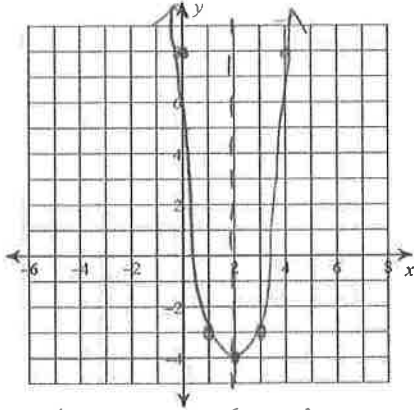


Key

## WS Unit 7 Review

Find the vertex and axis of symmetry. Then, using your graphing calculator, sketch the graph of each function.

1)  $y = 3x^2 - 12x + 8$



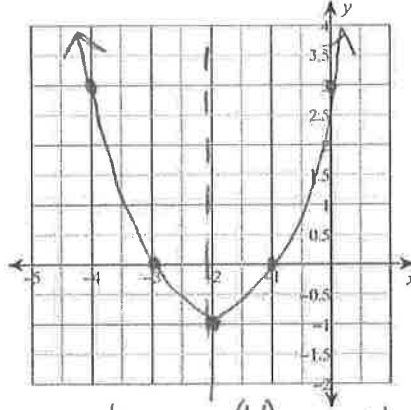
x	y
1	-3
2	-4
3	-3

$$x = \frac{-b}{2a} = \frac{-(-12)}{2(3)} = \frac{12}{6} = 2$$

$$x = 2 \quad y = 3(2)^2 - 12(2) + 8$$

$$y = -4 \quad (2, -4)$$

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



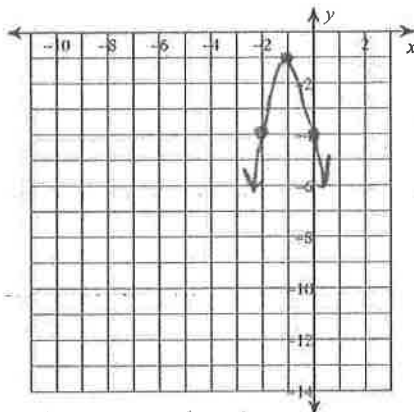
x	y
-3	0
-2	-1
-1	0

$$x = \frac{-b}{2a} = \frac{-(4)}{2(1)} = \frac{-4}{2} = -2$$

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

$$y = -1 \quad (-2, -1)$$

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



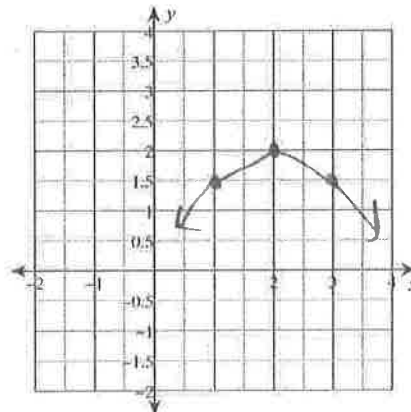
x	y
0	-4
-1	-1
-2	-4

$$x = \frac{-b}{2a} = \frac{-(-6)}{2(-3)} = \frac{6}{-6} = -1$$

$$x = -1 \quad y = -3(-1)^2 - 6(-1) - 4$$

$$y = -1 \quad (-1, -1)$$

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



x	y
1	1.5
2	2
3	1.5

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

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

$$y = 2 \quad (2, 2)$$

5) Using the graph from question #2, answer the following:

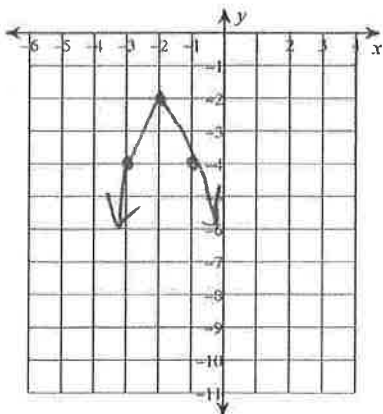
- a) What is the vertex?  $(-2, -1)$
- b) What is the axis of symmetry?  $x = -2$
- c) What is the y-intercept (as an ordered pair)?  $(0, 3)$
- d) What is the domain?  $x \in \mathbb{R}$
- e) What is the range?  $y \geq -1$
- f) Does it have a maximum or a minimum? min What is the value?  $-1$
- g) What are the zeros of the function?  $(-3, 0)$   $(-1, 0)$

6) Using the graph from question #3, answer the following:

- a) What is the vertex?  $(-1, -1)$
- b) What is the axis of symmetry?  $x = -1$
- c) What is the y-intercept (as an ordered pair)?  $(0, 4)$
- d) What is the domain?  $x \in \mathbb{R}$
- e) What is the range?  $y \leq -1$
- f) Does it have a maximum or a minimum? max What is the value?  $-1$
- g) What are the zeros of the function? n/a

Sketch the graph of each function. Then determine the domain and range.

