

Find the characteristic parts of each function. Use this information to produce the graph.

A) $y = -x^2 + 6x - 2$

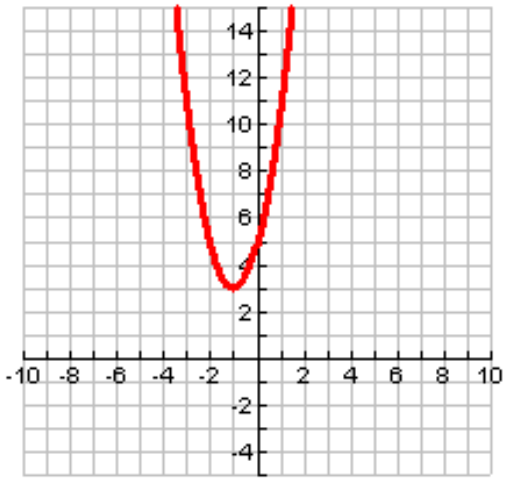
Characteristic	Value
Vertex	(3, 7) Max
Axis of Symmetry	x = 3
y-intercept	(0, -2)
Point symmetric to *y*-intercept	(6, -2)
x-intercept(s)	(0.35, 0) (5.65, 0)



x	*y*
0	-2
1	3
2	6
3	7
4	6
5	3
6	-2

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

Characteristic	Value
Vertex	(-1, 3) Min
Axis of Symmetry	x = -1
y-intercept	(0, 5)
Point symmetric to *y*-intercept	(-2, 5)
x-intercept(s)	None



x	*y*
-4	21
-2	11
-2	5
-1	3
0	5
1	11
2	21

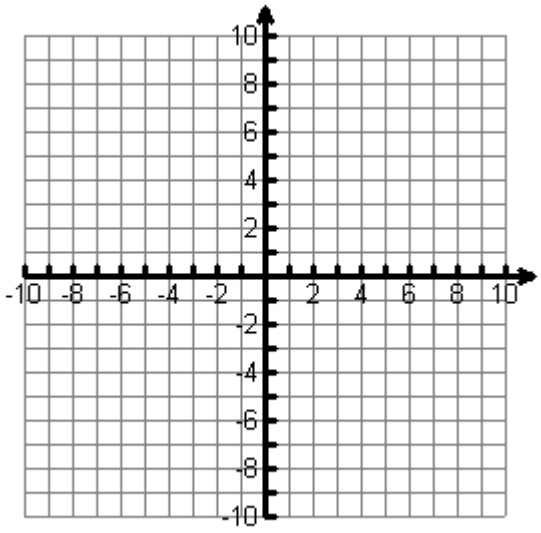
Characteristics of Quadratic Functions (pp. 3 of 5)

Practice Problems

For problems #1-4 make a table of values, graph the function, find the vertex, determine if the vertex is a maximum or minimum, write the equation of the line for the axis of symmetry, find the y-intercept and symmetric point, and give the x-intercepts.

1) $f(x) = x^2 + 4x - 5$

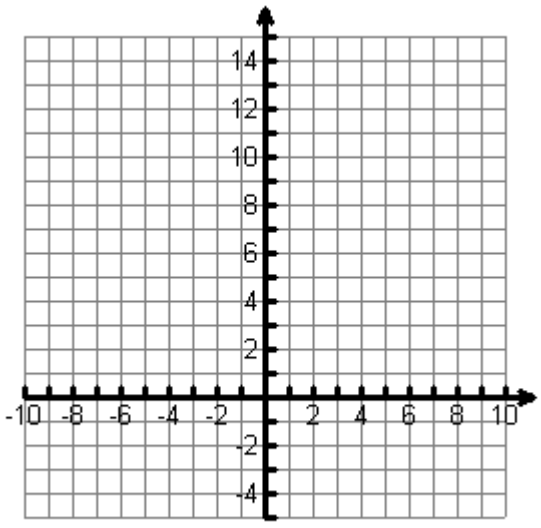
Characteristic	Value
Vertex	
Axis of Symmetry	
y-intercept	
Point symmetric to *y*-intercept	
x-intercept(s)	



