

Chapter 6 Review: Quadratic Functions

1. Which is the vertex for the quadratic function $y = -3(x-5)^2 + 7$?

1. D

- (A) $(-5, -7)$ (B) $(-5, 7)$ (C) $(5, -7)$ (D) $(5, 7)$

2. Which is a quadratic function?

2. D

- (A) $y = 5(x - 3) + 7$ (B) $y = 2(x - 3)^2(x + 1)$ (C) $y = 2x^2(x + 1)^2$ (D) $y = x(x + 1)$

3. Which is the y -intercept for the quadratic function $f(x) = 4(x-1)(2x+3)$?

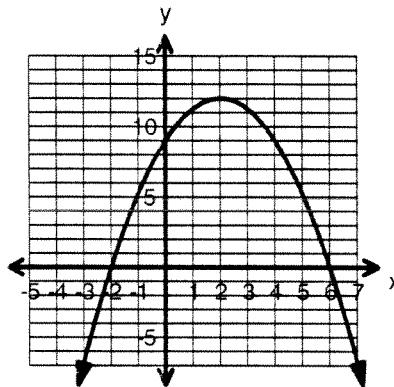
3. C

- (A) 1 (B) -3 (C) -12 (D) 0

4. Which represents the range for the graph?

4. B

- (A) $y \leq 9$
 (B) $y \leq 12$
 (C) $-2 \leq y \leq 6, y \in R$
 (D) $y \in R$



5. Which statement about the quadratic function $y = 5x^2 + 7x - 11$ with vertex $(-3, -27)$ is correct?

5. A

- (A) There is a minimum value of -27 . (B) There is a minimum value of -3 .
 (C) There is a maximum value of -27 . (D) There is a maximum value of -3 .

6. A parabola has x -intercepts at -6 and 2 . Which represents the function in Factored Form?

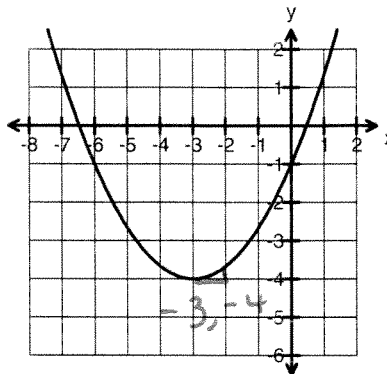
6. A

- (A) $y = a(x+6)(x-2)$ (B) $y = a(x-6)(x+2)$
 (C) $y = a(x-6)(x-2)$ (D) $y = a(x+6)(x+2)$

7. Which is the function in Vertex Form represented by the graph?

7. A

- (A) $y = \frac{1}{3}(x+3)^2 - 4$ (C) $y = \frac{1}{3}(x-3)^2 - 4$
 (B) $y = -\frac{1}{3}(x-3)^2 - 4$ (D) $y = -\frac{1}{3}(x+3)^2 - 4$



8. Which is the equation of the axis of symmetry for the function $y = -3x^2 - 6x + 7$?

8. A

- (A) $x = -1$ (B) $x = 2$ (C) $x = 1$ (D) $x = -2$
- $x = \frac{-b}{2a} = \frac{6}{2(-3)}$

9. Which represents the number of x-intercepts for the function $y = -\frac{1}{3}(x+3)^2 - 4$.

9. D

- (A) 1 (B) 2 (C) 3 (D) none

10. The area of a rectangular enclosure is given by the function $A(x) = -5x^2 + 150x$, where x is the width, in meters. What is the width that will produce a maximum area?

10. A

- (A) 15m (B) 5m (C) 150m (D) 30m
- $x = \frac{-b}{2a} = \frac{-150}{2(-5)}$

11. The Beatles Fan Club has 6000000 members and charges \$5.00 per month. If the Club raises membership fees by \$1.00 per month they expect 10000 fewer members per month. Which represents the revenue function?

