Math 2201   Name_____

Chapter 6 Test Review

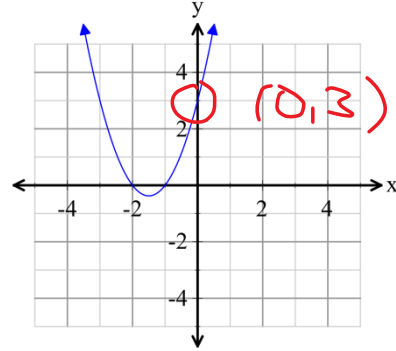**Part 1. Selected Response. Circle the letter of the correct response.**

1.   What is the y-intercept of the following parabola?

   A)   (0,-2)

   B)   (0,3)

   C)   (-2,0)

   D)   (3,0)

   (handwritten) (0,3)

2.   Choose the equation below that <u>does not</u> represent a quadratic function.

   A) $y = x^2 + 4x - 1$ B) $y = 0.25(x+1)(x-4)$

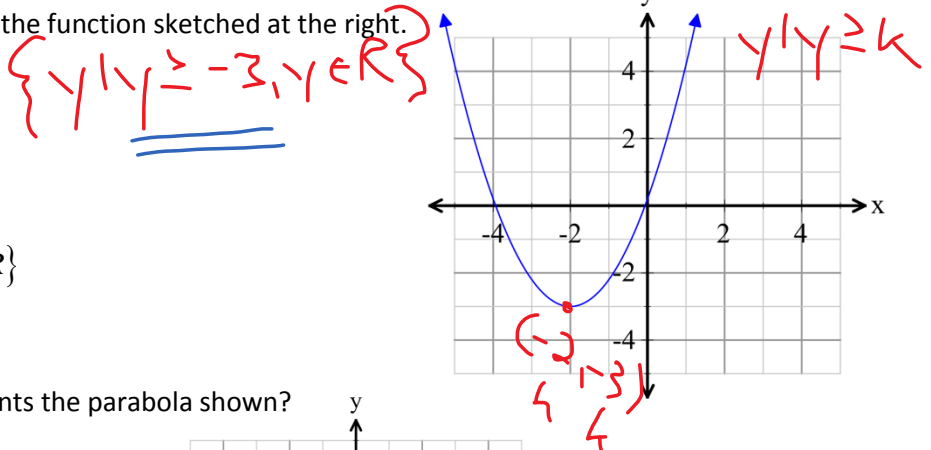   C) $y = 3(x+2)^2 - 4$ D) $y = 3x(x+2)(x-1)$

3.   Which quadratic function has a y-intercept of 7?

   (handwritten) $y = ax^2 + bx + c$ y-int

   A) $y = 7x^2$ B) $y = (x+7)^2$

   C) $y = x^2 + 7$ D) $y = (x-7)^2$

4.   Choose the correct range for the function sketched at the right.

   (handwritten) $\{y \mid y \geq -3, y \in R\}$ $y \mid y \geq k$

   A) $\{y \mid y \in R\}$

   B) $\{y \mid y \leq -3, y \in R\}$

   C) $\{y \mid y \geq -3, y \in R\}$

   D) $\{y \mid -5 \leq y \leq 1, y \in R\}$

   (handwritten) (-3,-3)

5.   Which equation best represents the parabola shown?

   A) $y = -2x^2 + 3x + 1$

   B) $y = -2x^2 - 3x - 1$

   C) $y = x^2 + 3x + 1$

   D) $y = x^2 - 3x - 2$

   (handwritten) $a < 0$ (0,1)
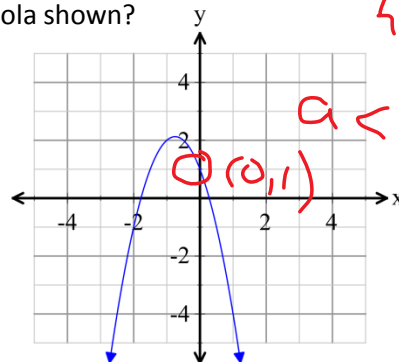
(handwritten top) $a>0$ ↟↟ min

6. Which statement below is TRUE for the quadratic function, $y = 2x^2 - 4x + 1$ with vertex (1,-1)?

    (handwritten) hk

    A)   There is a minimum value of 1.   B)   There is a minimum value of -1.
    C)   There is a maximum value of 1.   D)   There is a maximum value of -1.