x	*y*

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

Characteristic	Value
Vertex	
Axis of Symmetry	
y-intercept	
Point symmetric to *y*-intercept	
x-intercept(s)	



x	*y*

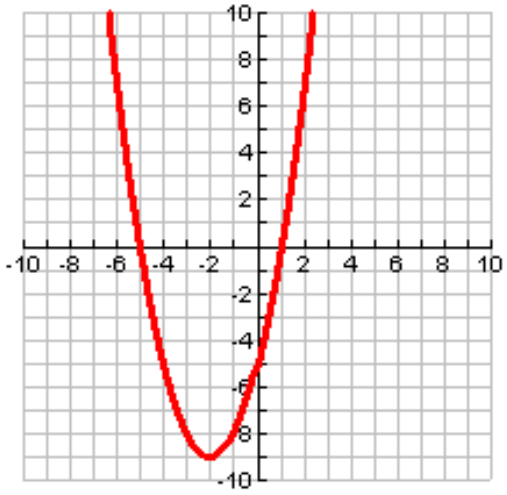
Characteristics of Quadratic Functions (pp. 3 of 5) KEY

Practice Problems

For problems #1-4 make a table of values, graph the function, find the vertex, determine if the vertex is a maximum or minimum, write the equation of the line for the axis of symmetry, find the y-intercept and symmetric point, and give the x-intercepts.

1) $f(x) = x^2 + 4x - 5$

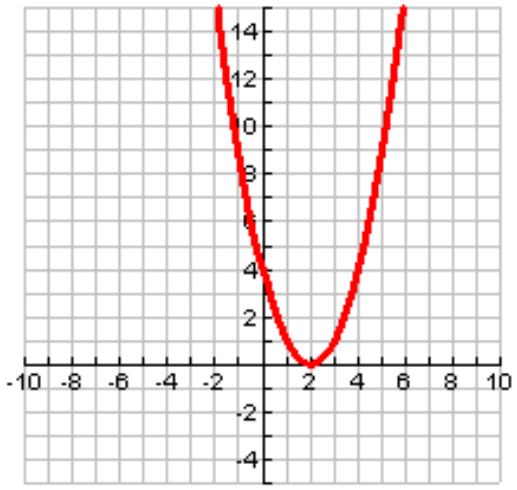
Characteristic	Value
Vertex	(-2, -9) Min
Axis of Symmetry	x = - 2
y-intercept	(0, -5)
Point symmetric to *y*-intercept	(-4, -5)
x-intercept(s)	(-5, 0) (1, 0)



x	*y*
-4	-5
-3	-8
-2	-9
-1	-8
0	-5

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

Characteristic	Value
Vertex	(2, 0) Min
Axis of Symmetry	x = 2
y-intercept	(0, 4)
Point symmetric to *y*-intercept	(4, 4)
x-intercept(s)	(2, 0)

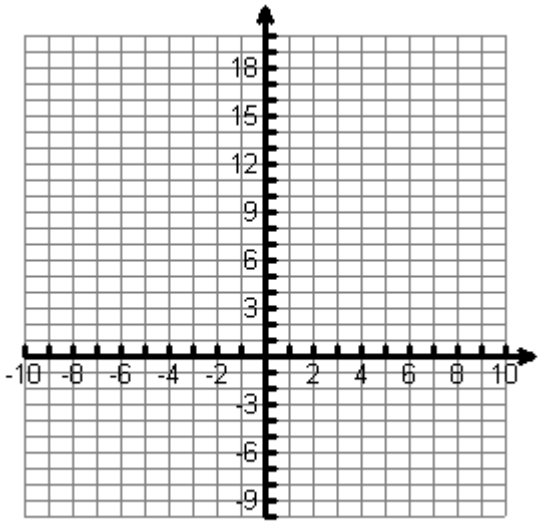


x	*y*
0	4
1	1
2	0
3	1
4	4

Characteristics of Quadratic Functions (pp. 4 of 5)

