

Name _____

ALG2/TRIG Q1 Test– Quadratic and Polynomial Functions (100 points)

Part I. Multiple Choice. Review. (2 points each)

1. Which of the following is a function?

- (1) $\{-8, -3, -5, 7\}$
- (2) $\{(-8, -3), (-3, -5), (-8, 7)\}$
- (3) $\{(-8, -3), (-3, -8), (7, 7)\}$
- (4) $\{(-8, -3), (-5, 7), (-5, -8), (7, -5)\}$

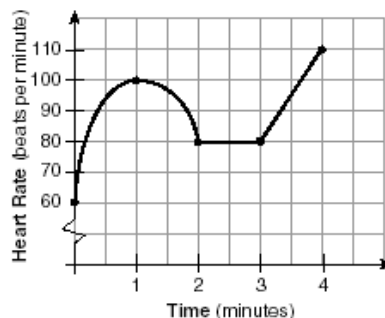
2. In economics, functions that involve revenue, cost, and profit are used. Suppose $R(x)$ and $C(x)$, denote the total revenue and the total cost, respectively, of producing a new high-tech widget. The difference $P(x) = R(x) - C(x)$ represents the total profit for producing x widgets. Given $R(x) = 60x - 0.4x^2$ and $C(x) = 3x + 13$, find $P(100)$.

- (1) 313
- (2) 2000
- (3) 55687
- (4) 1687

3. What is the solution set of the equation $|x^2 - 2x| = 3x - 6$?

- (1) $\{2, \pm 3\}$
- (2) $\{\pm 3\}$
- (3) $\{2, 3\}$
- (4) $\{2\}$

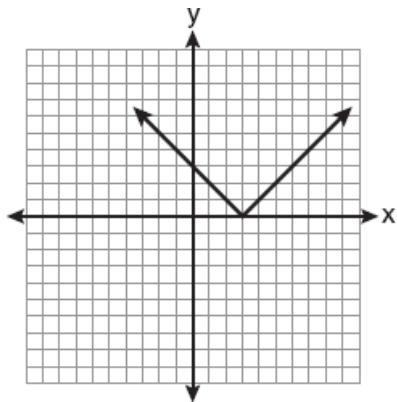
4. The accompanying graph shows the heart rate, in beats per minute, of a jogger during a 4-minute interval.



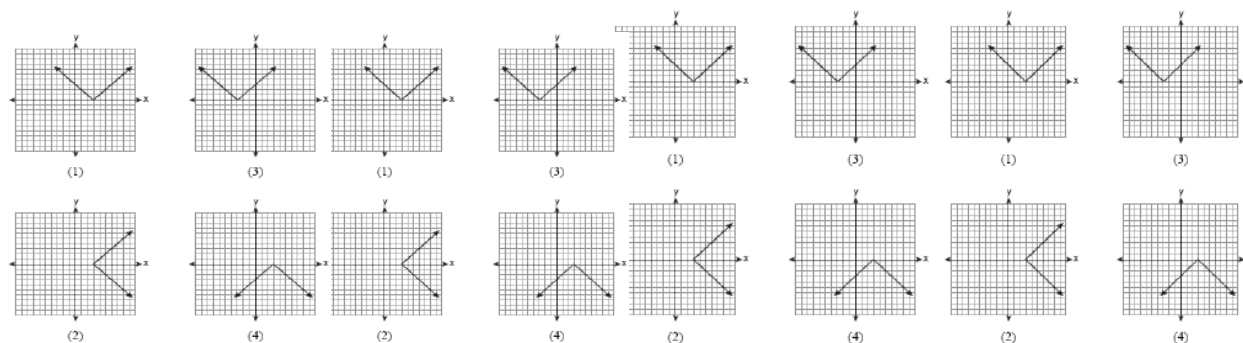
What is the range of the jogger's heart rate during this interval?

- (1) 0-4
- (2) 60-110
- (3) 0-110
- (4) 1-4

5. The diagram below shows the graph of $y = |x - 3|$.



Which diagram shows the graph of $y = -|x - 3|$?



