Linear Equations (Algebraic) Practice Questions

DO NOT USE A CALCULATOR ON ANY OF THE FOLLOWING QUESTIONS UNLESS INDICATED.
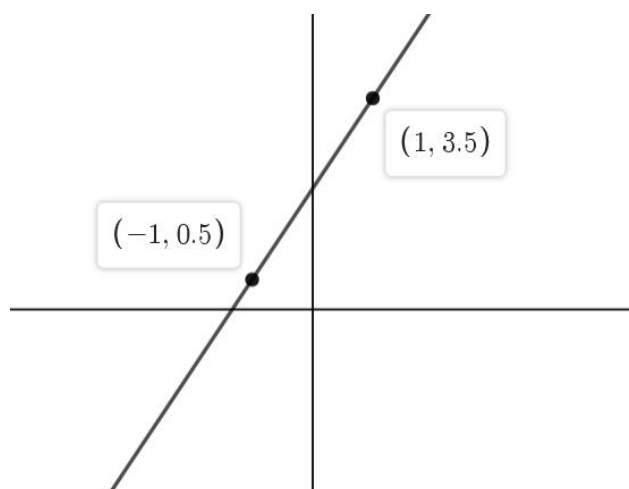
1. In the xy-plane, the graph of which of the following equations is a line with a slope of 3?

   (A) $y = \dfrac{1}{3}x + 1$

   (B) $y = x + 3$

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

   (D) $y = 3x + 1$

$(1, 3.5)$

$(-1, 0.5)$

3. Which of the following is an equation of Line l in the xy-plane above?
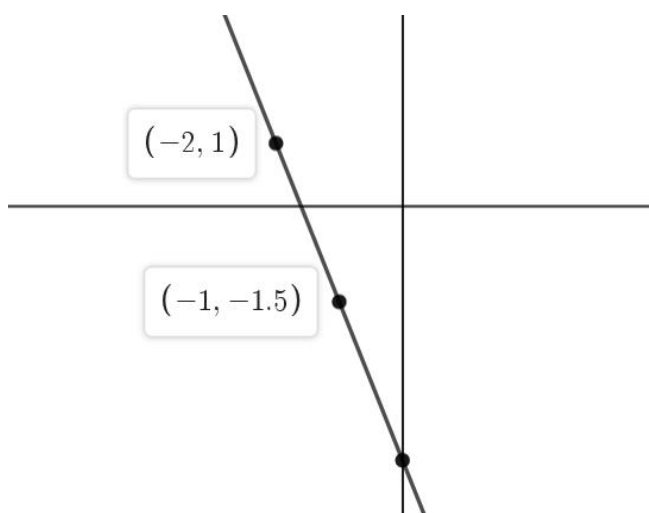
   (A) $y = 2x + \dfrac{3}{2}$

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

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

   (D) $y = 2x - \dfrac{3}{2}$

2. FREE RESPONSE: Line p is shown in the xy-plane below. What is the slope of line p?

$(-2, 1)$

$(-1, -1.5)$

4. Which of the following equations relates y to x for the values in the table below?

x	-2	-1	0	1	2
y	-5	-2	1	4	7

(A) $y = -2x + 1$

(B) $y = -2x - 6$

(C) $y = 2x - 1$

(D) $y = 3x + 1$

5. Line w in the xy-plane contains the points $(-5,2)$ and $(0,7)$. Which of the following is an equation of Line w?

(A) $y - 7 = x$

(B) $y - 1 = 7x$

(C) $7y = x + 1$

(D) $y + 7 = x$

$$15x - 5y = -10$$

6. In the xy-plane, the graph of which of the following equation is perpendicular to the graph of the equation above?

(A) $y - 3x = 4$

(B) $-\dfrac{1}{3}x = 4 - y$

(C) $3y - 4 = -x$

(D) $y + 3x = 4$

7. FREE RESPONSE: Some values of the linear function f are shown in the table below. What is the value of $f(6.5)$?

x	-5	3	11
$f(x)$	-7	9	25

8. The line $y = nx + 2$, where n is a constant, is graphed in the xy-plane. If the line contains the point (a,b), where $a \neq 0$ and $b \neq 0$, what is the slope of the line in terms of a and b?

(A) $\dfrac{a-b}{2}$

(B) $\dfrac{a-2}{b}$

(C) $\dfrac{b-a}{2}$

(D) $\dfrac{b-2}{a}$

$$-4x - 3y = 12$$

9. In the xy-plane, the graph of which of the following equation is parallel to the graph of the equation above?

(A) $y = -\dfrac{4}{3}x - 6$

(B) $y = -\dfrac{3}{4}x - 2$

(C) $y = -\dfrac{3}{4}x + 8$

(D) $y = \dfrac{4}{3}x + 2$

10. A line in the xy-plane has a slope of $-\dfrac{9}{2}$ and passes through the origin. Which of the following points lies on the line?

