

Unit 8 Test Review

Name Key Per _____

1. Use the graph to the right.

a. What is the vertex?

$$(-2, -1)$$

b. What is the axis of symmetry?

$$x = -2$$

c. For $x < -2$, is the function increasing or decreasing?

Increasing

d. For $x > -2$, is the function increasing or decreasing?

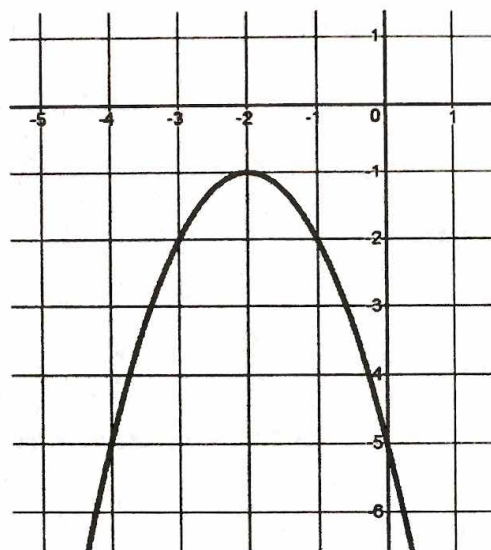
decreasing

e. What is the equation of this parabola in vertex form?

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

f. Is the vertex a maximum or minimum?

Maximum



2. Use the graph to the right.

a. What is the vertex?

$$(2, -6)$$

b. What is the axis of symmetry?

$$x = 2$$

c. For $x < 2$, is the function increasing or decreasing?

Decreasing

d. For $x > 2$, is the function increasing or decreasing?

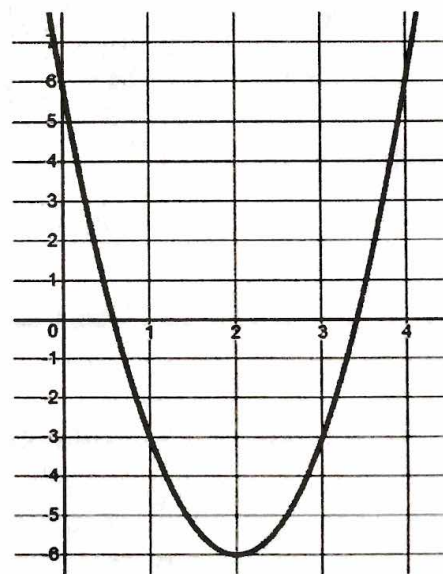
Increasing

e. What is the equation of this parabola in vertex form?

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

f. Is the vertex a maximum or minimum?

Minimum



3. Given the equation $f(x) = 2x^2 + 10x - 9$.

a. What is the y-intercept?

$$-9$$

b. Is it concave up or down?

Concave up

c. What is the axis of symmetry?

$$x = \frac{-b}{2a} = \frac{-10}{2(2)} = \frac{-10}{4} = \frac{-5}{2}$$

d. Determine the rate of change, from $x_1 = 0$ to $x_2 = 3$.

$$f(0) = 2(0)^2 + 10(0) - 9 = -9$$

$$f(3) = 2(3)^2 + 10(3) - 9 \\ = 2(9) + 30 - 9 = 18 + 30 - 9$$

$$m = \frac{39 - (-9)}{3 - 0} = \frac{48}{3} = \boxed{16}$$

4. Given the equation $g(x) = -x^2 + 12x + 35$.

a. What is the y-intercept?

$$35$$

b. Is it concave up or down?

Concave down

c. What is the axis of symmetry?

$$x = \frac{-b}{2a} = \frac{-12}{2(-1)} = 6$$

d. Determine the rate of change, from $x_1 = -2$ to $x_2 = 1$.

$$f(-2) = -(-2)^2 + 12(-2) + 35 \\ = -4 - 24 + 35 \\ = -28 + 35 = 7$$

$$f(1) = -(1)^2 + 12(1) + 35 \\ = -1 + 12 + 35 \\ = 46 \quad m = \frac{46 - 7}{1 - (-2)} = \frac{39}{3} = \boxed{13}$$

5. Given the equation $p(x) = -(x+3)^2 - 10$.

a. Vertex

$$(-3, -10)$$

b. Axis of Symmetry

$$x = -3$$

c. Minimum or maximum?

Maximum

$$d. p(2) = \underline{-(2+3)^2} - 10 = -25 - 10 = -35$$

e. Standard form of the equation

$$p(x) = -(x+3)(x+3) - 10 \\ = -(x^2 + 6x + 9) - 10 \\ = -x^2 - 6x - 9 - 10 \\ = -x^2 - 6x - 19$$

f. y-intercept

$$(0, -19)$$

g. State the transformations in words

- shift left 3
- reflect across x-axis
- shift down 10

6. Given the equation $q(x) = 2(x-1)^2 - 3$.

a. Vertex

$$(1, -3)$$

b. Axis of Symmetry

$$x = 1$$

c. Minimum or maximum?