    (handwritten) min: k

7. The equation of the axis of symmetry of $y = x^2 - 6x + 4$ is......

    (handwritten) $aos = h = -\frac{b}{2a} = \frac{-(-6)}{2(1)} = 3$

    A)   x =-3   B)   x = 3   C)   x = -6   D)   x = 6

    (handwritten) $K = 3$

8. Choose the correct graph for the quadratic function $y = -0.5(x+1)(x-3)$

    (handwritten) $(-1,0), (3,0)$

    A) *(circled)*
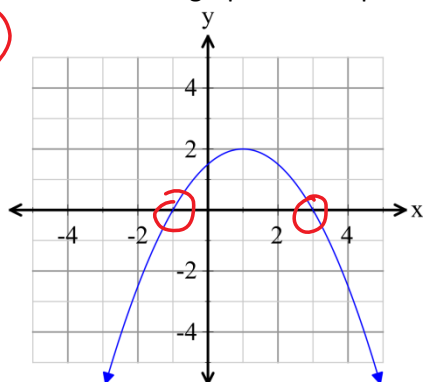
    B)
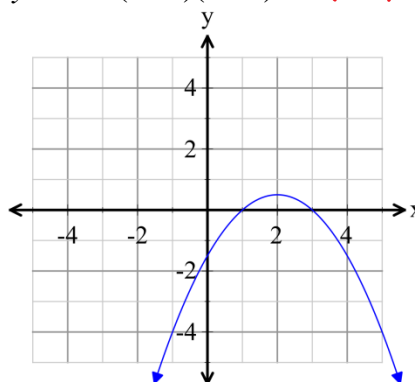
    C)
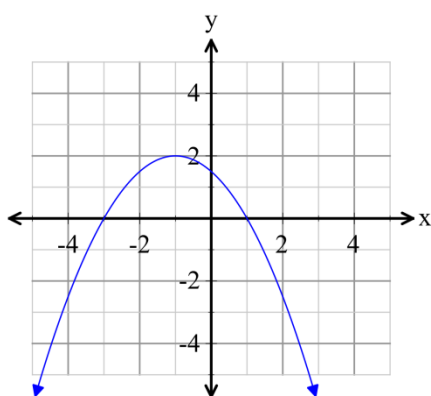
    D)
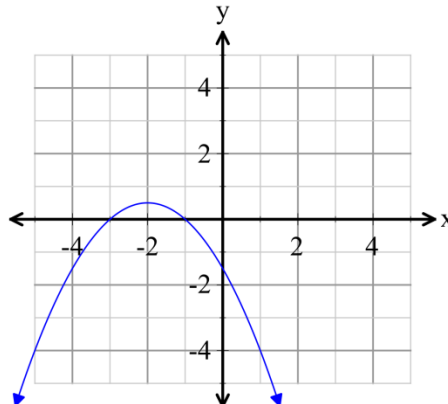
9. Choose the correct equation for the graph shown.

    A) $y = -\frac{2}{3}(x+1)(x-2)$

    (handwritten) $(-2,0)$ $(0,0)$

    B) $y = -\frac{3}{2}(x+1)(x+2)$

    (handwritten) $y = ax(x+2)$ $x+2$ x

    C) $y = -\frac{2}{3}x(x-2)$

    D) *(circled)* $y = -\frac{3}{2}x(x+2)$
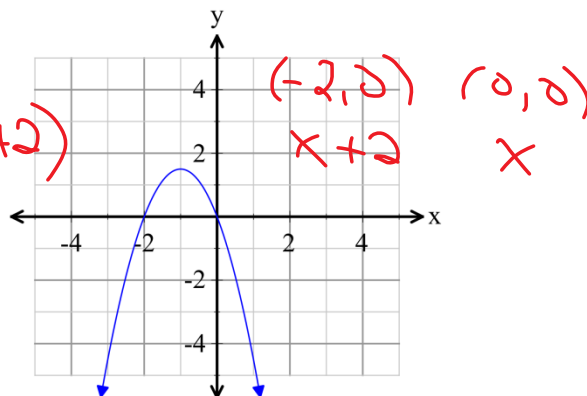
10. Determine the y-intercept of the quadratic function modeled by $f(x) = 2(x+1)(x-2)$.