(A) $(0,9)$

(B) $(2,9)$

(C) $(-2,-9)$

(D) $(-4,18)$

11. Line q in the xy-plane contains points from each of the Quadrants I, II, and III, but no points from Quadrant IV. Which of the following must be true?

(A) The slope of line q is zero.

(B) The slope of line q is positive.

(C) The slope of line q is negative.

(D) The slope of line q is undefined.

(-1 , 2)

(-3, -2)

(r, -2)

(0, -4)
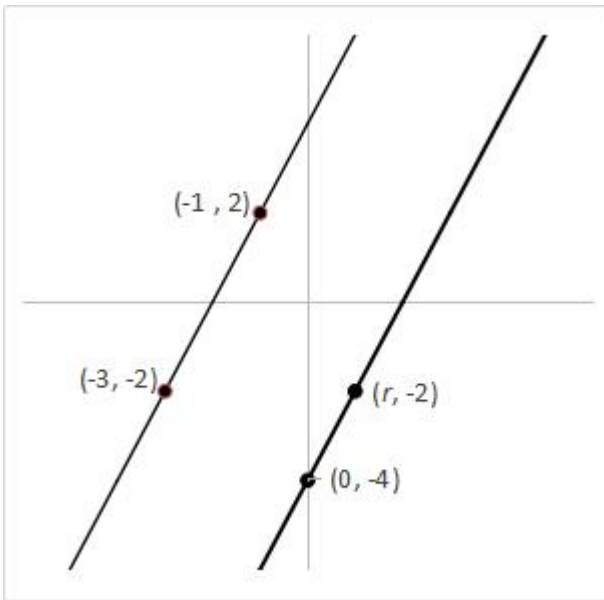
12. FREE RESPONSE: In the *xy*-plane above, line
  t is parallel to line *g*. What is the value of
  r ?

$$y < 2x + 1$$
$$y > 3$$

13. When the system of inequalities above is
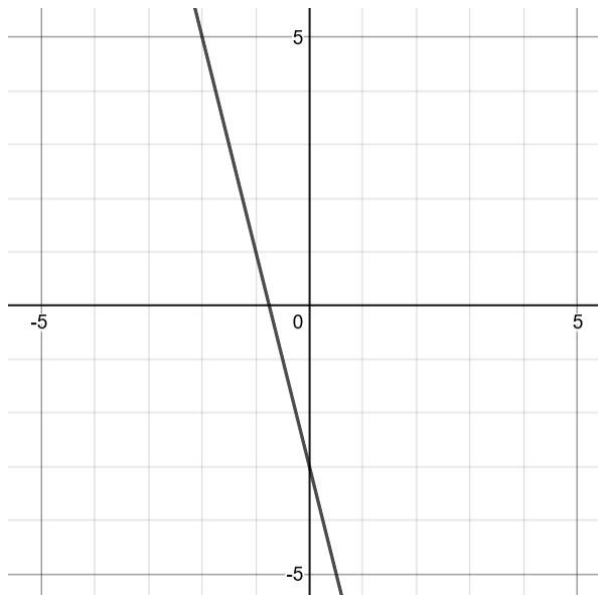 graphed in the *xy*-plane, which quadrant
  contains solutions to the system?

  (A) I

  (B) II

  (C) III

  (D) IV

14. FREE RESPONSE: The graph of a line in the
  xy-plane crosses the *x*-axis at *x*-coordinate -2
  and passes through the point $(5,3)$. The line
  crosses the *y*-axis at the point $(0, g)$. What is
  the value of *g* ?

15. FREE RESPONSE: The line with the equation
  $\frac{2}{3}x - \frac{5}{4}y = 1$ is graphed in the *xy*-plane. What
  is the *x*-coordinate of the *x*-intercept of the
  line?

16. (CALCULATOR) In the xy-plane, the line containing points $(-4,k)$ and $(k,-36)$ passes through the origin. Which of the following could be the value of k?

(A) 4

(B) 6

(C) 12

(D) 18

$$y < -x$$
$$y > -.5x + 1$$

18. When the system of inequalities above is graphed in the xy-coordinate plane, which of the quadrants contains solutions to the system?

(A) I

(B) II

(C) III

(D) IV

17. FREE RESPONSE: The graph of linear function f is shown in the xy-plane above. The graph of the linear function g (not shown) is perpendicular to the graph of f and passes through the point $(-2,1)$. What is the value of $g(-4)$?

