Name _____Period_____Date_____ **Unit 3 part B Practice Test**

1) Describe the end behavior for each function below.

a) $y = x^2 - 6x + 11$

$x \to \infty$, $f(x) \to$ ∞
$x \to -\infty$, $f(x) \to$ ∞

b) $-x^2 + 4x - 6$

$x \to \infty$, $f(x) \to$ −∞
$x \to -\infty$, $f(x) \to$ −∞

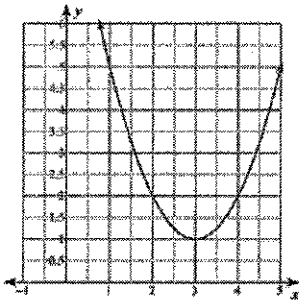
2) What is the vertex form of the quadratic $y = 3x^2 - 6x + 1$? $x = \frac{-b}{2a} = \frac{6}{2(3)} = 1$

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

A matches always opp.

3) Which of the following is **NOT** true of $f(x) = -2(x - 4)^2 + 30$?
a) It has an axis of symmetry of $x = 4$. ✓
b) It has a maximum of 30. ✓
c) It has a y-intercept of (0, 30).
d) The end behavior is that $y \to -\infty$ regardless of whether $x \to -\infty$ or $x \to \infty$. ✓

5) Which of the following is **NOT** true of the function graphed below:

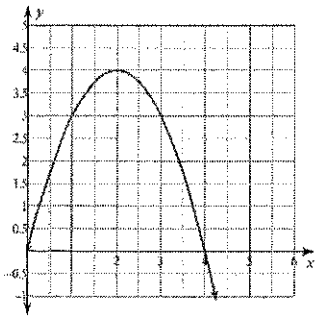


a) The interval of increase is (1, ∞).
has to be an x value
b) $a = 1$
c) The function is $y = x^2 - 6x + 10$.
d) It has a minimum value of 1.

6) Determine the domain and range of the function in question #5.

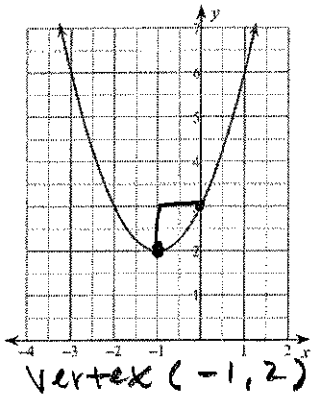
a) Domain: All Real Numbers, Range: All Real Numbers
b) Domain: (-∞, ∞), Range: [3, ∞)
c) Domain: All Real Numbers, Range: $y \geq 1$
d) Domain: (-∞, ∞), Range: (-∞, 1]

7) Find the equation of the parabola on the right.
~~a)~~ $y = x^2 + 4$
b) $y = -x^2 - 4$
~~c)~~ $y = x^2 - 4$
d) $y = -x^2 + 4$
Reflection and up 4



8) Write the equation of the quadratic equation in the graph.

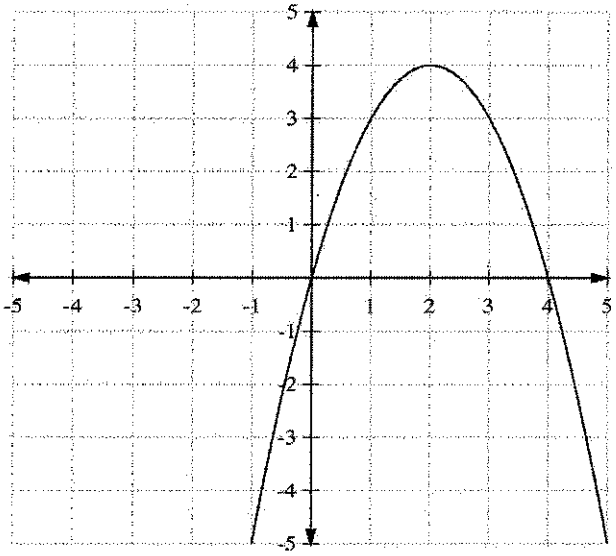
$(x+1)^2+2$




9) Write the quadratic equation whose vertex is at (-4, -6) and is reflected over the x- axis.

