Quadratics Test Review
Modeling Characteristics, and Transformations

Name: Key

I. Modeling with Quadratics

1. The function $g(t) = -16t^2 + 120t + 4$ can be used to model the height of a baseball where *t* is the time in seconds after the ball is hit.

A. At what height was the ball when it was hit?

$t(0) = 4$

$\boxed{4 \text{ ft}}$

B. Find the height of the ball after 1 second.

$t(1) = -16(1)^2 + 120(1) + 4$

$-16 + 120 + 4$

$\boxed{108 \text{ ft}}$

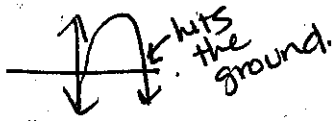
C. At what second did the ball reach its maximum height? What is the maximum height?

Find vertex $\frac{-120}{2(-16)} = 3.75$ $(3.75, 229)$

$\boxed{3.75 \text{ seconds}}$

D. How long is the ball in the air before it hits the ground?

When is $g(t) = 0$?



Approximately $\boxed{7.5 \text{ seconds}}$

2. You find out that the English department is changing textbooks and you do not have to return it. You get creative. You go to the roof of a 12 story building and decide to throw your book straight down at 48 feet per second into a pool at the bottom. This scenario can be modeled by the equation $s(t) = -16t^2 - 48t + 160$, where t is the time in seconds after the book in thrown.

A. Find the height of the book after 2 seconds.

$s(2) = -16(2)^2 - 48(2) + 160$

$s(2) = 0$

At 2 seconds the book is $\boxed{0 \text{ ft}}$

B. How many seconds will it take for the book to hit the water in the pool?

$s(t) = 0$

$\boxed{2 \text{ seconds}}$

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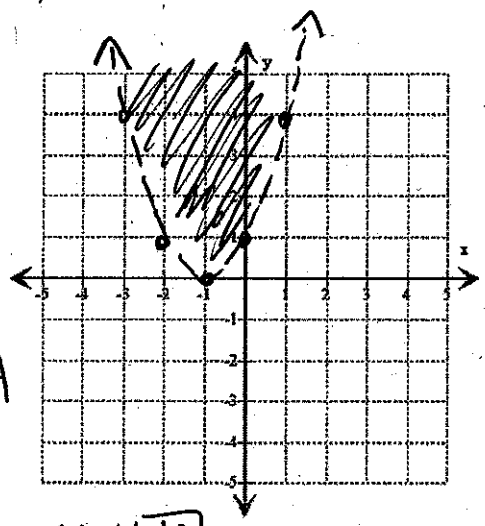
II. **Quadratic Inequalities**

1. $y > x^2 + 2x + 1$

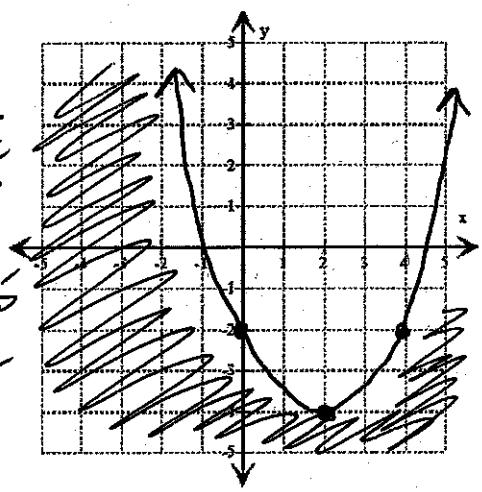
x	y
-3	4
-2	1
-1	0
0	1
1	4



test (0,0) $0 > 1$ $\boxed{\text{NO}}$

2. $y \leq \frac{1}{2}x^2 - 2x - 2$

x	y
0	-2
1	-3.5
2	-4
3	-3.5
4	-2



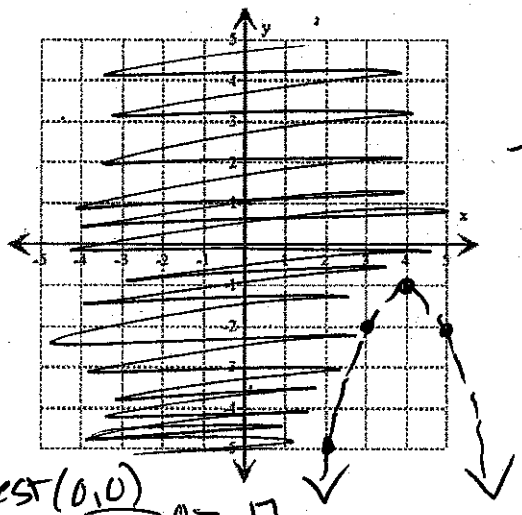
test (0,0)

$0 \leq -2$

$\boxed{\text{NO}}$

3. $y > -(x-4)^2 - 1$

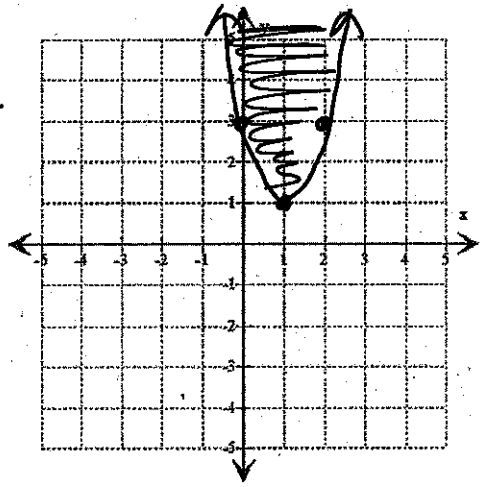
x	y
2	-5
3	-2
4	-1
5	-2
6	-5



test (0,0) $\boxed{\text{yes}}$ $0 > -17$

4. $y \geq 2(x-1)^2 + 1$

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



test (0,0)