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

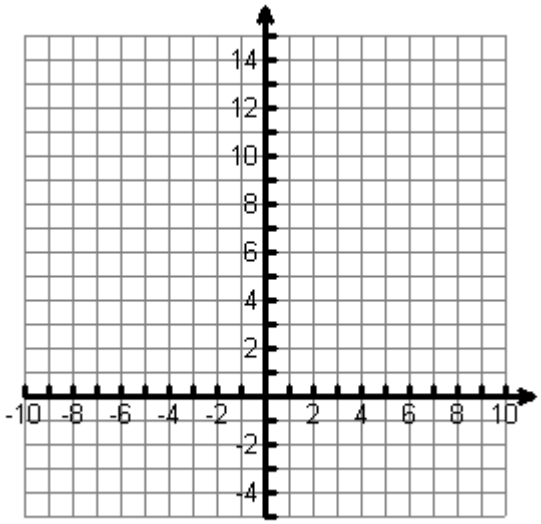
Characteristic	Value
Vertex	
Axis of Symmetry	
y-intercept	
Point symmetric to *y*-intercept	
x-intercept(s)	



x	*y*

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

Characteristic	Value
Vertex	
Axis of Symmetry	
y-intercept	
Point symmetric to *y*-intercept	
x-intercept(s)	

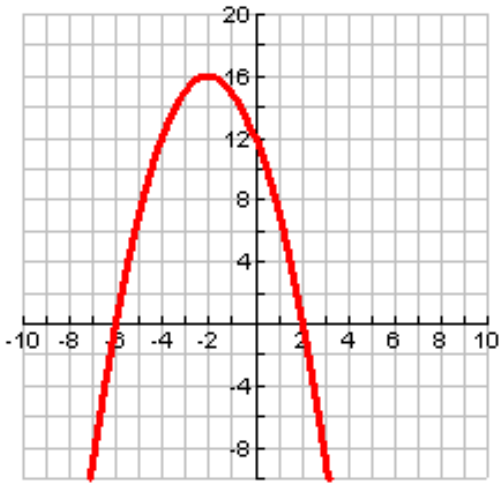


x	*y*

Characteristics of Quadratic Functions (pp. 4 of 5) KEY

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

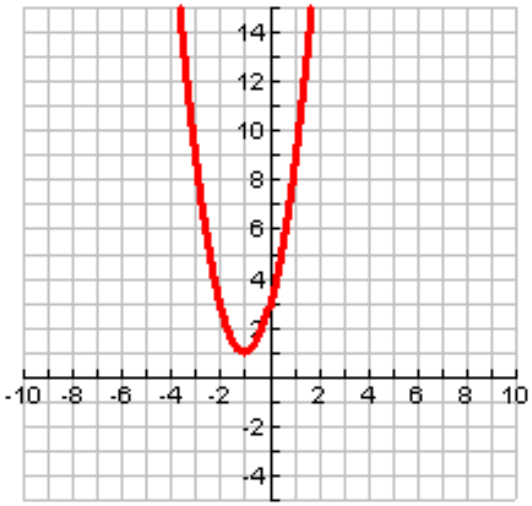
Characteristic	Value
Vertex	(-2, 16) Max
Axis of Symmetry	x = -2
y-intercept	(0, 12)
Point symmetric to *y*-intercept	(-4, 12)
x-intercept(s)	(-6, 0) (2, 0)



x	*y*
-4	12
-3	15
-2	16
-1	15
0	12

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

Characteristic	Value
Vertex	(-1, 1) Min
Axis of Symmetry	x = -1
y-intercept	(0, 3)
Point symmetric to *y*-intercept	(-2, 3)
x-intercept(s)	None



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

Name: Date: Period:

Practice Worksheet: Graphing Quadratic Functions in Intercept Form

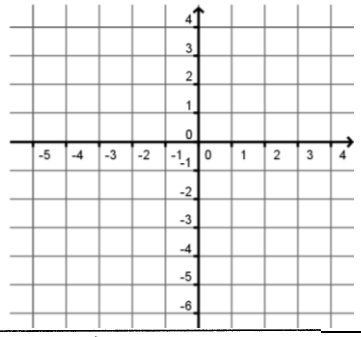
For #1-6, label the x-intercepts, axis of symmetry, vertex, y-int., and at least one more point on the graph.