$-(x+4)^2-6$

10)



a. Vertex: (2, 4)
b. Axis of Symmetry: x = 2
c. domain: (-∞, ∞) range: (-∞, 4)
d. interval of increase (-∞, 2)
e. interval of decreases (2, ∞)
f. extrema: MAX
g. max/min value y = 4
h. zeroes (0, 0) (4, 0)
f. find rate of change 0<x<3 1
(0, 0) (3, 3) $\frac{3-0}{3-0}$

g. as x→∞, y→ -∞
as x→-∞, y→ -∞

11) For the function $f(x) = (x + 3)^2 - 9$, what is the value of x where the function changes from decreasing to increasing? x = -3

12) If the graph of $y = x^2$ is vertically stretched by a factor of 2, reflected over the x axis, translated right 7 and down 9, what would be the equation of this transformed graph?

~~a)~~ $f(x) = -\frac{1}{2}(x-7)^2 - 9$ Shrink
b) $f(x) = -2(x-7)^2 - 9$
c) $f(x) = -2(x+7)^2 - 9$ ↑ Left
~~d)~~ $f(x) = 2(x+7)^2 - 9$ not reflected
e) none of these

13) What is the axis of symmetry of $y = 2(x-3)^2 - 18$
a) x = –3
b) x = 3
c) x = –6
d) x = 6

14) Circle all that are true: The axis of symmetry ~~ALWAYS contains~~ these points: extrema, vertex, max/min, y-intercept, x-intercepts, the midpoint of x-intercepts.

15) Describe the transformations performed on the parent function $y = x^2$ to the function $y = -(x-4)^2 + 3$

Reflection Right Up

16) Describe the extrema and its value for the quadratic equation: $y = -x^2 - 8x + 5$

~~a)~~ minimum at y = 5

~~c)~~ minimum at y = 21

only positive functions

b) maximum at y = 21

d) maximum at y = 5

$x = -\frac{b}{2a} = \frac{8}{2(-1)}$

$x = -4$

$-(-4)^2 - 8(-4) + 5$

17) Given standard form, convert to vertex form AND given vertex form, convert to standard form.

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

$(x+2)(x+2)$

$x^2 + 2x + 2x + 4$

$x^2 + 4x + 4 - 1$

$\boxed{x^2 + 4x + 3}$

II. $f(x) = x^2 - 6x + 5$

$\boxed{(x-3)^2 - 4}$

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

$= \frac{6}{2(1)}$

$x = 3$

$(3)^2 - 6(3) + 5$

III. $f(x) = -4(x+7)^2 - 5$

$(x+7)(x+7)$

$x^2 + 7x + 7x + 49$

$-4(x^2 + 14x + 49)$

$-4x^2 - 56x + 49 - 5$

$\boxed{-4x^2 - 56x + 44}$

IV. $f(x) = 3x^2 - 36x + 101$

$\boxed{3(x-6)^2 - 7}$

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

$= \frac{36}{2(3)}$

$x = 6$

$3(6)^2 - 36(6) + 101$

18) A rectangular painting has an area of $(2x^2 + 8x + 6)$ cm$^2$. Its length is $(2x + 2)$ cm. Find the width.

$2x^2 + 8x + 6 = (2x + 2)(x + 3)$

$6x + 2x = 8x$

$2 * 3 = 6$

19) A square parking lot has an area of $(4x^2 + 20x + 25)$ ft$^2$. What is the length of one side of the parking lot?