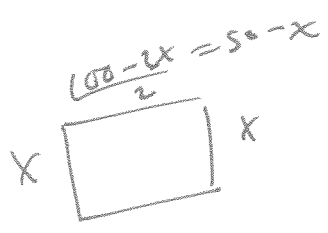
11. D

- (A) $R = (6000000 + 1x)(5 - 10000x)$ (B) $R = (6000000 - 1x)(5 + 10000x)$
 (C) $R = (6000000 + 10000x)(5 - 1x)$ (D) $R = (6000000 - 10000x)(5 + 1x)$

12. A farmer constructs a rectangular enclosed fence in an open field using 100m of fencing. Which quadratic function models the maximum area of the enclosed region?

12. C

- (A) $A(x) = (100 - x)x$ (B) $A(x) = (100 - 2x)x$
 (C) $A(x) = (50 - x)x$ (D) $A(x) = (50 - 2x)x$



Part B: Show all workings to receive full credit. [30 marks]

13. Given the function $y = -\frac{1}{2}(x+4)^2 + 6$ determine the following information and sketch the graph. [7]

(A) Axis of Symmetry equation: $x = -4$

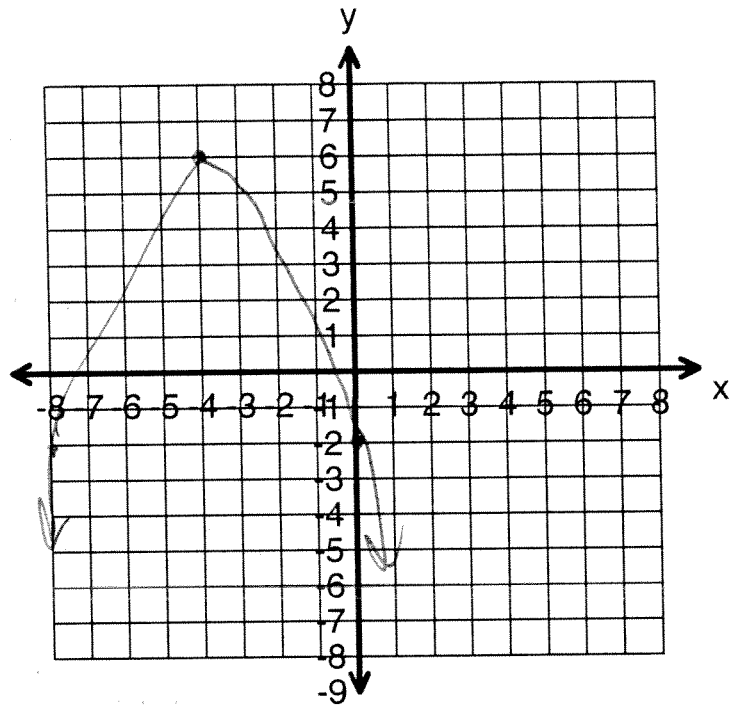
(B) Vertex: $(-4, 6)$

(C) Maximum or Minimum value is $\text{max } 6$

(D) Y-intercept: -2

(E) Domain: $x \in \mathbb{R}$

(F) Range: $\{y \mid y \leq 6\}$



14. An osprey dives toward the water to catch a salmon. Its initial height above the water is 30 feet $(0, 30)$. It descends and at 2 seconds it catches a salmon when it is at a height of 1 foot. Determine the quadratic function that models the flight path of the osprey. [4]