1] $y = -(x+4)(x-2)$

x-intercepts: (_____, 0) (_____, 0)
Axis of Symmetry is x=_____

Vertex: (____, ____)

Opens up or down?
Slope to pt one unit from vertex:
y-intercept: (0,_____)

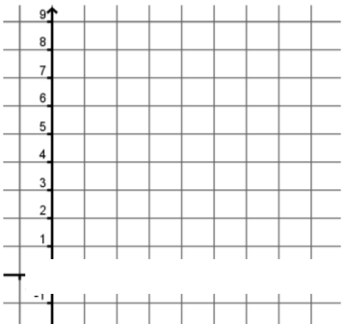


2] $y = -x(x-8)$

x-intercepts: (_____, 0) (_____, 0)
Axis of Symmetry is x=_____

Vertex: (____, ____)

Opens up or down?
Slope to pt one unit from vertex:
y-intercept: (0,_____)

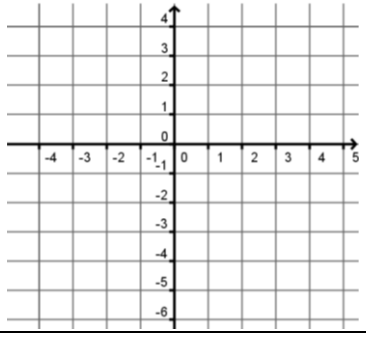


3] $y = (x+2)(x-2)$

x-intercepts: (_____, 0) (_____, 0)
Axis of Symmetry is x=_____

Vertex: (____, ____)

Opens up or down?
Slope to pt one unit from vertex:
y-intercept: (0,_____)

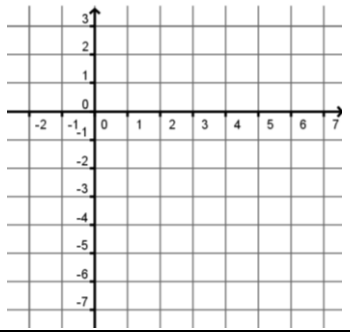


4] $y = -\frac{1}{3}(x+1)(x-5)$

x-intercepts: (_____, 0) (_____, 0)
Axis of Symmetry is x=_____

Vertex: (____, ____)

Opens up or down?
Slope to pt one unit from vertex:
y-intercept: (0,_____)

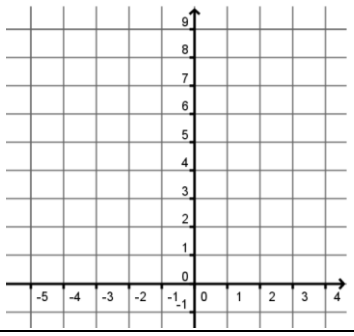


5] $y = 4(x+2)(x+1)$

x-intercepts: (_____, 0) (_____, 0)
Axis of Symmetry is x=_____

Vertex: (____, ____)

Opens up or down?
Slope to pt one unit from vertex:
y-intercept: (0,_____)

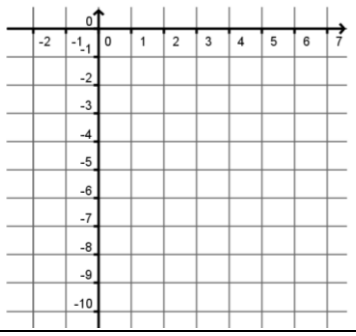


6] $y = -(x-3)(x-3)$

x-intercepts: (_____, 0) (_____, 0)
Axis of Symmetry is x=_____

Vertex: (____, ____)

Opens up or down?
Slope to pt one unit from vertex:
y-intercept: (0,_____)



Name: Date: Period:

Practice Worksheet: Graphing Quadratic Functions in Intercept Form

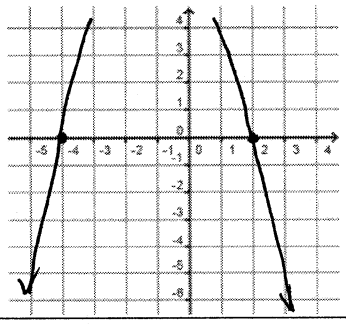
For #1-6, label the x-intercepts, axis of symmetry, vertex, y-int., and at least one more point on the graph.

