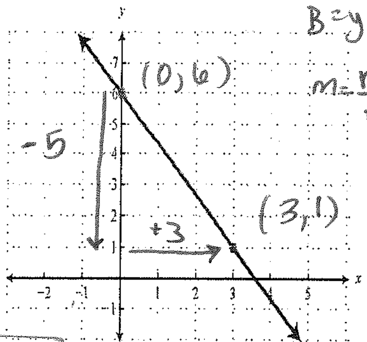
Algebra 1: Unit 7 Practice Test: Graphing Quadratic Functions

Name: Key

1.



B = y-int: (0, 6)

$m = \frac{rise}{run} = \frac{-5}{3}$

Is this a $\boxed{\text{linear}}$ or quadratic function? How do you know?

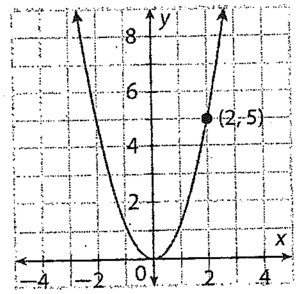
IT MAKES A LINE!

Write the equation of the function:

$y = mx + B$

$\boxed{y = -\frac{5}{3}x + 6}$

2.



Is this a linear or $\boxed{\text{quadratic}}$ function? How do you know?

IT MAKES A PARABOLA

Write the equation of the function in standard form: GOES THROUGH ORIGIN (AS VERTEX)

use

(2, 5) $f(x) = ax^2$

$5 = a \cdot 2^2$

$\frac{5}{4} = \frac{4a}{4}$

$a = \frac{5}{4}$

$\boxed{f(x) = \frac{5}{4}x^2}$

For numbers 3-5: Find all the parts and graph the quadratic function in standard, vertex and intercept form.

3. Standard Form: $f(x) = -x^2 + 6x - 5$

(1) $a = -1$
$B = 6$
$C = -5$

x	$f(x)$
1	0
0	-5
3	4
6	-5
5	0

(2) AXIS OF SYMMETRY:

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

$x = 3$

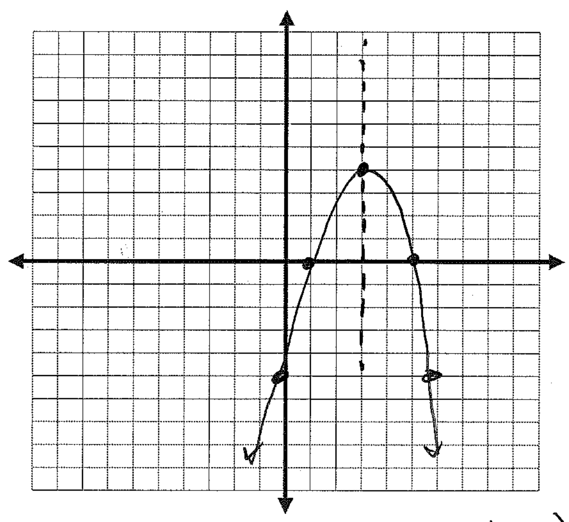
(3) VERTEX:

$f(3) = -1 \cdot 3^2 + 6(3) - 5$

$= -9 + 18 - 5$

$= 9 - 5$

$f(3) = 4$



(4) y-INTERCEPT: (0, C)

(0, -5)

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

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

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

$x - 5 = 0$ $x - 1 = 0$

$x = 5$ $x = 1$

Direction of opening: DOWN

Vertex: (3, 4)

Axis of Symmetry: $x = 3$

$\boxed{\text{Maximum}}$/Minimum: $y = 4$

y-intercept: (0, -5)

x-intercept(s): (1, 0) (5, 0)

