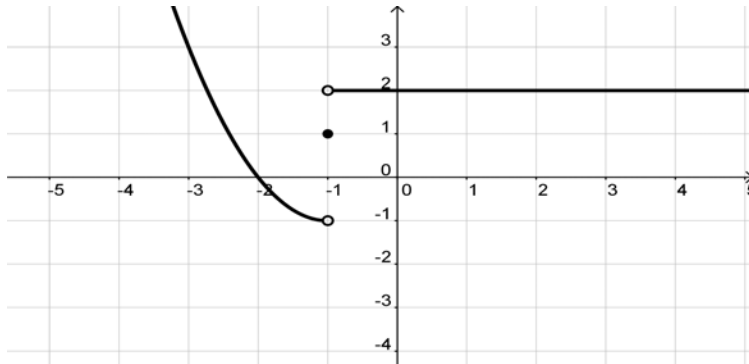


1. Which of the following represents a function?

I.



II. **Domain**

Real Numbers

**Range**

Whole Numbers

Integers

Rational Numbers

Irrational Numbers

$\sqrt{29}$

$\pi$

III.  $x^2 + y^2 = 9$

IV. An equation that changes Celsius to Fahrenheit.

- A. II only
- B. II, IV only
- C. All of them
- D. I, II, IV only
- E. None of them

2. A firecracker is shot into the air with an initial velocity of 96 ft/sec. The following equation describes its height at time  $t$  (in seconds).  $f(t) = -16t^2 + 96t$  When will the firecracker reach its maximum height?

- A. After 3 seconds
- B. It cannot be determined
- C. After 6 seconds
- D. After 5 seconds
- E. After 4 seconds

Name: \_\_\_\_\_ School Name: \_\_\_\_\_

3. Given that a quantity  $Q(t)$  is described by the exponential growth function  $Q(t) = 500e^{0.04t}$ , where  $t$  is measured in minutes. ( $e$  is approximately the number 2.72) What quantity is present initially?

- A. 0
- B.  $500e$
- C. 0.04
- D.  $e$
- E. 500

4. Simplify. Assume  $x$  and  $y$  are positive real numbers and  $m$  and  $n$  are rational numbers.

$$\left( \frac{x^{-3/m} y^{6/n}}{x^{-6/m} y^{9/n}} \right)^{-1/3}$$

- A.  $x^{1/m} y^{1/n}$
- B.  $\frac{y^{1/n}}{x^{1/m}}$
- C.  $-\frac{1}{y^{1/n} x^{1/m}}$
- D.  $\frac{1}{y^{1/n} x^{1/m}}$
- E.  $\frac{1}{yx}$

5. Darla's heart rate is a linear function of the number of minutes she spends on the elliptical machine. Her heart rate was 78 after 2 minutes and 86 after 4 minutes. Which function models the situation over the first 8 minutes?

- A.  $f(x) = 2x + 78$
- B.  $f(x) = 8x + 86$
- C.  $f(x) = 4x + 70$
- D.  $f(x) = 8x + 70$
- E.  $f(x) = 2x + 86$

Name: \_\_\_\_\_ School Name: \_\_\_\_\_

6. Kara is at the doctor's office. The doctor knows that she needs 250 milligrams of a certain drug. The drug is available only in a solution whose concentration is 40 milligrams of the drug per 0.6 milliliters of solution. How many milliliters of solution should Kara be given?

- A. 0.096 milliliters
- B. 3.75 milliliters
- C. 10.42 milliliters
- D. 24 milliliters
- E. 150 milliliters

7. Find the **product** of the real roots for  $\frac{1}{3}x^2 = -\frac{1}{2}x + \frac{1}{3}$ .

- A.  $-\frac{1}{2}$
- B. -2
- C. 4
- D. -1
- E. No real roots exist.

8. A fruit and nut stand sells sesame seeds for \$0.80 per quarter pound and sunflower seeds for \$1.00 per quarter pound. The owner wants to sell a mixture of these two types of nuts. How many pounds of sunflower seeds must he mix with 2 pounds of sesame seeds to sell the mixture for \$0.95 per quarter pound?