1] $y = -(x+4)(x-2)$

x-intercepts: (−4, 0) (2, 0)
Axis of Symmetry is x= −1

Vertex: (−1, −9)

Opens up or down?
Slope to pt one unit from vertex:
y-intercept: (0, 8)

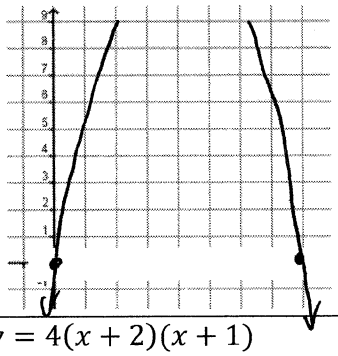


2] $y = -x(x-8)$

x-intercepts: (0, 0) (8, 0)
Axis of Symmetry is x= 4

Vertex: (4, 16)

Opens up or down?
Slope to pt one unit from vertex:
y-intercept: (0, 0)

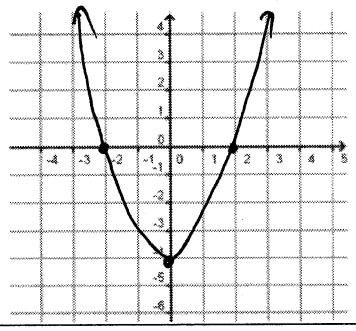


3] $y = (x+2)(x-2)$

x-intercepts: (−2, 0) (2, 0)
Axis of Symmetry is x= 0

Vertex: (0, −4)

Opens up or down?
Slope to pt one unit from vertex:
y-intercept: (0, −4)

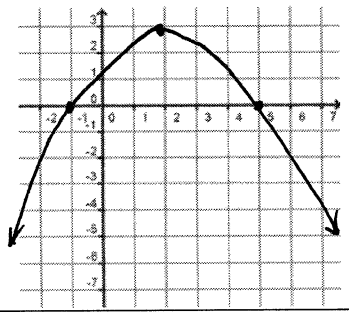


4] $y = -\frac{1}{3}(x+1)(x-5)$

x-intercepts: (−1, 0) (5, 0)
Axis of Symmetry is x= 2

Vertex: (2, 3)

Opens up or down?
Slope to pt one unit from vertex:
y-intercept: (0, $\frac{5}{3}$)

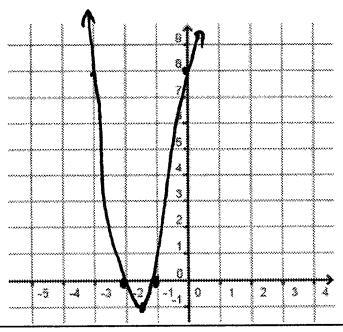


5] $y = 4(x+2)(x+1)$

x-intercepts: (−2, 0) (−1, 0)
Axis of Symmetry is x= $-\frac{3}{2}$

Vertex: ($-\frac{3}{2}$, −1)

Opens up or down?
Slope to pt one unit from vertex:
y-intercept: (0, 8)

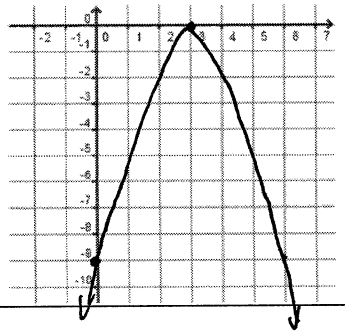


6] $y = -(x-3)(x-3)$

x-intercepts: (3, 0) (3, 0)
Axis of Symmetry is x= 3

Vertex: (3, 0)

Opens up or down?
Slope to pt one unit from vertex:
y-intercept: (0, −9)



TEST - Dr Ahn Math

1. Find all intercepts and the vertex of the following functions:

(a) $f(x) = (x-4)^2 - 1$

- Vertex:
- y-intercept:
- x-intercept:

(b) $g(x) = 3x^2 - 6x - 9$

- Vertex:
- y-intercept:
- x-intercept:

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

- Vertex:
- y-intercept:
- x-intercept:

