

15 OCTOBER 2019

1. The points $(1, -2)$, $(3, t)$, and $(7, 22)$ lie on a straight line. Find the value of t .

2. Albertine is planning to open a Halloween punch stand, and she needs to purchase equipment and ingredients to make the Halloween punch. If she decides to make a total of 20 gallons of punch, the equipment and ingredients will cost her a total of 84 dollars. However, if she decides to make 35 gallons, it will cost her 110 dollars.
Let $C(x)$ be the cost to Albertine, in dollars, of producing x gallons of Halloween punch. Assuming $C(x)$ is a linear function, find a formula for $C(x)$.

3. Odette has \$500 to spend on papayas and pumpkins for a Halloween party. Each organically grown papaya costs \$4, and each pumpkin costs \$9. The number of pumpkins, y , is a function of the number of papayas she decides to buy, x .



- (a) Find an equation relating x and y .
- (b) Interpret the practical meaning of the x and y intercepts in the context of the party.

Answers: The x -intercept represents _____
The y - intercept represents _____

4. Find an equation of a line that
 - (a) passes through the point $(7, 13)$ and is parallel to the line $3x - 6y = 89$.
 - (b) has x -intercept -13 and y -intercept 18 .
 - (c) Passes through the point $(1, 2)$ and is perpendicular to the line $4x + 8y = 2019$
 - (d) Has x -intercept of 5 and passes through *the point of intersection* of the two lines

$$3x - 8y = 48$$

$$7x + 3y = 40$$

5. Consider the straight line $y = x - 1$. For each of the following points determine if it
(1) lies *on* the line; (2) lies *below* the line; or (3) lies *above* the line.

- (a) $(2, 0)$
- (b) $(4, 3)$
- (c) $(3, 2)$
- (d) $(1, -2)$
- (e) $(6, 8)$

6. Find a *possible* equation for the line that is perpendicular to the graph of $5x - 3y = 15$ if the two lines intersect at $x = 15$. Give an exact answer.

7. Could the table represent a linear function?

| | | | | | |
|-----|----|----|----|----|----|
| x | 9 | 11 | 13 | 15 | 17 |
| y | 44 | 47 | 50 | 53 | 56 |

8. A gram of fat contains 9 dietary calories, whereas a gram of carbohydrates contains only 4.
 (a) Write an equation relating the amount f , in grams, of fat and the amount c , in grams, of carbohydrates that one can eat if limited to a total of 2200 calories/day.
 (b) The USDA recommends that calories from fat should not exceed 30% of all calories. What does this tell you about f ?
 Round your answer to the nearest integer.

A 2200-calorie diet should include no more than about grams of fat.

9. Without solving the equations, decide how many solutions the system has.

$$5y = -4 + x \quad x = 4 + 5y$$

10. Solve the following systems of equations or explain why no solution exists (that is, the system is *inconsistent*). If the system has infinitely many solutions (that is, the system is *dependent*), then so state.

(a) $7x + 5y = -111$ $35x + 25y = -1$

(b) $3x - y = 10$ $5x - 9x = -20$

(c) $3x + 4y = 10$ $4x + y = 9$

(d) $3x = 7y$ $12y = 5x - 1$

(e) $3x - y = 8$ $33x - 11y = 88$

(f) $\frac{3}{x} + \frac{4}{y} = 22$ $\frac{5}{x} - \frac{1}{y} = 6$ Hint: Make a change of variables.

11. The miles per gallon, $M(v)$, of Albertine's Porsche is a function of her speed, v , in mph. What is the practical meaning of $M(81) = 23$? (Answer using a complete sentence.)

12. Starting salary (measured in thousands of dollars), $F(t)$, in the land of Oz is a function of the number of years, t , of schooling (beginning in the First Grade). What is the meaning of $F(14) = 19$?

(Answer using a complete sentence)

13. Odette has \$400 to spend on apples and Evian for a Halloween party. A six-pack of Evian costs \$8 and an apple costs \$3. The number of six-packs she can afford, y , is a function of the number of apples she decides to buy, x .

(a) Find an equation relating x and y .

(b) Interpret the x and y -intercepts in the context of the party.

14. Determine whether the expression is a quadratic expression in x . If so, write the expression in standard form and state the values of a , b , and c .

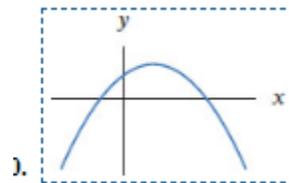
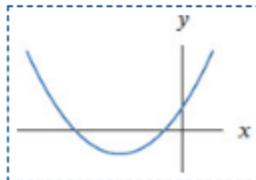
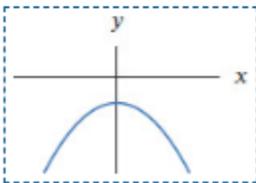
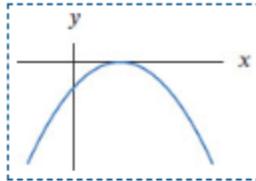
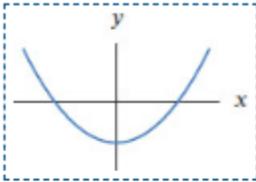
(a) $1 - 7x^2 - 12x$

(b) $9x^2 - 5$

(c) $(x - 1)^2 - 5x^2$

(d) $\frac{6+4x^2+1}{2}$

15. For each graph below, a graph of the form $y=ax^2+bx+c$ is given. State whether the values a and C are positive, negative, or zero.



16. In AlphaVille the temperature is measured in EUCLID degrees. In BetaVille, temperatura is measured in GAUSS degrees. You are told that 5 Guass degrees equals 8 Euclid degrees, and that 24 Gauss degrees equals 68 Euclid degrees. Find a relationship between Gauss degrees and Euclid degrees.

17. If the Widget Company charges x dollars per ítem, it finds that it can sell $1500 - 3x$ of them. Each item costs \$5 to produce.
- Express the revenue, $R(x)$, as a function of price.
 - Express the cost, $C(x)$, as a function of price.
 - Express the profit, $P(x)$, which is revenue minus cost, as a fuinction of price.

18. Dmitry drops a ball from the top of a tower. Its height above the ground in feet t seconds after it is dropped is given by $100 - 16t^2$.
- Explain why the 16 tells you something about how fast the ball is falling.
 - When dropped from the top of a tree, the height of the ball at time t is $120 - 16t^2$. Which is taller: the tower or the tree?
 - When dopped from a building on Mars, the height of the ball is given by $10 - 20t^2$. How does the height of the building compare to the height of the tower? How does the motion of the ball on Mars compare to its motion on Earth?