Domain: all real #s

Range: $\{y \mid y \leq 4\}$

4. Vertex Form: $f(x)=\frac{1}{3}(x+6)^2-3$

$a=\frac{1}{3}$
$h=-6$
$k=-3$

x	f(x)
-9	0
-12	9
-6	-3
0	9
-3	0

V

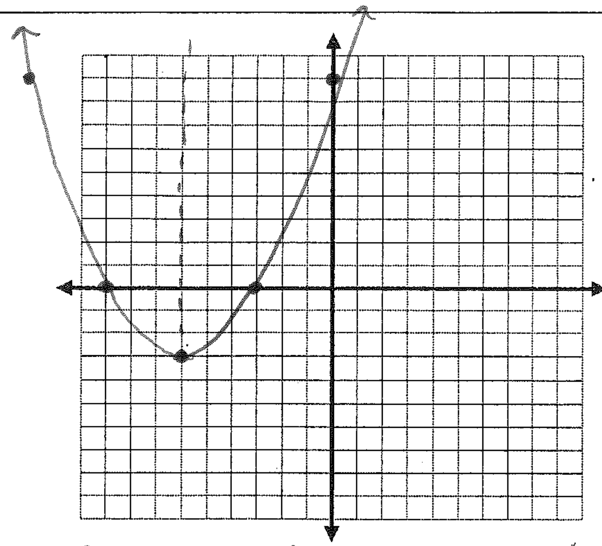
x-intercepts:

$0=\frac{1}{3}(x+6)^2-3$
$+3 \quad +3$
$\frac{3}{1}\cdot 3=\frac{1}{3}(x+6)^2\cdot\frac{3}{1}$
$\sqrt{9}=\sqrt{(x+6)^2}$
$3=x+6$
$-6 \quad -6$
$-3=x$

Vertex: $(-6,-3)$

y-intercept: $x=0$

$f(0)=\frac{1}{3}(0+6)^2-3$
$=\frac{1}{3}(6)^2-3$
$=\frac{1}{3}(36)-3$
$=12-3$
$=9$



Direction of opening: opens up

Vertex: $(-6,-3)$

Axis of Symmetry: $x=-6$

Maximum/$\boxed{\text{Minimum:}}$ $y=-3$

y-intercept: $(0,9)$

x-intercept(s): $(-3,0)$ $(-9,0)$

Domain: $\mathbb{R}$

Range: $\{y \mid y \geq -3$

5. Intercept Form: $f(x)=2(x+1)(x-3)$ $a=2$

x	$f(x)$
-1	0
3	0
1	-8
0	-6
2	-6

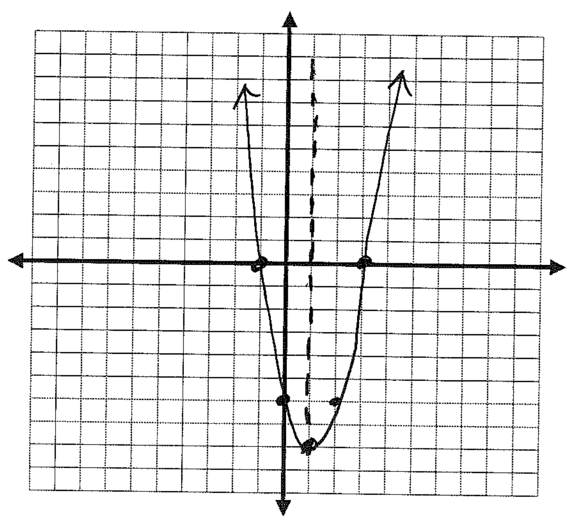
(1) $a=2 \rightarrow$ opens up

(2) $x+1=0$ $\quad x-3=0$ (x-intercepts)
$-1 \; -1 \quad +3 \; +3$
$x=-1 \quad x=3$

(3) Axis of Symmetry
$x=1$

(4) Vertex:
$f(1)=2(1+1)(1-3)$
$=2(2)(-2)$
$f(1)=-8$

(5) y-intercept:
$f(0)=2(0+1)(0-3)$
$=2(1)(-3)$
$f(0)=-6$



Direction of opening: Up

Vertex: $(1,-8)$

Axis of Symmetry: $x=1$

Maximum/$\boxed{\text{Minimum}}$ $y=-8$

y-intercept:

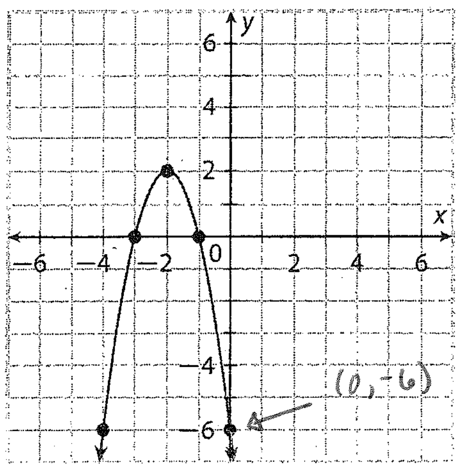
x-intercept(s): $(-1,0)$ $(3,0)$

Domain: all real #s

Range: $\{y \mid y \geq -8\}$

Use the graph of the parabola below to answer the following questions.