Minimum

$$d. q(-1) = \underline{2(-1-1)^2} - 3 = 2(-2)^2 - 3 \\ = 8 - 3 = 5$$

e. Standard form of the equation

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

f. y-intercept

$$(0, -1)$$

g. State the transformations in words

- shift right 1
- vertical stretch by 2
- shift down 3

7. Mickey shoots Donald Duck out of a cannon. Donald Duck's height (in feet) can be modeled by the equation $h(t) = -16t^2 + 96t + 6$ where t is time in seconds. The equation can also be written in vertex form as $h(t) = -16(t-3)^2 + 150$.

a. What is the initial height of Donald Duck?

6 feet (0, 6)

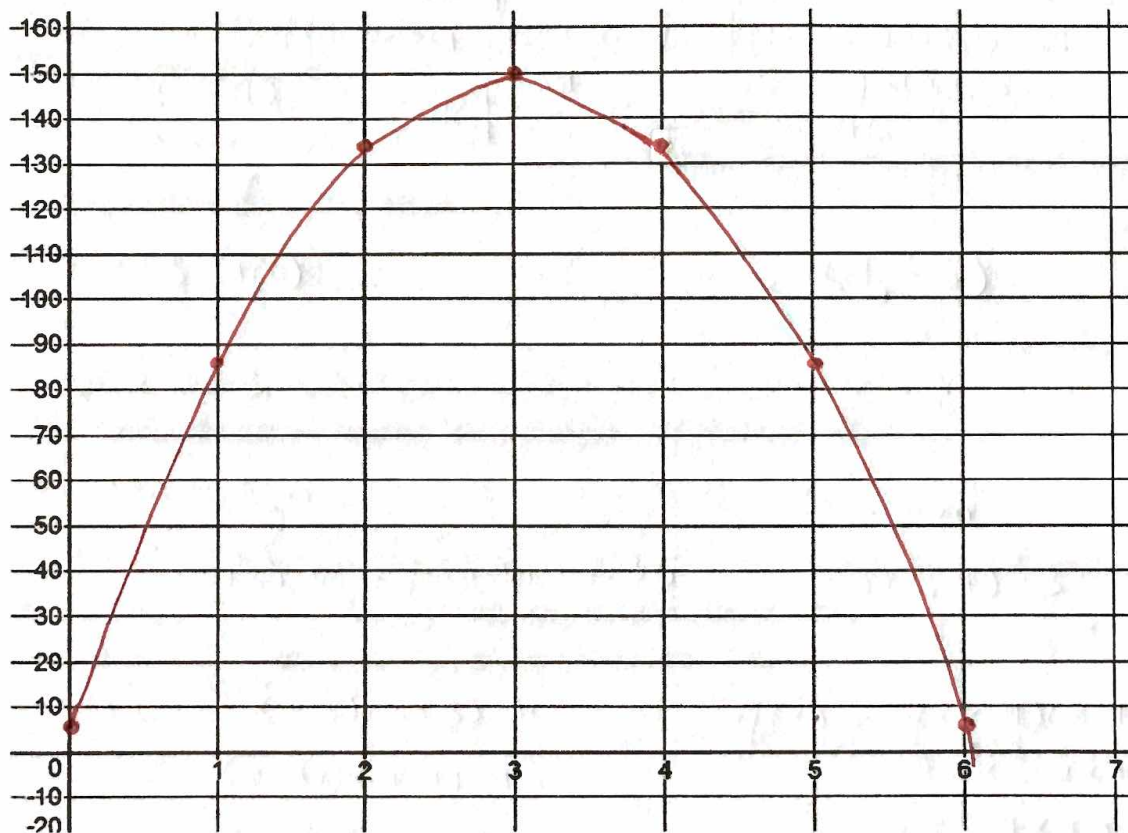
b. How long does it take Donald to reach his maximum height?

(3, 150) 3 seconds

c. What is Donald's maximum height?

150 feet

d. Graph Donald Duck's trajectory on the graph below.



$$h(2) = -16(2-3)^2 + 150$$

$$= -16(-1)^2 + 150$$

$$= -16 + 150$$

$$= 134$$

$$h(1) = -16(1-3)^2 + 150$$

$$= -16(4) + 150$$

$$= 86$$

e. About when does the Donald hit the ground?