Handwritten: y-int: x=0 $y = 2(0+1)(0-2) = 2(1)(-2) = -4$ (0, -4)

- A) (0,2)
- B) (0,-2)
- C) (0,-4) ← circled
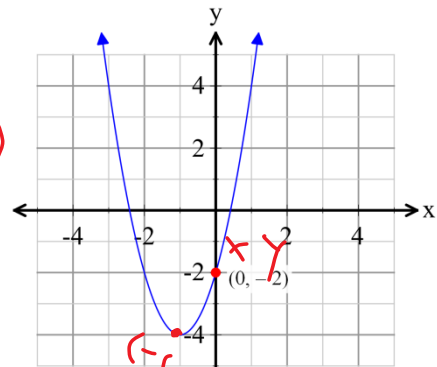- D) (0,4)

11. What is the equation of the axis of symmetry of the parabola with the equation $y = -3(x+1)(x-5)$?

Handwritten: $(-1, 0)$, $(5, 0)$ $aos = h = -\frac{1+5}{2} = \frac{4}{2} = 2$ $x = 2$

- A) $x = -2$
- B) $x = -3$
- C) $x = 2$ ← circled
- D) $x = 3$

12. What is the vertex of the function described by $y = -(x+1)(x-3)$?

Handwritten: $h = \frac{-1+3}{2} = \frac{2}{2} = 1$ $K = -(1+1)(1-3) = -(2)(-2) = 4$ (1,4)

- A) (1,8)
- B) (1,4) ← circled
- C) (-1,0)
- D) (-1,3)

13. Choose the quadratic function that has a maximum point located at (-2,3).

- A) $y = -2x^2 + 3$
- B) $y = -(x+2)^2 + 3$ ← circled, underlined
- C) $y = 2x^2 - 3$
- D) $y = (x-2)^2 - 3$

14. What is the vertex of the parabola, $y = 3(x+1)^2 - 2$?

Handwritten: $(-1, -2)$

- A) (3,1)
- B) (-3,-2)
- C) (-1,2)
- D) (-1,-2) ← circled

15. Choose the correct equation for the parabola shown.

Handwritten: $y = a(x-h)^2 + k$ $-2 = a(0+1)^2 - 4$ $-2 + 4 = a$ $a = 2$

- A) $y = 2(x+1)^2 - 4$ ← circled, underlined
- B) $y = 0.5(x+1)^2 - 4$
- C) $y = 2(x-1)^2 - 4$
- D) $y = 0.5(x-1)^2 - 4$

Graph with axes, parabola, point (0, -2), vertex labeled (-1,-4)

16. How many x-intercepts does the parabola, $f(x) = -(x+1)^2 - 2$ have?

Handwritten: (-1, -2)   a<0 sad   (down-opening sketch)

- A) 0 ← circled
- B) 1
- C) 2
- D) 3

17. How many times does the graph of the function, $y = \frac{1}{2}(x+4)^2$ intersect the x-axis?

Handwritten: (-4, 0)   (sketches)

- A) 0
- B) 1 ← circled
- C) 2
- D) 3

18. Which function has the range described by $\{y \mid y \leq -2, y \in R\}$?

- A) $y = \frac{1}{3}(x-1)^2 + 2$ ← struck through
- C) $y = -\frac{1}{3}(x-1)^2 - 2$ ← circled
- C) $y = 3(x+1)^2 - 2$ ← struck through
- D) $y = -3(x+1)^2 + 2$

$$h = -\frac{b}{2a} = \frac{-24}{2(-6)} = \frac{24}{12} = 2$$

19. The path of a ball hit into the air is modeled by the quadratic function, $h = -6t^2 + 24t + 1$. where t is the time in seconds and h is the height of the ball in metres. Determine the time it will take for the ball to reach its maximum height.