6. vertex: $(-2, 2)$



a) Does the parabola have a minimum or a $\boxed{\text{maximum}}$? Find the maximum or minimum.

VERTEX : $(-2, 2)$ $y = 2$

b) What is the parabola's axis of symmetry?

$x = -2$

c) Write the parabola in **Vertex Form:**

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

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

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

POINT: $(0, -6)$

$-6 = a(0+2)^2 + 2$

$-6 = a(2)^2 + 2$

$-6 = 4a + 2$
$-2 \quad -2$

$\frac{-8}{4} = \frac{4a}{4}$

$a = -2$

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

d) Write the parabola in **Intercept Form:**

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

X-INTERCEPTS : $x = -1$
$x = -3$

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

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

POINT: $(-4, -6)$

$-6 = a(-4+1)(-4+3)$

$-6 = a(-3)(-1)$

$\frac{-6}{3} = \frac{3a}{3}$

$-2 = a$

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

e) Write the parabola in **Standard Form:**

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

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

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

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

$\boxed{y = -2x^2 - 8x - 6}$

f) What is the y-intercept for the graph?

$(0, -6)$

g) Describe the transformations necessary to get from the graph of the parent function $f(x) = x^2$ to the graph above.

- IT FLIPS UPSIDE DOWN, SINCE a IS NEGATIVE
- IT IS STEEPER THAN THE PARENT FUNCTION AS a IS 2.
- THERE IS A HORIZONTAL SHIFT TO THE LEFT 2 AND A VERTICAL SHIFT UP 2.

Algebra 1: Unit 7 Practice Test: Graphing Quadratic Functions Name: ______________________________

Football Task

7. The football team kicker was asked to participate in a demonstration for his math class. He took a football to the edge of the roof of the school building and kicked it up into the air at a slight angle, so that the ball eventually fell all the way to the ground. The class determined that the motion of the ball from the time it was kicked could be modeled closely by the function,

$$h(t) = -16t^2 + 96t + 112$$

where *h(t)* represents the height of the ball in feet after *t* seconds.

$a = -16$
$B = 96$
$C = 112$

a) Determine whether the function has a maximum or minimum value. Explain your answer.

SINCE A BALL'S PATH IS AN UPSIDE-DOWN PARABOLA, ITS VERTEX IS A MAXIMUM.

b) Find the maximum or minimum value of the function. After how many seconds did the ball reach this value? Show how you found your answer.

$x = \frac{-B}{2A} \to \frac{-96}{2(-16)} \to \frac{-96}{-32}$ $\boxed{x = 3}$

$h(3) = -16(3^2) + 96(3) + 112$
$= -16(9) + 288 + 112$
$= -144 + 288 + 112$
$= 256$

VERTEX: (3, 256)
SECONDS, 256 FT

After 3 seconds, the ball reached 256 ft.

c) Evaluate *h(0)*. What does this value tell you? Explain in the context of the problem.

(y-INTERCEPT)

$h(0) = -16(0^2) + 96(0) + 112$
$= 112$

THE BUILDING IS 112 FEET OFF THE GROUND.

d) How long is the ball in the air? Explain your answer.

(x-INTERCEPTS) - Solve by factoring

$h(t) = -16t^2 + 96t + 112$
$0 = -16t^2 + 96t + 112$
$= -16(t^2 - 6t - 7)$
$= -16(t - 7)(t + 1)$
$= -16$

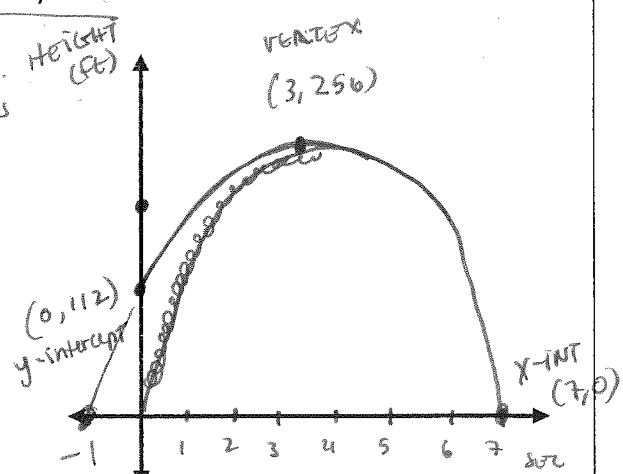
$t - 7 = 0$
$+7 \quad +7$
$t = 7$ $\boxed{7 \text{ SECONDS}}$

$t + 1 = 0$
$-1 \quad -1$
$\cancel{t = -1}$

e) What interval of the domain is the ball increasing (i.e., ball going up)? For what interval of the domain is the function decreasing (i.e., ball going down)? Explain how you know.

