15   **Part I:**   **Multiple Choice. Write the correct answer in the space provided at the end of this section.**

1. Which describes the graph of $y = 3(x + 4)^2 + 1$?

    (A) Vertex (-4,1) and opens up.

    (B) Vertex (-4,1) and opens down.

    (C) Vertex (4,-1) and opens up.

    (D) Vertex (4,-1) and opens down.

2. What is the range of the quadratic function $y = -2x^2 + 12x - 14$?

    (A) $\{y|y \le -4, y \in R\}$

    (B) $\{y|y \ge -4, y \in R\}$

    (C) $\{y|y \le 4, y \in R\}$

    (D) $\{y|y \ge 4, y \in R\}$

3. A quadratic function has a maximum height of 5 and x-intercepts at -8 and 8. What is the vertex?

    (A) (-5,0)

    (B) (0,-5)

    (C) (0,5)

    (D) (5,0)

4. A lifeguard has 100 m of rope to enclose a rectangular swimming area. Which equation represents the maximum area of the enclosure if the lifeguard uses the beach as one side and the rope for the other three sides?

    (A) $A = w(50 - w)$

    (B) $A = w(50 - 2w)$

    (C) $A = w(100 - w)$

    (D) $A = w(100 - 2w)$

5. Which of the following quadratic functions has the most narrow parabola when compared to $y = x^2$?

(A) $y = \frac{4}{3}(x - 5)^2 - 2$

(B) $y = \frac{1}{2}(x - 5)^2 - 2$

(C) $y = \frac{2}{7}(x - 5)^2 - 2$

(D) $y = \frac{1}{5}(x - 5)^2 - 2$

6. Which function has axis of symmetry $x = 2$?

(A) $y = 3x^2 - 6x + 4$

(B) $y = 3x^2 + 6x + 4$

(C) $y = 3x^2 - 12x + 4$

(D) $y = 3x^2 + 12x + 4$

7. The point $(2, 4)$ is on the graph of the quadratic equation $f(x) = -x^2 + bx + 12$. What is the value of b?

(A) $-\frac{13}{2}$

(B) -6

(C) -2

(D) $\frac{3}{2}$

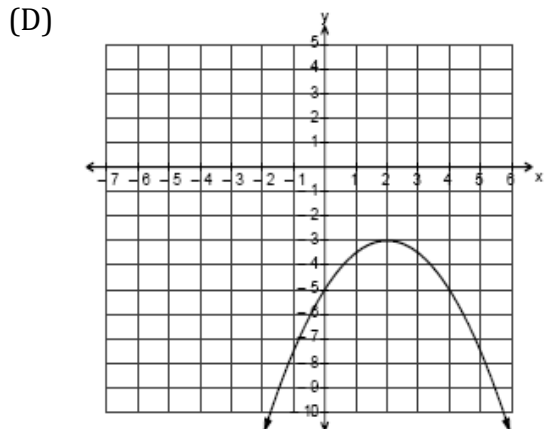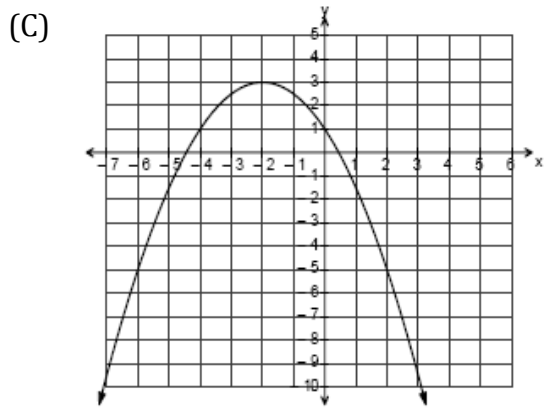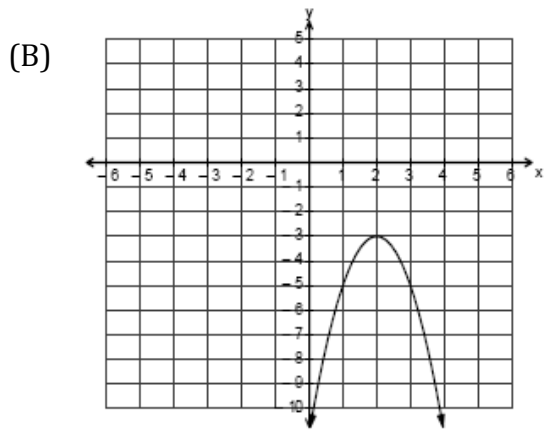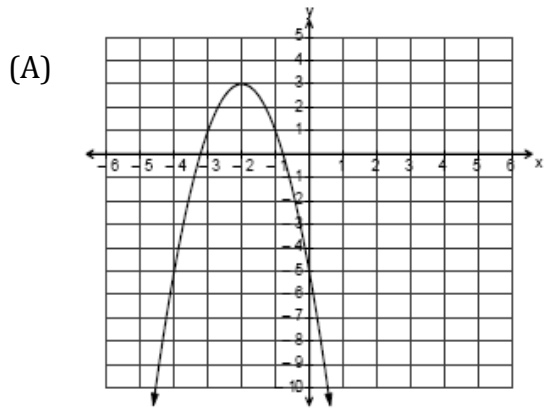8. Which value of c makes $x^2 - 7x + c$ a perfect square?