    A) 1 s   **B)** 2 s   C) 19 s   D) 30 s

20. The area of a rectangular enclosure is given by the function, $A(x) = -5x^2 + 150x$, where x is is the width, in metres. What is the width that will produce a maximum area?
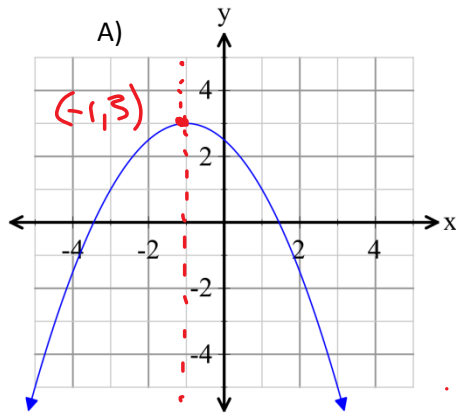
    A) 5 m   **B)** 15 m   C) 30 m   D) 150 m

    $$h = -\frac{b}{2a} = \frac{-150}{2(-5)} = 15$$

Constructed Response. Show all workings.

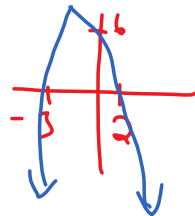21. Given each function, determine each of the following and **sketch the graph for b and c**.

    i) equation of axis of symmetry
    ii) vertex
    iii) minimum or maximum value is ___
    iv) y-intercept
    v) domain
    vi) range

    A)

    (-1,3)

    i. aos: x = -1
    ii. (-1,3)
    iii. max: k = 3
    iv. y-int: (0, 2.5)
    v. {x | x ∈ R}
    vi. {y | y ≤ 3, y ∈ R}

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

    i. $h = \frac{-3+2}{1} \approx -0.5$

    ii. $k = -(-0.5+3)(-0.5-2)$
    $= -(2.5)(-2.5)$
    $= 6.25$
    $(-0.5, 6.25)$

    iii. max: k = 6.25

    iv. y-int: x = 0
    $y = -(0+3)(0-2) = 6$
    $(0, 6)$

    v. {x | x ∈ R}

    vi. {y | y ≤ 6.25, y ∈ R}

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

    i. x = -2

    ii. (-2, 4)

    iii. m.h: k = 4

    iv. $y = \frac{1}{2}(0+2)^2 - 4 = -2$
    $(0, -2)$

    v. {x | x ∈ R}

    v. {y | y ≥ 4, y ∈ R}

    (-2, -4)
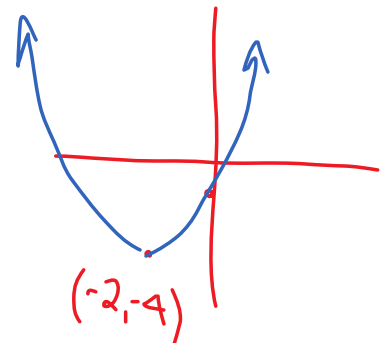
22. A hawk dives toward the water to catch a salmon. Its initial height above the water is 30 feet. It descends and at 2 seconds it catches a salmon when it is at a height of 1 foot above the water. Algebraically determine the quadratic function that models the flight path of the hawk.
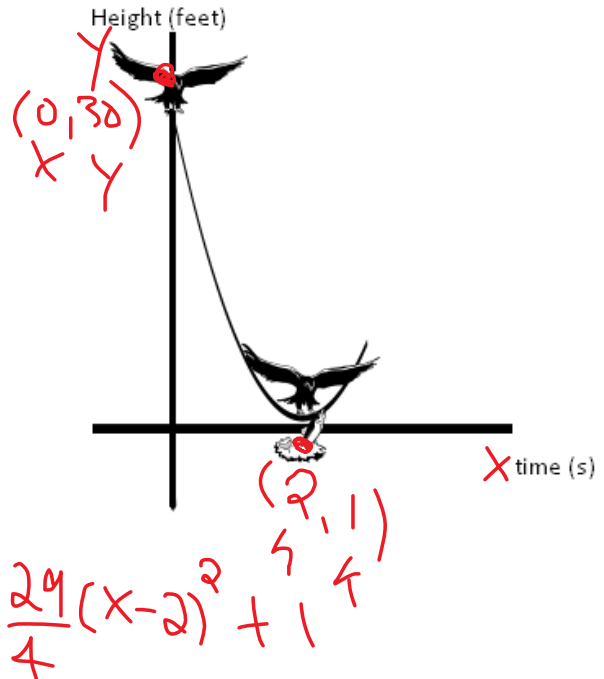
Height (feet)