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

$$30 = a(0-2)^2 + 1$$

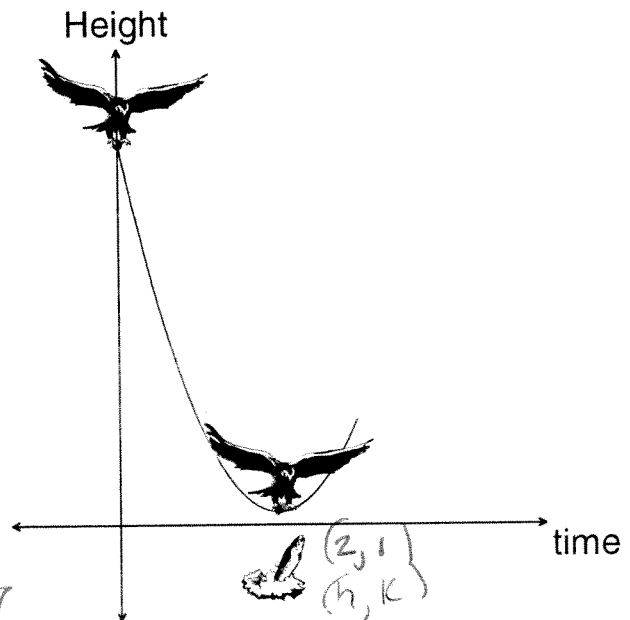
$$30 = a(4) + 1$$

$$30 = 4a + 1$$

$$\frac{29}{4} = \frac{4a}{4}$$

$$a = \frac{29}{4}$$

$$y = \frac{29}{4}(x-2)^2 + 1$$



15. A ball is thrown into the air and its height $h(t)$ above the ground, in meters, after t seconds is modeled by the function $h(t) = -6t^2 + 24t + 6$.

(A) What is the initial height of the rocket? 6 [1]

(B) What was the height of the ball at 3 seconds? 24 [2]

(C) When did the ball reach its maximum height? 2 [2]

(D) What was the maximum height of the ball? 30 [1]

$$h(3) = -6(3)^2 + 24(3) + 6 = 24$$

$$x = \frac{-b}{2a} = \frac{-24}{2(-6)} = 2$$

$$y = -6(2)^2 + 24(2) + 6 = 30$$

16. Last year, QE charged a \$10 session fee for photos and 400 sessions were booked. This year, the student council estimates that for every \$1 increase in price, they expect to have 20 fewer sessions booked.

(A) Write a quadratic function to model the maximum revenue for this situation. [2]

(B) Determine the maximum revenue. [3]

(C) What session fee will give the maximum revenue? [1]

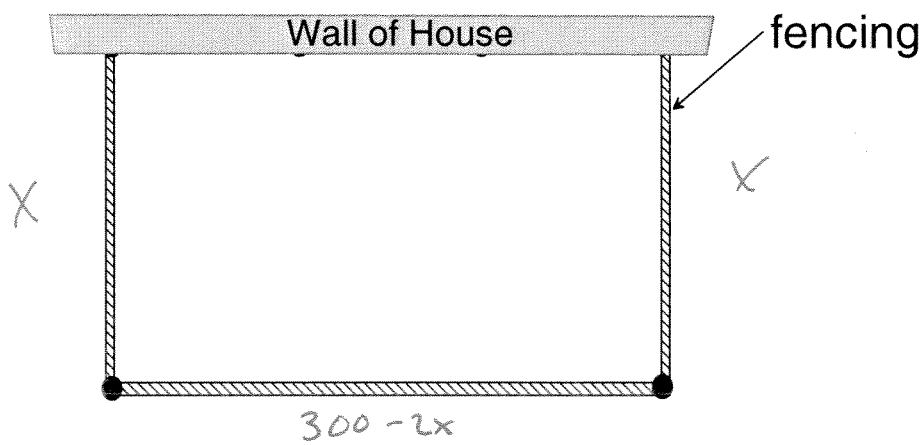
$$y = (400 - 20x)(10 + x) = 4000 + 200x - 20x^2$$

$$x = \frac{-b}{2a} = \frac{-200}{2(-20)} = 5$$

$$\text{Max } R = 4000 + 200(5) - 20(5)^2 = 4500$$

$$\text{Fee} = 10 + 1(5) = 15$$

17. A rectangular region is to be constructed using 300m of fencing and a house as one side.



(A) Write the quadratic function that models the rectangular region. $A = x(300 - 2x) = 300x - 2x^2$ [2]

(B) Determine the width which maximizes the area. $x = \frac{-b}{2a} = \frac{-300}{2(-2)} = 75 \text{ m}$ [1]

(C) Determine the maximum enclosed area. [2]

$$A = 300(75) - 2(75)^2 = 11250 \text{ m}^2$$