$0 \geq 3$

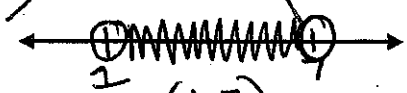
$\boxed{\text{NO}}$

5. $0 < -x^2 + 6x - 7$

$-(x^2 - 6x + 7) > 0$

$-(x-1)(x-7) > 0$

$x=1 \quad x=7$



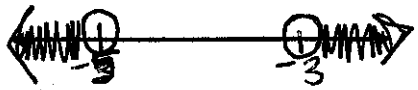
Interval: (1,7)

6. $0 > -2x^2 - 16x - 30$

$-2(x^2 + 8x + 15) < 0$

$-2(x+3)(x+5) < 0$

$x=-3 \quad x=-5$



Interval: $(-\infty, -5) \cup (-3, \infty)$

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III. Transformations

Describe the transformations below.

1. $f(x) = -\frac{2}{7}x^2 - 10$

Horizontal Shift: None

Reflection: none (x-axis) y-axis (neg.)

Vertical Shift: down 10

Dilation: none stretch (shrink)

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

Horizontal Shift: Right 1

Reflection: none (x-axis) y-axis

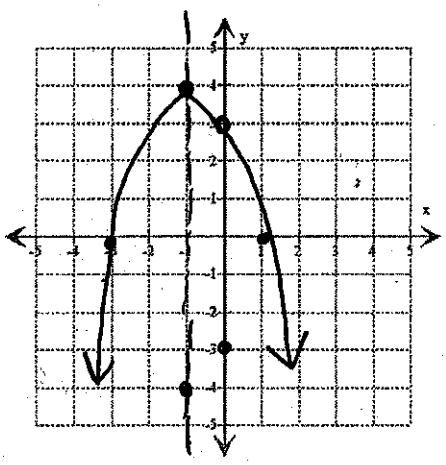
Vertical Shift: up 2

Dilation: none (stretch) shrink

$\frac{-1 \times 3}{2} = 1$

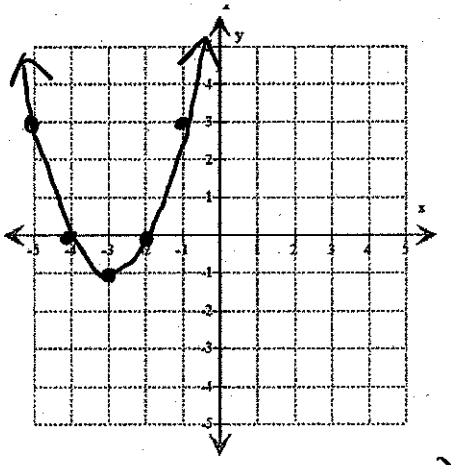
Graph the following quadratic equations.

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



AOS: $x = -1$ Vertex: $(-1, 4)$

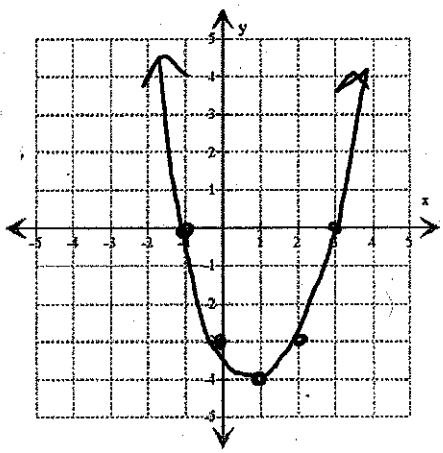
6. $y = x^2 + 6x + 8$



AOS: $x = -3$ Vertex: $(-3, -1)$

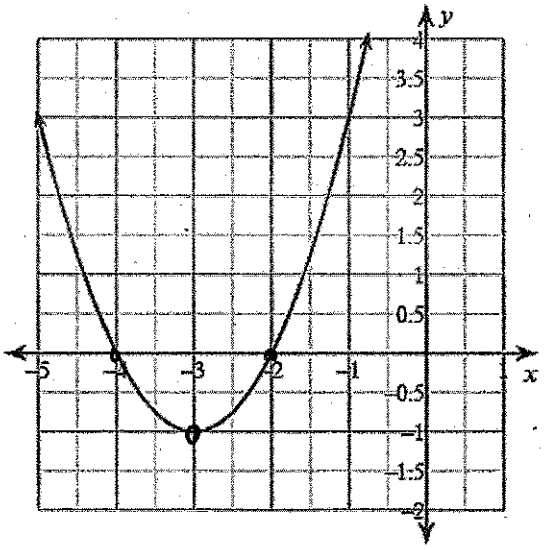
7. $y = (x + 1)(x - 3)$

(2) (1-3) -2



AOS: $x = 1$ Vertex: $(1, -4)$

IV. Characteristics



Vertex	$(-3, -1)$
Domain	$(-\infty, \infty)$
Range	$[-1, \infty)$
Increasing Interval	$(-3, \infty)$
Decreasing Interval	$(-\infty, -3)$
Zeros	$(-4, 0)$ $(-2, 0)$
Y-intercept	not shown
Maximum	—
Minimum	$y = -1$
Axis of Symmetry	$x = -3$
Left End Behavior	As $x \to -\infty$, $y \to \infty$
Right End Behavior	As $x \to \infty$, $y \to \infty$