

# Algebra 1 · Graphing Quadratic Functions · Test Answer Key

Common Core F-IF.C.7a, F-IF.C.8a, F-IF.B.4, A-SSE.B.3b · mathovore.fr

This answer key gives a complete solution and a scoring guide for each question. Award partial credit as described. A student who reaches the right vertex by a different valid method should receive full credit for that part.

## Algebra 1 Common Core: F-IF.C.7a · F-IF.C.8a · F-IF.B.4 · A-SSE.B.3b

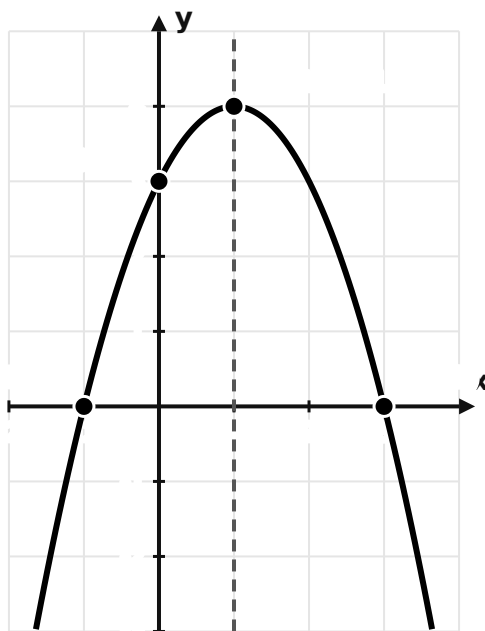
### Question 1: Features from standard form (2 points)

- a.  $a=2>0$ , so it opens **up**. The y-intercept is  $f(0)=6$ :  $(0,6)$ .
- b.  $x=-\frac{-8}{2(2)}=2$  and  $f(2)=8-16+6=-2$ . Axis  $x=2$ , vertex  $(2,-2)$ .

*Scoring: 1 point for direction and y-intercept (both needed); 1 point for the axis and the vertex.*

### Question 2: Read a graph (2 points)

- a. Vertex  $(1,4)$ ; axis  $x=1$ .
- b. x-intercepts  $(-1,0)$  and  $(3,0)$ ; y-intercept  $(0,3)$ .



Parabola with features marked.

Scoring: 1 point for the vertex and axis; 1 point for all three intercepts.

### Question 3: Factored form (2 points)

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- a. Zeros:  $x = -1$  and  $x = 5$ . The axis is halfway:  $x = \frac{-1+5}{2} = 2$ .  
b.  $g(2) = (3)(-3) = -9$ . Vertex:  $(2, -9)$ .

Scoring: 1 point for both zeros and the axis; 1 point for the vertex.

### Question 4: Complete the square (3 points)

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$$h(x) = (x^2 + 10x + 25) - 25 + 16 = (x + 5)^2 - 9.$$

Vertex:  $(-5, -9)$ .

Zeros:  $(x + 5)^2 = 9$ , so  $x + 5 = \pm 3$  and  $x = -2$  or  $x = -8$ . Check:  $(x + 2)(x + 8) = x^2 + 10x + 16$ .

Scoring: 1 point for the vertex form, 1 point for the vertex, 1 point for both zeros.

### Question 5: Change the form (2 points)

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- a.  $-2(x^2 - 2x + 1) + 8 = -2x^2 + 4x + 6$ .  
b. Set  $y = 0$ :  $(x - 1)^2 = 4$ , so  $x = 3$  or  $x = -1$ . Factored form:  $y = -2(x + 1)(x - 3)$ . Check:  
 $-2(x^2 - 2x - 3) = -2x^2 + 4x + 6$ .

Scoring: 1 point for correct expansion; 1 point for finding the zeros and keeping the factor  $-2$ .