(1)

(2)

(3)

(4)

6. If $f(x) = -2x + 7$ and $g(x) = x^2 - 2$, then $f(g(3))$ is equal to

(1) -7

(2) -1

(3) -3

(4) 7

7. What is the inverse of the function $y = 2x - 3$?

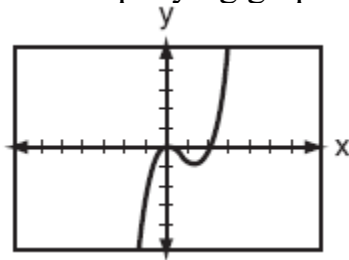
(1) $y = \frac{x + 3}{2}$

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

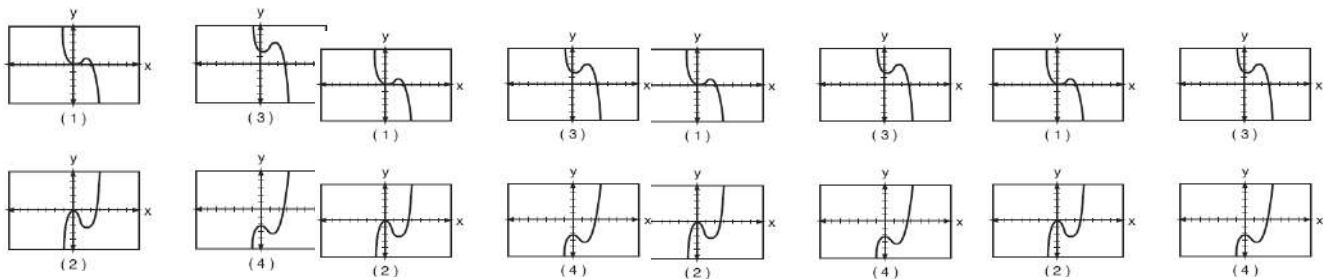
(2) $y = \frac{x}{2} + 3$

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

8. The accompanying graph represents the equation $y = f(x)$.



Which graph represents $g(x)$, if $g(x) = -f(x)$?



(1)

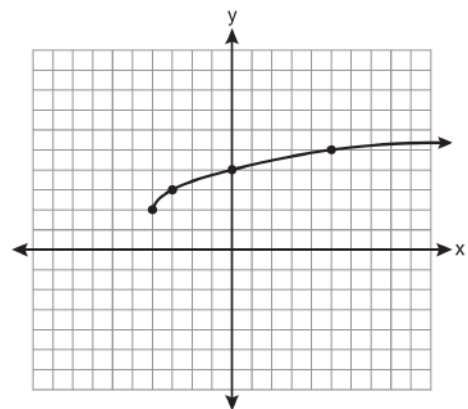
(2)

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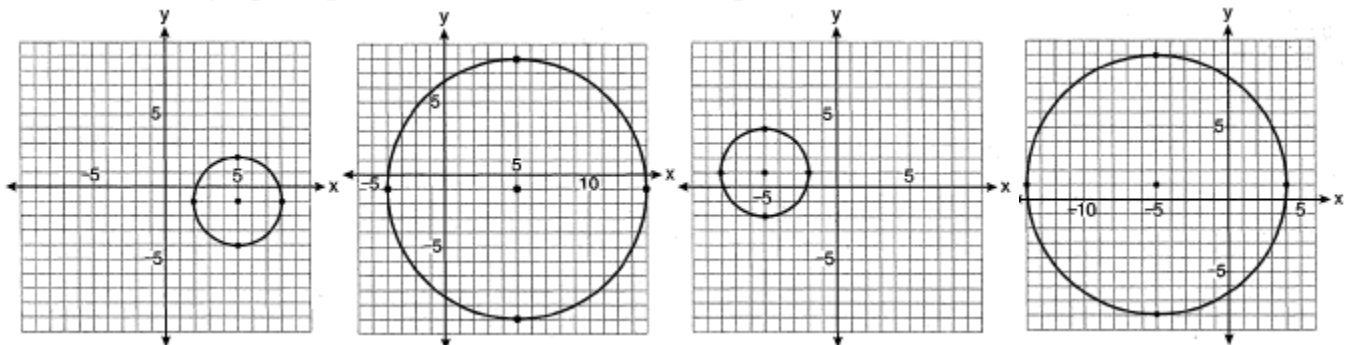
(4)

9. What are the domain and the range of the function shown in the graph to the right?

- 1) $\{x|x > -4\}; \{y|y > 2\}$
- 2) $\{x|x \geq -4\}; \{y|y \geq 2\}$
- 3) $\{x|x > 2\}; \{y|y > -4\}$
- 4) $\{x|x \geq 2\}; \{y|y \geq -4\}$



10. Which graph represents a circle with the equation $(x-5)^2 + (y+1)^2 = 9$?



- (1)
- (2)
- (3)
- (4)

Part II.