(d) $p(x) = -(x+1)^2 + 4$

- Vertex:
- y-intercept:
- x-intercept:

TEST - Dr Ahn Math

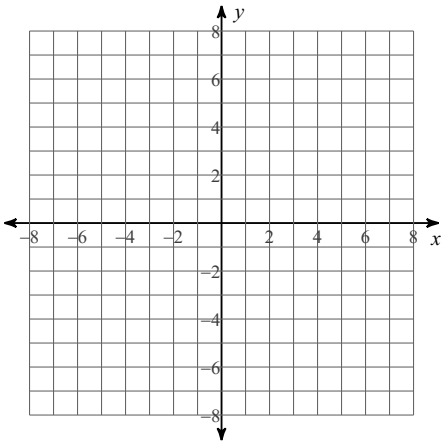
7) $f(x) = -2x(x+2)$

x-intercepts:

axis of symmetry:

vertex:

y-intercept:



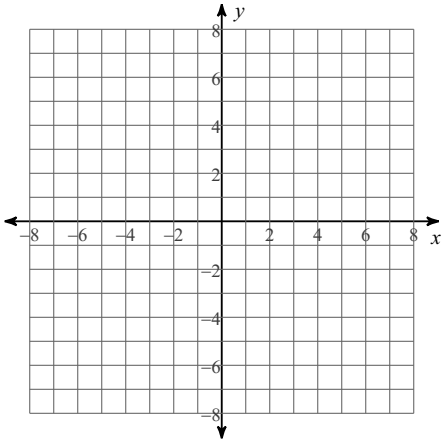
8) $f(x) = \frac{1}{2}(x+4)(x-2)$

x-intercepts:

axis of symmetry:

vertex:

y-intercept:



Worksheet, Section 2.2
Solutions

1. Find all intercepts and the vertex of the following functions:

(a) $f(x) = (x-4)^2 - 1$

- Vertex: $(4, -1)$
- y-intercept: $f(0) = (0-4)^2 - 1 = 15$, so $(0, 15)$.
- x-intercept: set $0 = (x-4)^2 - 1$ so $x = 4 \pm \sqrt{1}$, or $x = 3, 5$

(b) $g(x) = 3x^2 - 6x - 9$

- Vertex: $x = -b/(2a) = 6/(2 \cdot 3) = 1$, so $y = g(1) = 3 - 6 - 9 = -12$. Then vertex $= (1, -12)$
- y-intercept: $g(0) = -9$, so $(0, -9)$.
- x-intercept: Using quadratic formula: $x = (6 \pm \sqrt{36 + 4 \cdot 3 \cdot 9})/(2 \cdot 3) = 1 \pm 2$. Or we can factor $g(x) = 3(x^2 - 2x - 3) = 3(x-3)(x+1)$.

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

- Vertex: $x = \dfrac{-(-3)}{2(-1)} = -1.5$, $y = h(1.5) = 6.25$.
- y-intercept: $h(0) = 4$
- x-intercept: $h(x) = -(x+4)(x-1)$, so $x = -4, 1$.

(d) $p(x) = -(x+1)^2 + 4$

- Vertex: $(-1, 4)$
- y-intercept: $h(0) = -1 + 4 = 3$
- x-intercept: set $0 = -(x+1)^2 + 4$ so $x = -1 \pm \sqrt{4}$, or $x = -3, 1$

Answers to Intercept Form and ZPP HW

1) 3, -5

2) 0, -7

3) 4, -1/6

4) 0, -2/3, 4

5) x-int: (3 ,0) and (1, 0)
AOS: $x = 2$
vertex: (2, -1)
y-int: (0, 3)

6) x-int: (-2, 0) and (4, 0)
AOS: $x = 1$
vertex: (1, 9)
y-int: (0, 8)

7) x-int: (0, 0) and (-2, 0)
AOS: $x = -1$
vertex: (-1, 2)
y-int: (0, 0)

8) x-int: (-4, 0) and (2, 0)
AOS: $x = -1$
vertex: (-1, -4.5)
y-int: (0, -4)

9) $f(x) = (x + 5)(x - 3)$

10) $f(x) = -(x + 2.5)(x - 6.5)$