$4x^2 + 20x + 25$

$(2x + 5)(2x + 5)$

20) A ball is hit into the air from a height of 4 feet. The function $h(t) = -16t^2 + 120t + 4$ can be used to model the height of the ball where *t* is the time in seconds after the ball is hit.

a. about how long is the ball in the air? (in other words, how long before the ball hits the ground ;)) $0 = -16t^2 + 120t + 4$

$b^2 - 4ac$

$(120)^2 - 4(-16)(4)$

$\frac{-120 \pm \sqrt{14656}}{-32}$ $+ = -0.033$ $- = \boxed{7.5 \text{ sec}}$

b. What is the maximum height the ball reaches?

$x = \frac{-b}{2a} = \frac{-120}{2(-16)} = 3.75$ $-16(3.75)^2 + 120(3.75) + 4 = \boxed{229 \text{ ft}}$

21) A mileage formula (miles per gallon) for a new car is $f(x) = -0.03x^2 + 2.4x - 30$, where x is speed in miles per hour.

a. At what speed x is the maximum miles per hour for this car? $x = \frac{-b}{2a} = \frac{-2.4}{2(-0.03)} = 40$ Mph

b. What is the maximum miles per gallon at this speed?

$-0.03(40)^2 + 2.4(40) - 30 = 18$ mpg

c. What is the axis of symmetry of the graph of this function? $x = 40$

d. What is the y-intercept of this function? (hint: where x = 0)

$-30$

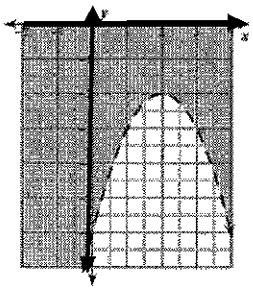
22) Elizabeth reads about a rocket whose path can be modeled by the function $h(t) = -16t^2 + 180t + 15$.

a. What is the initial velocity and launch height? Velocity = 180 height= 15

b. How high is the rocket after 5 seconds?

$-16(5)^2 + 180(5) + 15 = \boxed{515 \text{ ft}}$

23) Approximately how long after launch does the rocket initially reach 200 feet?
What is the inequality shown in the graph below?



$0 < -6$ X

~~a)~~ $y > x^2 - 6x + 11$
Need Reflection

b) $y < -x^2 + 4x - 6$

~~c)~~ $y \geq -x^2 - 4x - 2$
need Dotted

d) $y > -x^2 + 4x - 6$

$0 > -6$ ✓

Algebra 2 Name_____ ID: 1

# Question #23 on Study Guide

Date_____ Period____

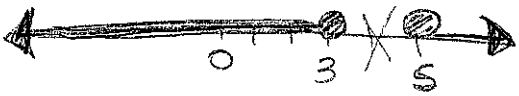
**Solve each quadratic inequality. Write final answer in interval notation.**

1) $y \le x^2 - 8x + 15$

$y \le (x-5)(x-3)$

$0 \le (x-5)$ $\boxed{x \ge 5}$

$0 \le (x-3)$ $\boxed{x \ge 3}$



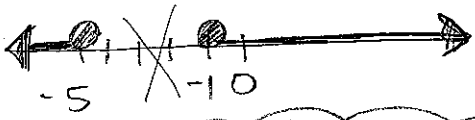

$(-\infty, 3] \cup [5, \infty)$

2) $y \le x^2 + 6x + 5$

$0 \le (x+5)(x+1)$

$0 \le x+5$ $\boxed{x \ge -5}$

$0 \le x+1$ $\boxed{x \ge -1}$



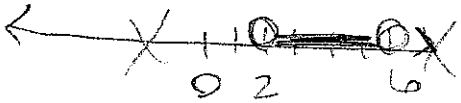

$(-\infty, -5] \cup [-1, \infty)$

3) $y > x^2 - 8x + 12$

$0 > (x-6)(x-2)$

$0 > (x-6)$ $\boxed{x < 6}$

$0 > (x-2)$ $\boxed{x < 2}$




$(2, 6)$