$(0, 30)$

$$Y = a(x-h)^2 + k$$
$$30 = a(0-2)^2 + 1$$
$$30 - 1 = 4a$$
$$\frac{29}{4} = \frac{4a}{4}$$
$$a = 29/4$$

$(2, 1)$

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

X time (s)

23. A rocket is launched into the air and its height, h(t), above the ground, in metres, after t seconds is modeled by the function $h(t) = -5t^2 + 20t + 3$

$c = y\text{-int (initial height)}$

A) What is the initial height of the rocket?

$3m$

B) Determine the height of the rocket at 3 seconds?

$$h(3) = -5(3)^2 + 20(3) + 3 = 18m$$

C) When did the rocket reach its maximum height?

(h, k)

$$h = \frac{-b}{2a} = \frac{-20}{2(-5)} = \frac{-20}{-10} = 2\ s.$$

D) What was the maximum height of the rocket?

$$k = h(2) = -5(2)^2 + 20(2) + 3 = 23m$$

24. Kevin has 120 m of fencing and wants to make a rectangular pen for his new puppy to be able to play in. If he intends to use his garage as one side of the pen,

A) determine a quadratic function to model the area of the pen.

① $l + 2w = 120$

② $A = l \cdot w$

$l = -2w + 120$

$A = (-2w + 120)w$

$A = -2w^2 + 120w$

GARAGE

DOG PEN

w

l
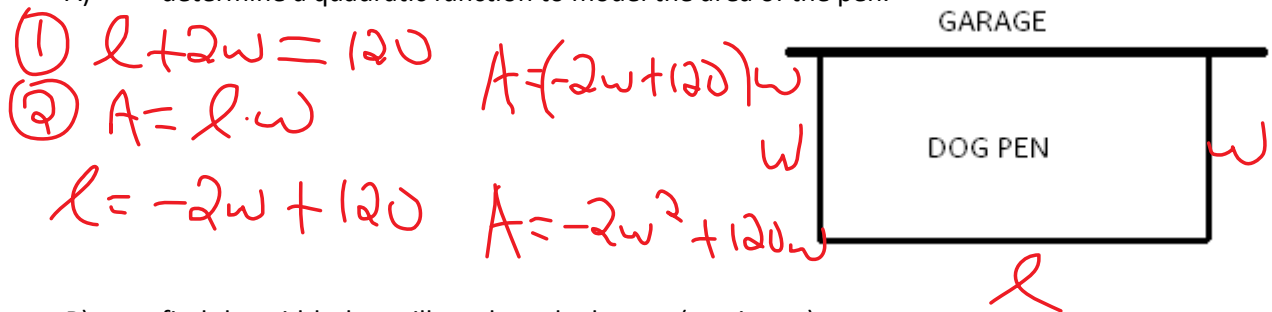
B) find the width that will produce the largest (maximum) area.

$w_{max} = h = \dfrac{-b}{2a} = \dfrac{-120}{2(-2)} = \dfrac{-120}{-4} = 30m$

C) Determine the maximum area.

$A_{max} = k = -2(30)^2 + 120(30) = 1800m^2$

25. Taylor has 600 m of electric fencing and needs to build a rectangular enclosure, with one side as the barn, that will provide separate sleeping areas for three of her goats that have contracted a contagious illness. The situation is not ideal but she wants to provide them with as much room as possible for this temporary arrangement. Algebraically determine the width that will produce the maximum area for the region shown below. Find the maximum area.

① $l + 4w = 600$

② $A = l \cdot w$

$l = -4w + 600$

$A = (-4w + 600)w$

$A = -4w^2 + 600w$

barn

w   w   w   w

$w_{max} = h = \dfrac{-b}{2a} = \dfrac{-600}{2(-4)} = 75m$ l

$A_{max} = k = -4(75)^2 + 600(75) = 22500m^2$