**Math 2200** **Chapter 3 Sample Test** **Name:** _____

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

1. Which describes the graph of $y = -5(x + 2)^2 - 3$?

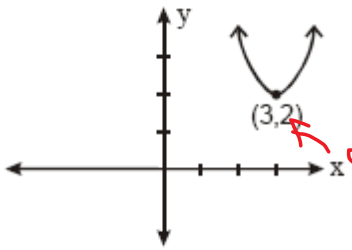
   ~~(A) Vertex (2,-3) and opens up.~~

   (B) Vertex (2,-3) and opens down.

   ~~(C) Vertex (-2,-3) and opens up.~~

   (D) Vertex (-2,-3) and opens down.

2. What is the range of the function shown?




   (A) $\{y|y \leq 2, y \in R\}$

   (B) $\{y|y \geq 2, y \in R\}$

   (C) $\{y|y \leq 3, y \in R\}$

   (D) $\{y|y \geq 3, y \in R\}$

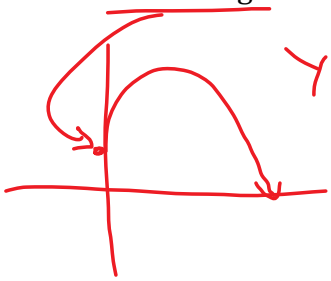
3. The motion of an arrow shot from a tree is modeled by the equation $h(t) = -5t^2 + 8t + 3$ What is the initial height of the arrow?

   (A) $-5$

   (B) 0

   (C) 2

   (D) 3



4. What value of $k$ makes the polynomial $x^2 + kx + 36$ a perfect square?

   (A) 3

   (B) $3\sqrt{2}$

   (C) 6

   (D) 12

5. What is the value of $\boldsymbol{a}$ in the function $y = ax^2 - 24x + 12$, if the axis of symmetry for the graph of the function is $x = 3$?

(A) $-4$

(B) $-3$

(C) $3$

(D) $4$

$p = \frac{-b}{2a}$ ← p

$3 = \frac{-(-24)}{2a}$

$\frac{6a}{6} = \frac{24}{6}$

$a = 4$

6. What is the vertex of $y = x^2 + 4x + 1$

(A) $(-2, -3)$

(B) $(-2, 1)$

(C) $(-2, 3)$

(D) $(4, 1)$

$y = (x^2 + 4x + 4) + 1 - 4$

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

$(-2, -3)$

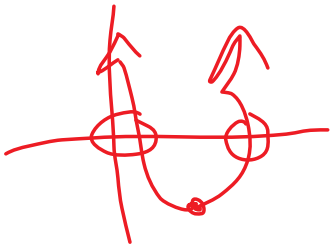
7. A quadratic function has a vertex of $(4, -5)$ and opens up. How many $x$-intercepts does it have?

(A) 0

(B) 1

(C) 2

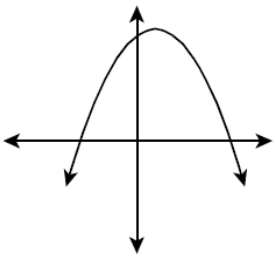
(D) undefined



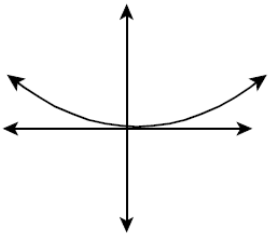
8. Which of the graphs will have an equation with the smallest $a$ value when compared to $y = x^2$?

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

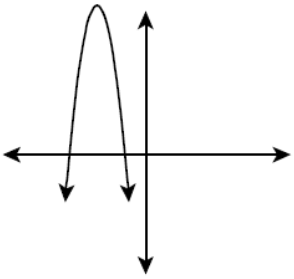
(A)



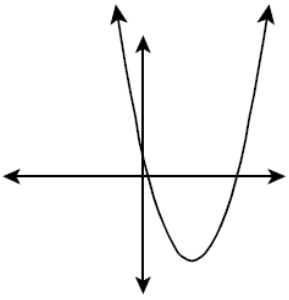
(B)



(C)

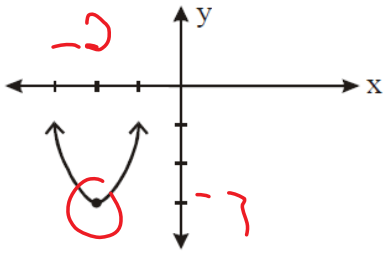


(D)