### Question 6: Compare two functions (2 points)

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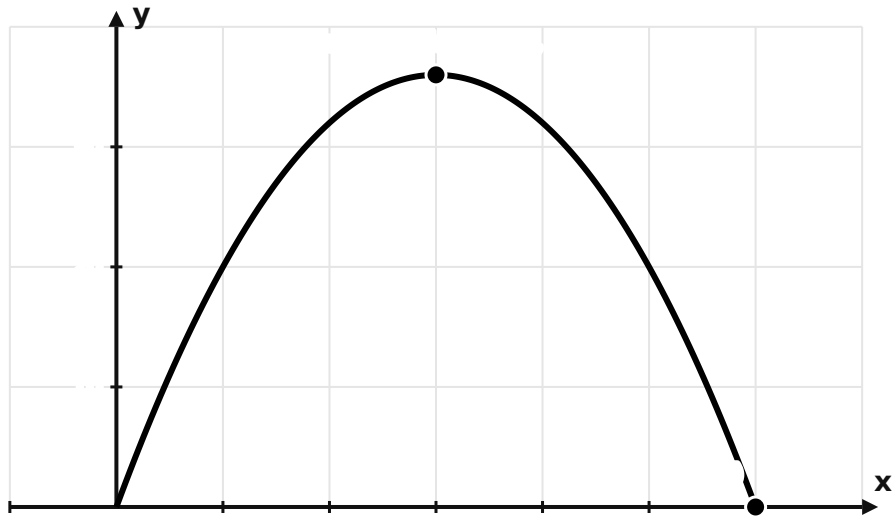
- a. The values repeat around  $x = 2$  and the lowest is  $-2$ . Vertex  $(2, -2)$ ; axis  $x = 2$ .  
b. For  $r$ :  $x = -1$  and  $r(-1) = 1 - 2 - 5 = -6$ . Since  $-6 < -2$ ,  $r$  **has the smaller minimum**.

Scoring: 1 point for the vertex and axis; 1 point for the minimum of  $r$  and the correct comparison.

### Question 7: Kicked ball (3 points)

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- a.  $t = -\frac{48}{2(-16)} = 1.5$  and  $h(1.5) = -36 + 72 = 36$ . **36 feet at 1.5 seconds**.  
b.  $-16t(t - 3) = 0$ , so  $t = 0$  (the kick) or  $t = 3$  seconds.  
c.  $h(1) = -16 + 48 = 32$  **feet**.

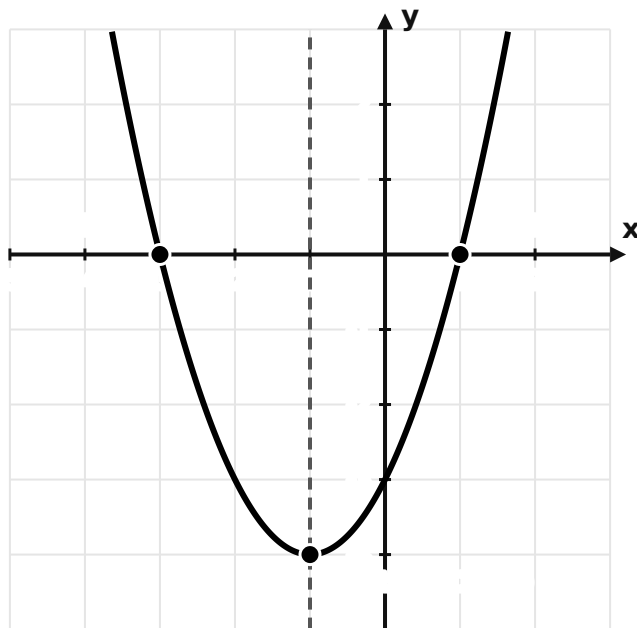


Height  $h$  (feet) of a kicked ball after  $t$  seconds.

Scoring: 1 point for each part (a), (b) and (c).

### Question 8: Intervals of a function (2 points)

- The vertex is  $(-1, -4)$ , so  $f$  is decreasing for  $x < -1$ .
- The graph is below the  $x$ -axis between the zeros  $-3$  and  $1$ :  $-3 < x < 1$ .



Parabola with features marked.

Scoring: 1 point for each part. Accept interval notation.

### Question 9: Pen with fence (2 points)

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- a. The third side is  $60-2x$ , so  $A(x) = x(60-2x) = -2x^2 + 60x$ .
- b.  $x = -\frac{60}{2(-2)} = 15$  and  $A(15) = 15(30) = \mathbf{450 \text{ square feet}}$ .

*Scoring: 1 point for the function; 1 point for finding the vertex and the area.*

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| <b>Total</b>     |
| <b>20 points</b> |