Multiple Choice. Unit 2. (3 points each)

11. If the sum of the roots of $x^2 + 3x - 5$ is added to the product of its roots, the result is

- (1) 15 (2) -2 (3) -15 (4) -8

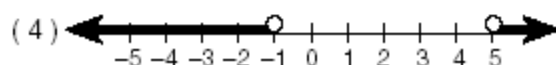
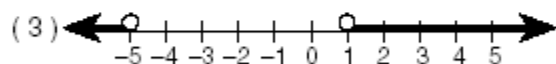
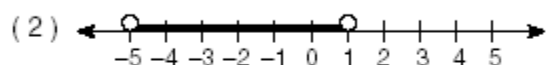
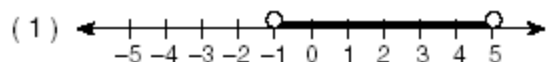
12. Which ordered pair is in the solution set of the system of equations $y = -x + 1$ and $y = x^2 + 5x + 6$?

- (1) (-5, -1) (2) (5, -4) (3) (-5, 6) (4) (5, 2)

13. A ball is thrown straight up at an initial velocity of 54 feet per second. The height of the ball t seconds after it is thrown is given by the formula $h(t) = 54t - 12t^2$. How many seconds after the ball is thrown will it return to the ground?

- (1) 9.2 (2) 4.5 (3) 6 (4) 4

14. Which graph represents the solution set of the inequality $x^2 - 4x - 5 < 0$?



15. The equation $3x^3 + 4x^2 - 15x = 0$ has how many roots?

- (1) 1 (2) 2 (3) 3 (4) 0

Part III. Long Response. Show ALL Work!!!

16. What number would you need to fill in the blank in order to “complete the square” for each expression below: *(2 points each)*

a) $x^2 + 10x + \underline{\hspace{2cm}}$

b) $2x^2 - 5x + \underline{\hspace{2cm}}$

17. A student used the quadratic formula to solve a quadratic. What one error is the student making? *(3 points)*

$$3x^2 + 10x - 2 = 0$$

step 1:
$$x = \frac{-10 \pm \sqrt{(10)^2 - 4(3)(-2)}}{2(3)}$$

step 2:
$$x = \frac{-10 \pm \sqrt{76}}{6}$$
 etc.

What error was made?

18. Approximate the solutions to the equation $x^3 + x^2 - 4x - 4 = -1$ to the nearest tenth.
(Remember: You just need to use your calculator.) *(4 points)*

19.Factor Completely: (2 points each)

a) $3x^2 - 17x + 20$

b) $x^3 + 3x^2 - 6x - 18$

c) $x^4 - 5x^2 - 36$

20. Solve the quadratic using factoring $x^3 - 4x^2 - 21x = 0$
(6 points)

- 21.** Solve the quadratic using the quadratic formula $3x^2 + 6x + 2 = x^2$
Remember to express the solution in simplest form. (6 points)

- 22.** Solve the quadratic by completing the square $x^2 + 12x = 2x - 7$
Remember to express the solution in simplest form. (6 points)

- 23.** If a quadratic equation has the given roots, find a possible quadratic equation with these roots. (3 points each)

a) $\{3, -7\}$

b) $\left\{\frac{2}{3}, \frac{1}{6}\right\}$

24. Solve the following system of equations algebraically: (8 points)

$$5 = y - x$$

$$4x^2 = -17x + y + 4$$

equation $h(x) = -8x^2 + 56x + 5$, where $h(x)$ is the height of the spider (in inches) from the base of the cord at time x (in minutes). Answer each question below. ***If necessary, round answers to the nearest tenth.***

(Remember: In order to get full credit, you MUST show how you solved each question. If you used a graph or table from your calculator, you must reproduce the graph or table on paper. I have to be able to tell exactly how you solved each problem.)

- Sketch the graph and show an appropriate window. (4 points)
- Evaluate $h(3)$ and interpret in words what it means. (4 points)
- How many minutes does it take for the spider to reach its maximum height?
What is that maximum height?
(4 points)
- For what times is the spider at least 53 inches from the base of the cord?
(4 points)