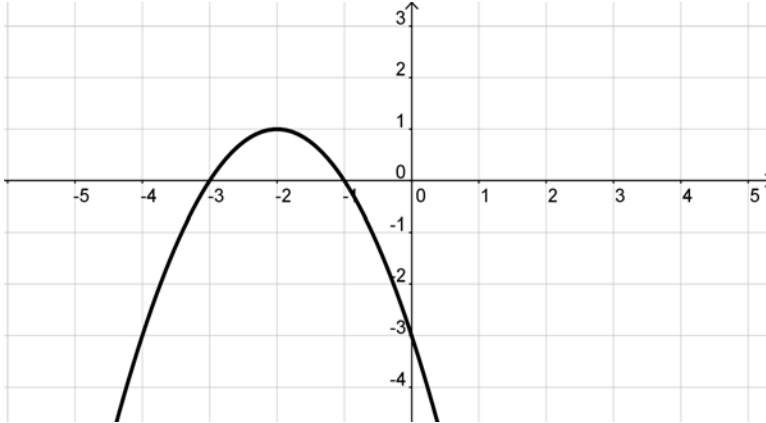
- A. 6 pounds
- B. 1.5 pounds
- C. 15 pounds
- D. 1 pound
- E. 3 pounds

9. Bryce's doctor tells him that his diet needs to contain at least 400 milligrams (mg) of calcium, at least 10 mg of vitamin B and at least 40 mg of vitamin D. Two foods, X and Y will provide what he needs. Each ounce of Food X contains 30 mg of calcium, 1 mg of vitamin B, 2 mg of vitamin D, and 2.5 mg of cholesterol. Each ounce of Food Y contains 25 mg of iron, 0.5 mg of vitamin B, 5 mg of vitamin D, and 5.5 mg of cholesterol. Give a constraint for this problem.

- A.  $x + y \geq 0$
- B.  $x + .5y \leq 10$
- C.  $30x + y \geq 400$
- D.  $30x + 25y \leq 55$
- E.  $2x + 5y \geq 40$

Name: \_\_\_\_\_ School Name: \_\_\_\_\_

10. Which equation best represents the given function?



- A.  $f(x) = -x^2 - 4x + 3$
- B.  $f(x) = -x^2 - 4x - 5$
- C.  $f(x) = -x^2 + 4x - 3$
- D.  $f(x) = -x^2 + 4x + 5$
- E.  $f(x) = -x^2 - 4x - 3$

11. Two boats, Lucky Lady and Sea Breeze are at a dock. Lucky Lady starts to sail south at 5 mph. One hour later Sea Breeze sails west at 10 mph. Give a quadratic equation that models when the two boats are 100 miles apart?

- A.  $125L^2 - 200L + 100 = 10,000$
- B.  $125L^2 = 10,000$
- C.  $25L^2 = 10,000$
- D.  $125L^2 + 100L = 10,000$
- E.  $225L^2 = 10,000$

12. A license plate consists of 2 letters followed by 4 digits. How many license plates are possible if the 1st letter can't be O, I nor Q, the 1st digit can't be 0 and neither letters nor numbers may repeat?

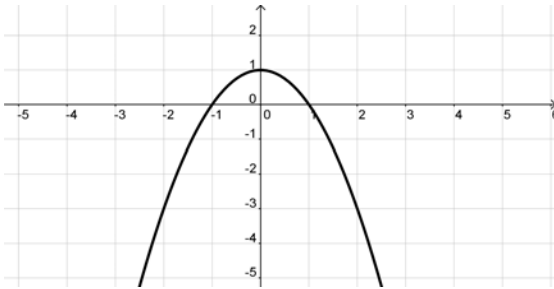
- A. 3,013,920
- B. 2,608,200
- C. 6,760,000
- D. 1,530,144
- E. 3,875,040

Name: \_\_\_\_\_

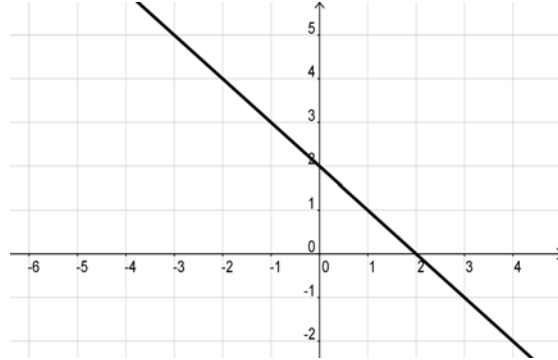
School Name: \_\_\_\_\_

13. Which of the following functions has no real solutions?

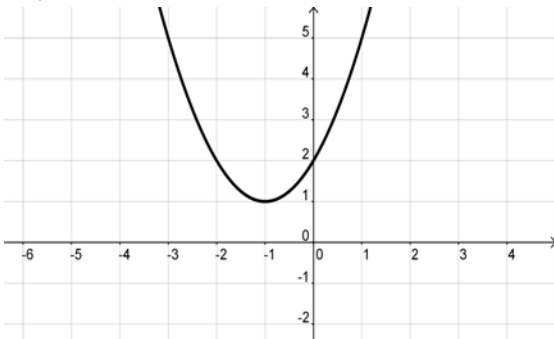
I.