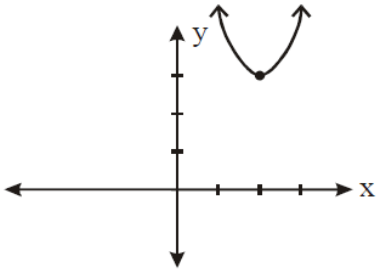


9. Which graph best represents the function $y = (x + 2)^2 - 3$?

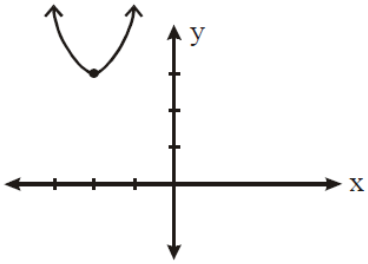
(A)



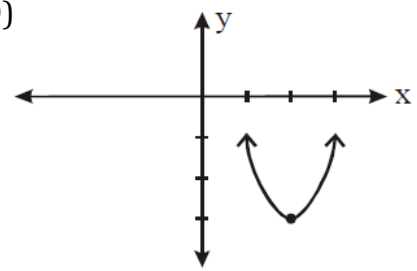

(B)




(C)

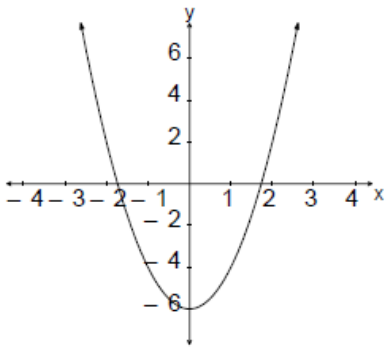



(D)

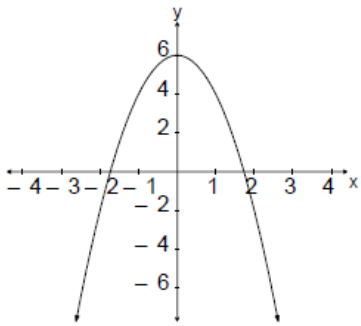


10. Which graph represents the function $y = ax^2 - 6, a > 0$?

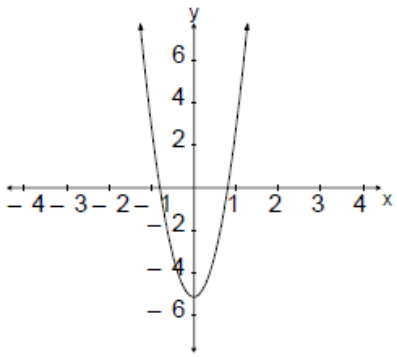
(A)



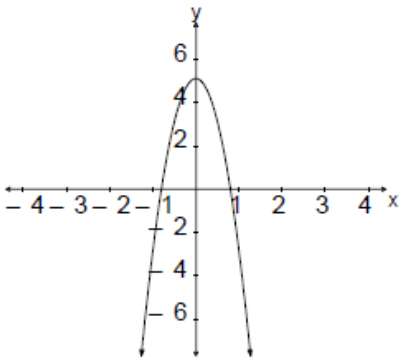

(B)




(C)




(D)



**Answers to multiple choice.**

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

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

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

11. A signal flare is fired from ground level and reaches a maximum height of 245 m at a
4 time of 7 s. After travelling for 14 s, the flare hits the ground. Algebraically determine the quadratic function representing the path of the flare, and use it to determine the approximate height of the flare at 9 s.