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

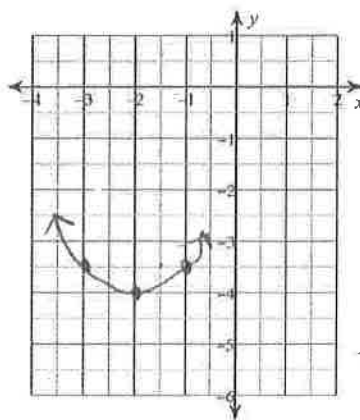


Vertex  $(-2, -2)$

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

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

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



Vertex  $(-2, -4)$

x	y
-3	-3.5
-2	-4
-1	-3.5

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

9) a) Using your graphing calculator, find the zeros of the function  $f(x) = x^2 - 2x - 3$ .

$(3, 0) \quad (-1, 0)$

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

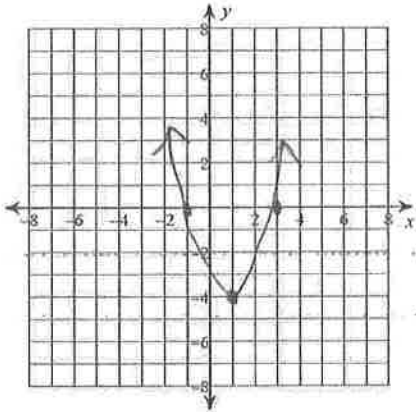
b) Does this function have a maximum or minimum?

min

c) What is the maximum or minimum value?

$\text{min} = -4 \quad (1, -4) \leftarrow \text{vertex}$

d) Sketch the graph of the function using your values you found.



10) The function  $h(x) = -16x^2 + 32x + 2$  represents the height in feet of a softball after  $x$  seconds. Find the maximum height of the softball.

$x = \frac{-b}{2a} = \frac{-32}{2(-16)} = \frac{-32}{-32} = 1$

$x = 1$

$y = -16(1)^2 + 32(1) + 2$   
 $y = 18$

$\boxed{\text{max} = 18 \text{ ft}}$

11) The function  $h(x) = -16x^2 + 64x$  represents the height in feet of a firework  $x$  seconds after it has been launched.

a) Find the maximum height of the firework.

$x = \frac{-b}{2a} = \frac{-64}{2(-16)} = \frac{-64}{-32} = 2$

$x = 2$

$y = -16(2)^2 + 64(2)$   
 $y = 64$

$\boxed{\text{max} = 64 \text{ ft}}$

b) What is the initial height of the firework?

~~$h = 2 \text{ ft}$~~

$\boxed{h = 0 \text{ ft}}$

c) How long is the firework in the air?

~~$h(x) = -16x^2 + 64x + 2$~~   
 ~~$h(x) = -16x^2 + 64x$~~

\* Use GDC to estimate  
- when  $y = 0$

$0 = -16x^2 + 64x$

$\boxed{4 \text{ seconds}}$

Describe the transformation of each quadratic function.

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

Open up  
stretch by 3 (narrow)  
vertex (5, 4) right 5, up 4

13)  $y = -\frac{2}{3}(x + 1)^2 + 7$

Open down  
compress by  $\frac{2}{3}$  (wide)  
vertex (-1, 7) left 1, up 7

14)  $y = -\frac{5}{4}(x - 11)^2$

Open down  
stretch by  $\frac{5}{4}$  (narrow)  
vertex (11, 0) right 11

Write a quadratic function in vertex form to represent the transformation.

15) opens up, left 8 and down 17, stretched by a factor of 4

$$y = 4(x + 8)^2 - 17$$

16) vertex at (-6, 10), opens up, compressed by a factor of your choice

$$f(x) = \frac{1}{2}(x + 6)^2 + 10$$

17) up 9, right 12, opens down, compressed by  $\frac{3}{7}$

$$g(x) = -\frac{3}{7}(x - 12)^2 + 9$$

18) CHALLENGE:

Write a quadratic function in vertex form whose graph satisfies the given conditions:

a) vertex at (-5, -1) and pass thru (-2, 2)

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

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

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

$$2 = 9a - 1$$

+1

+1

$$\frac{3}{9} = \frac{9a}{9} \quad a = \frac{1}{3}$$

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

b) vertex at (1, 8) and pass thru (3, 12)

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

$$12 = a(3 - 1)^2 + 8$$

$$12 = 4a + 8$$

-8

-8

$$\frac{4}{4} = \frac{4a}{4} \quad a = 1$$

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