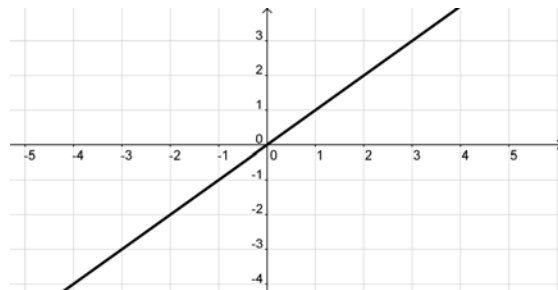
II.



III.



IV.



- A. I
- B. II
- C. III
- D. IV

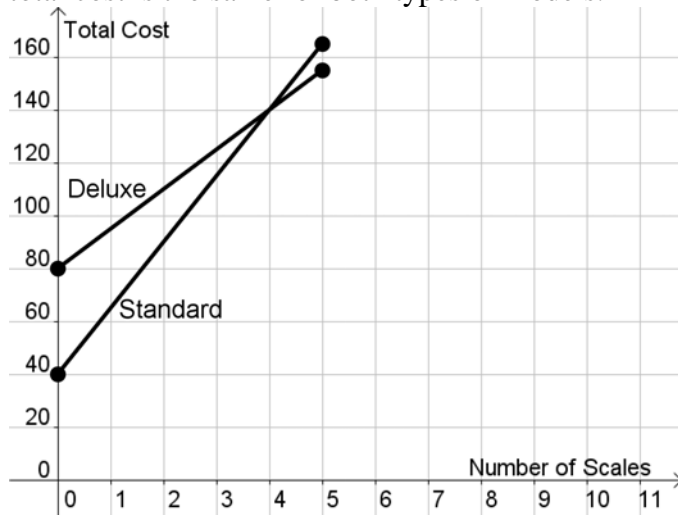
14. A jar contains 15 quarters, 7 dimes, 5 nickels, and 8 pennies. A coin is drawn at random from the box. What is the mean of the value of the draw?

- A. 13.7 cents
- B. 3.4 cents
- C. 40 cents
- D. 120 cents
- E. 478 cents

15. Let  $f(x) = -4x + 11$ . Find the y-intercept of  $f(-x + 2)$ .

- A. 2
- B. 11
- C. 19
- D. 3
- E. 4

16. A company produces two types of weighing scales, a standard model and a deluxe model. The total cost functions for each are graphed below. The total cost is in hundreds of dollars and the number of scales is in tens. Find the number of scales for which the total cost is the same for both types of models.



- A. 4
- B. 140
- C. 40
- D. 1400
- E. 50

17. A popular 200 room hotel is filled to capacity every night at \$100 per room. For each \$1 increase in rent, 3 fewer rooms are rented. Give a quadratic equation that models this situation.

- A.  $f(x) = -3x^2 - 99x + 19,900$
- B.  $f(x) = -3x^2 - 103x + 19,700$
- C.  $f(x) = -3x^2 - 101x + 19,900$
- D.  $f(x) = -3x^2 + 97x + 19,700$
- E.  $f(x) = -3x^2 - 100x + 20,000$

18. A box contains three red marbles, two blue marbles and two white marbles. A marble is drawn at random from the box. What is the probability that a blue marble is drawn?

- A.  $\frac{2}{7}$
- B.  $\frac{3}{7}$
- C.  $\frac{4}{7}$
- D.  $\frac{6}{7}$
- E.  $\frac{1}{7}$

19. Which of the following is/are True?

I. A linear system of two equations with two unknowns may have infinitely many solutions.

II. A quadratic equation and an equation that represents a circle cannot have only one real solution.

III. A linear system of inequalities with two unknowns cannot have no solution.

IV. The following system has a solution set.

$$y \geq x^2 - 4$$

$$x - y \geq 2$$

V. The graphs represented by  $xy = 20$  and  $x^2 + y^2 = 41$  intersect in at least one point.

The product of the x value and y value of one of these points of intersection is 20.

A. All of them

B. I, IV, V only

C. I, II, III only

D. None of them

E. II, IV only

20. Solve the equation  $A = y\left(\frac{1}{r} - \frac{mnB}{y}\right)$  for  $r$ .

A.  $r = \frac{y}{A - mnB}$

B.  $r = \frac{A + mnB}{y}$

C.  $r = \frac{1}{y(A + mnB)}$

D.  $r = \frac{y}{A + mnB}$

E.  $r = \frac{1}{Ay + mnB}$