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

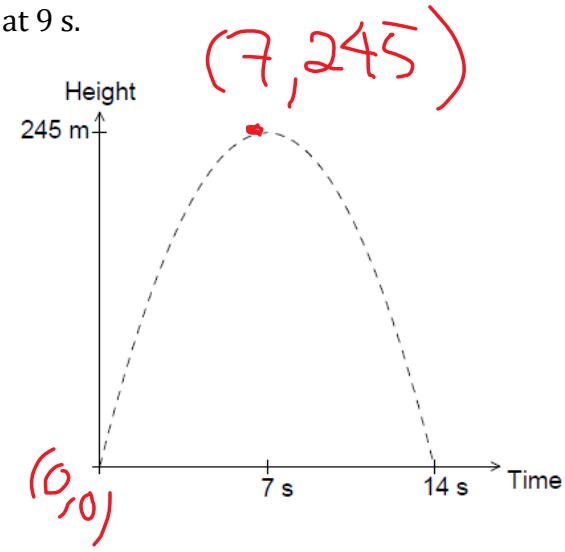
$0 = a(0-7)^2 + 245$

$\frac{-245}{49} = \frac{49a}{49}$

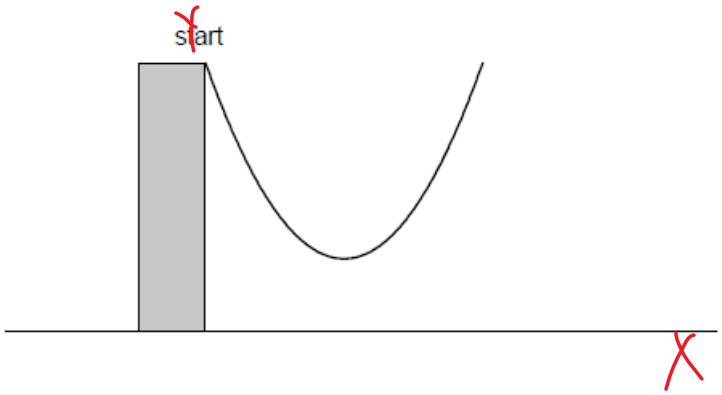
$a = -5$ $y = -5(x-7)^2 + 245$ (0,0)

$y(9) = -5(9-7)^2 + 245$

$= 225$ m



12. The flight path of an owl as it dives from a tree is shown below. The height of the owl above the ground, in metres, $t$ seconds after it begins its dive is approximated by $h(t) = 5t^2 - 20t + 25$.




1 (A) What is the height of the owl at the start of the dive?

25 m

3 (B) Algebraically determine the minimum height of the owl.

$p = \frac{-(-20)}{2(5)} = 2$ (2, 5) ← minimum value.

$q = 5(2)^2 - 20(2) + 25 = 5$

Min height of 5m @ 2s.

13. Convert the following function from standard from to vertex form by completing the
3 square and state the vertex.

$$f(x) = -3x^2 - 24x - 14$$

$y = -3(x^2 + 8x) - 14$

$y = -3(x^2 + 8x + 16) - 14 + 48$

$y = -3(x + 4)^2 + 34$

vertex $(-4, 34)$

4 14. A lifeguard must join 3 shoreline ties and 3 anchored buoys with single strands of rope to form a rectangular swimming area in 2 sections with no rope running along the shoreline. The lifeguard uses 600m of rope in total. Find the quadratic function that models this situation, and determine the length and width that will produce a maximum for the entire rectangular swimming area.

$3w + \ell = 600$

$A = \ell \cdot w$

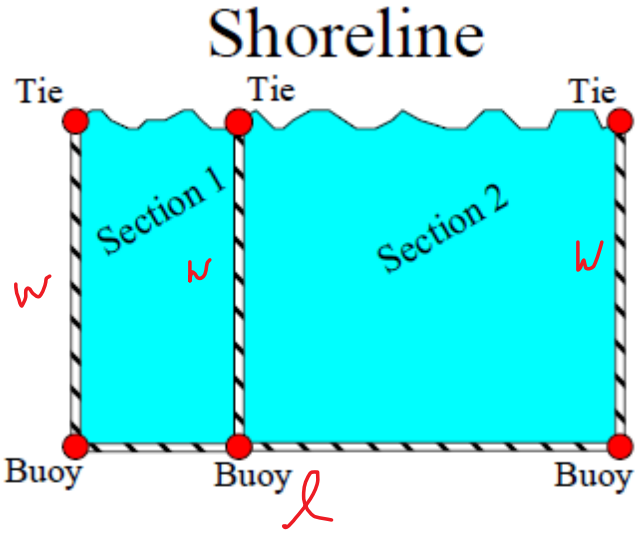
$\ell = -3w + 600$

$A = (-3w + 600)w$

$A = -3w^2 + 600w$

$p = \frac{-b}{2a} = \frac{-600}{2(-3)} = 100$

$W = 100m$




$\ell = -3(100) + 600$

$= 300m$