THE BALL IS GOING UP FROM 0-3 SECONDS, AND FALLS FROM 3 SECONDS TO 7 SECONDS. I KNOW THIS BECAUSE THE VERTEX REPRESENTS THE MAXIMUM HEIGHT OF THE BALL.

f) Do a rough graph of the problem. Label the x-axis, y-axis, vertex, x-intercept and y-intercept.



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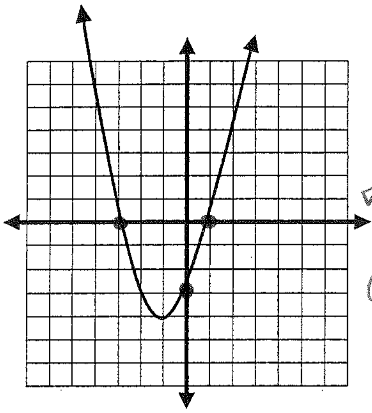
On the scantron, choose the best answer.

1. Which function is represented by the graph?



(-3,0) (1,0) ARE X-INTERCEPTS, SO IN INTERCEPT FORM ITS WRITTEN AS $(x - -3)(x-1)$ or $(x+3)(x-1)$ rewrite in standard form

	x	$+3$
x	x^2	$+3x$
-1	$-1x$	-3

~~A.~~ $f(x) = -x^2 + 2x - 3$

~~B.~~ $f(x) = -x^2 - 2x - 3$

a is NEGATIVE - THIS GRAPH OPENS UP.

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

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

2. Find the vertex of the graph $f(x) = x^2 - 6x + 10$ (standard form)

$a=1$
$B=-6$
$C=10$

$X = \frac{-B}{2A} = \frac{--6}{2(1)} = \frac{6}{2} = 3$

$x=3$

$f(3) = 3^2 - 6(3) + 10$
$= 9 - 18 + 10$
$= -9 + 10$
$= 1$

$(3, 1)$

3. Which function has a maximum value? ← opens down

A. $f(x) = x^2 + 2x - 15$ ← a is positive

B. $f(x) = -x^2 + 3x + 40$ ← a is negative

C. $f(x) = (x+5)^2 - 11$ ← a is positive

D. $f(x) = (x+4)(x-3)$ ← a is positive

$(x-h)^2 + k$

4. What are the zeros and vertex of this graph:

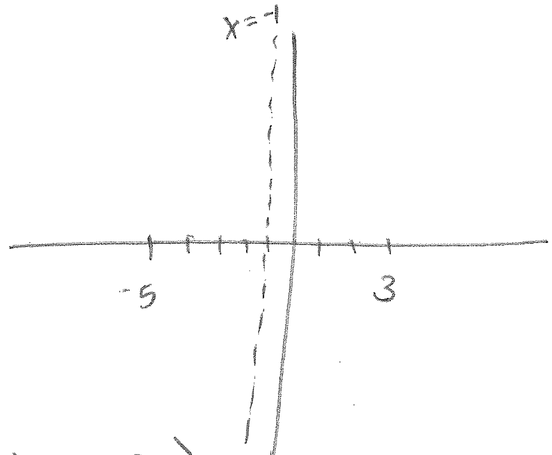
x-intercepts

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

$0 = x+5$
$-5 \quad -5$
$-5 = x$

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

$f(-1) = (-1+5)(-1-3)$
$= (4)(-4)$
$= -16$



(X-INTERCEPTS)
ZEROS = (-5,0) (3,0) VERTEX: (-1,-16)

5. The graphs of $f(x) = (x+4)^2 - 6$ can be obtained from the graph of $f(x) = x^2$ using what transformation?

$h=-4$
$k=-6$ $\}$ $(-4,-6)$

Translate ________________________________

• SHIFT THE PARENT FUNCTION TO THE

LEFT FOUR AND DOWN SIX.