(A) $\frac{7}{2}$

(B) $\frac{49}{4}$

(C) 7

(D) 49

9. Which graph represents $y = -2(x - 2)^2 - 3$?

(A)

(B)

(C)

(D)

10. What is the value of a in the function $y = ax^2 - 48x + 12$, if the axis of symmetry for the graph of the function is $x = 6$?

(A)   −4

(B)   −1

(C)   1

(D)   4

11. What is the domain of the quadratic function $f(x) = -3x^2 + 12x - 1$?

(A) $\{x|x \in R\}$

(B) $\{x|x \geq -1, x \in R\}$

(C) $\{x|x \geq 2, x \in R\}$

(D) $\{x|x \geq 11, x \in R\}$

12. A quadratic function has a minimum value at −8 and $a > 0$. How many x-intercepts are there?

(A) 0

(B) 1

(C) 2

(D) 3

13. What is the vertex form of $y = 3x^2 - 12x + 1$?

(A) $y = 3(x - 2)^2 + 13$

(B) $y = 3(x - 2)^2 - 11$

(C) $y = 3(x + 2)^2 + 13$

(D) $y = 3(x + 2)^2 + 11$

14. The quadratic function, $f(x) = -2x^2 + 8x - 5$, has an axis of symmetry of $x = 2$. What is the maximum value?

(A) -29

(B) -5

(C) 2

(D) 3

15. Jimmy sells makes and sells hacky sacks. The material for each hacky sack costs $3.00 and he has been selling about 10 per day for $8.00 each. He has been thinking about raising the price, so he takes a survey and finds that for every $2 increase in price he would lose three sales a day. What equation could be used to determine the hacky sack price that results in the greatest revenue?

(A) $y = (5 - 2n)(10 + 3n)$

(B) $y = (5 + 2n)(10 - 3n)$

(C) $y = (5 - 3n)(10 + 2n)$

(D) $y = (5 + 3n)(10 - 2n)$

Answers to multiple choice.

1.___   2.___   3.___   4.___   5.___

6.___   7.___   8.___   9.___   10.___

11.___   12.___   13.___   14.___   15.___

26   **Part II: Constructed Response. Answer each question in the space provided.**
        Show all   workings.

4   16. A toy rocket is launched into the air and reaches a maximum height of 80 m after a
            time of 4 seconds. If the rocket lands after 8 seconds, determine the quadratic
            function that describes the flight path of the rocket. Use the function to determine
            the height of the rocket at 6.5 seconds.
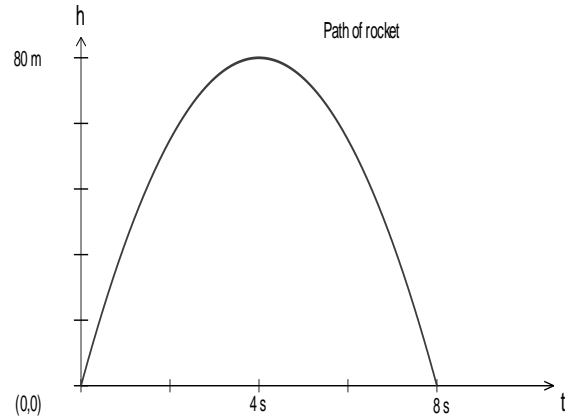
4   17. Determine the equation, in the form $= a(x - p)^2 + q$, of the quadratic function that
            contains the points $(1, -9)$ and $(7, -9)$ and has a minimum value of -12.

3

18. A baseball is hit and follows a parabolic path described by the function $h(t) = -3t^2 + 12t + 1$, where t is time in seconds after the ball is hit and $h(t)$ is the height of the ball above ground in metres. Algebraically determine the maximum height reached by the ball and the time it takes the ball to reach its maximum height.

3

19. Convert the following function from standard from to vertex form by completing the square:

$$f(x) = -6x^2 - 48x + 29$$

4   20. If the points $(-2, 6)$ and $(1, -6)$ are on the graph of the quadratic function
         $f(x) = -3x^2 + bx + c$, determine the values of b and c.

4   21. A farmer uses 400 m of fencing to create a rectangular pig pen and to divide it into
         four regions of equal area as shown. Algebraically determine the function which
         gives the area of the pig pen as a function of its width, and state the dimensions that
         produce maximum area.