About 6.1 seconds

f. What is Donald's rate of change from 4 to 5 seconds?

$$h(4) = 134$$

$$h(5) = 86$$

$$m = \frac{134 - 86}{4 - 5} = \frac{48}{-1} = -48 \text{ ft/second}$$

8. The table of values on the right shows a quadratic function.

x	f(x)
-7	-9
-6	-2
-5	3
-4	6
-3	7
-2	6
-1	3
0	-2
1	-9

a. Fill in the blanks.

b. $f(-6) = -2$

c. $f(1) = -9$

d. vertex

$(-3, 7)$

e. axis of symmetry

$x = -3$

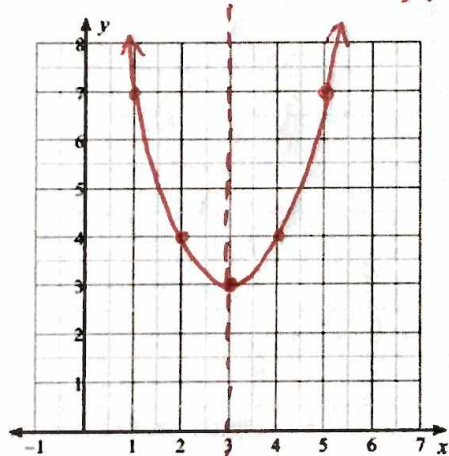
f. y-intercept

$(0, -2)$

Graph the following parabolas using transformations. Be sure to include the axis of symmetry.

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

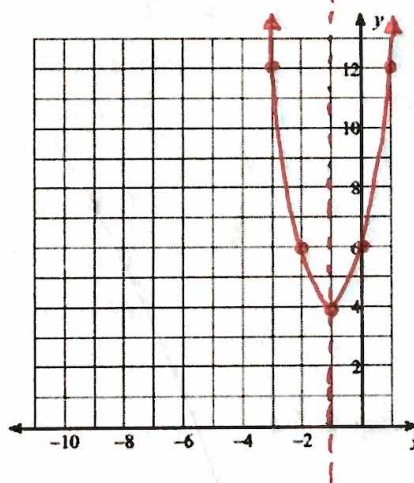
$x = 3$



x	f(x)
2	4
1	7

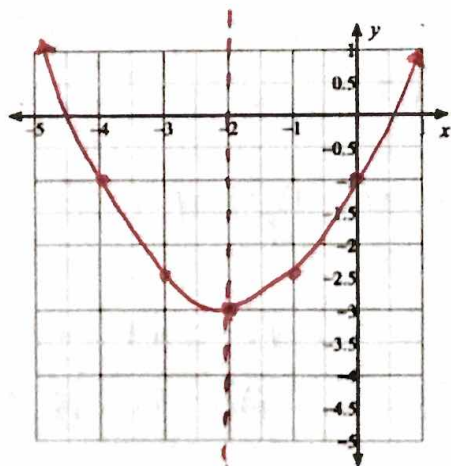
10) $f(x) = 2(x+1)^2 + 4$

$x = -1$



x	f(x)
0	6
1	12

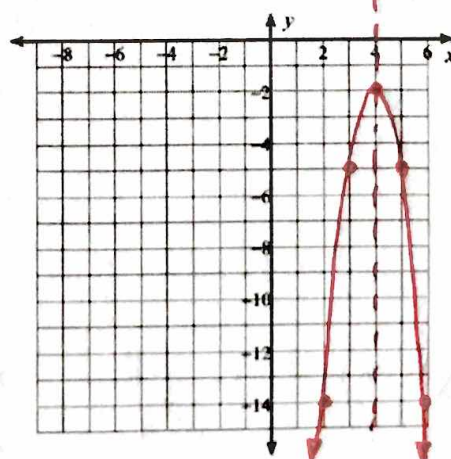
11) $f(x) = \frac{1}{2}(x+2)^2 - 3$



x	f(x)
-1	$-2\frac{1}{2}$
0	-1

$x = -2$

12) $f(x) = -3(x-4)^2 - 2$



x	f(x)
2	-14
3	-5

$x = 4$

Change the following factored form to the standard form.

$$13) y = (x - 3)(x + 7)$$

$$y = x^2 + 7x - 3x - 21$$

$$y = x^2 + 4x - 21$$

$$14) y = -2(x + 4)(x - 5)$$

$$y = -2(x^2 - 5x + 4x - 20)$$

$$y = -2x^2 + 2x + 40$$

Change the following vertex form to the standard form.

$$15) y = (x + 8)^2 - 1$$

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

$$y = x^2 + 8x + 8x + 64 - 1$$

$$y = x^2 + 16x + 63$$

$$16) y = -2(x - 3)^2 - 4$$

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

$$y = -2(x^2 - \underbrace{3x - 3x}_{-6x} + 9) - 4$$

$$y = -2x^2 + 12x - 18 - 4$$

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