19. (CALCULATOR) FREE RESPONSE: In the xy-plane, line t has an x-intercept of -40 and is perpendicular to the line with equation $y + 2 = \dfrac{3}{2}x$. If the point $(27.5,-n)$ is on line t, what is the value of n?
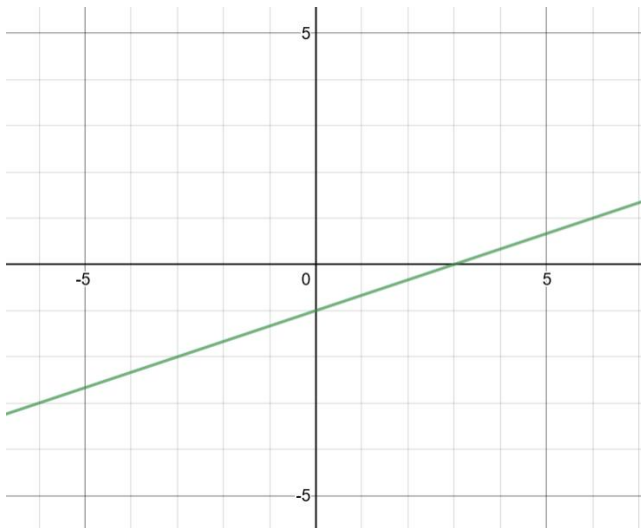
$$2x + y = 6$$
$$8 - 2y = ax$$

$$tx + y = 5$$
$$-c = y - 5x$$

20. FREE RESPONSE: If there are no solutions to the system of equations above, what is the value of a?

22. FREE RESPONSE: If the system of equations above has infinitely many solutions, what is the value of $t - 4c$?

21. The graph of the linear function f is shown in the xy-plane above. The slope of the graph of the linear function g is 3 times the slope of the graph of f. If the graph of g passes through the point $(-3, 6)$, what is the value of $g(15)$?

Systems of Equations Practice Questions

DO NOT USE A CALCULATOR ON ANY OF THE FOLLOWING QUESTIONS UNLESS INDICATED.

$$3x + 5y = 26$$
$$2y - 4x = 0$$

1. For the system of equations above, what is the value of $x + y$?

(A) 2

(B) 4

(C) 6

(D) 8

$$y = x - 10$$
$$\frac{y}{2} + 3x = 23$$

2. Which ordered pair (x, y) satisfies the system of equations shown above?

(A) $(-2, 8)$

(B) $(8, -2)$

(C) $(12, 2)$

(D) $(6, 10)$

3. (CALCULATOR) If $3n + 4t = 29$ and $4n + 3t = 27$, what is the value of $n + 4t$?

(A) 3

(B) 5

(C) 17

(D) 23

$$2x + 5y = -23$$
$$3y - 4x = 7$$

4. What is the solution (x, y) to the system of equations above?

(A) $(-4, -3)$

(B) $(-1.5, -4)$

(C) $(5, 9)$

(D) $(6, -5)$

5. (CALCULATOR) An online video game store sells controllers and video games. Each video game sells for $30 and each controller sells for $25. If Ian purchased a total of 9 controllers and video games that have a combined sale price of $250, how many controllers did he purchase?

(A) 1

(B) 2

(C) 3

(D) 4

$$y > 4x + 4$$
$$4x > 12$$

6. Which of the following consists of the y-coordinates of all the points that satisfy the system of inequalities above?

(A) $y > 3$

(B) $y > 4$

(C) $xy > 16$

$$1.6x + 2.4y = 2.8$$
$$3.5x + .8y = -.55$$

9. CALCULATOR: The system of equations above is graphed in the xy-plane. What is the x-coordinate of the intersection point (x, y) of the system?

(A) -1

(B) -0.5

(C) 1

(D) 1.5

$$\frac{3}{2}y + \frac{1}{2}x = 2$$
$$\frac{5}{4}y + \frac{7}{4}x = -9$$

7. FREE RESPONSE: The system of equations above has solution (x, y). What is the value of y?

10. If $\frac{x}{2y} = 1$, what is the value of $\frac{6y}{3x}$?

(A) 0

(B) 1

(C) 2

(D) 3

$$x + 4y = 1$$
$$2x + 10y = -2$$

8. FREE RESPONSE: According to the system of equations above, what is the value of $-x$?

$$x \le 4y + 2$$
$$x - y > 4$$

11. Which of the following ordered pairs (x, y) satisfy the system of inequalities above?

(A) $(3, 2)$

(B) $(4, 1)$

(C) $(3, -2)$

(D) $(6, 1)$

$$4x + 2y = 850$$
$$3x + 5y = 1900$$

12. (CALCULATOR) FREE RESPONSE: Based on the system of equations above, what is the value of $7x + 7y$?

13. Thomas has two small businesses. He makes clay figurines which earn him an average of $15 per hour of work, and he mows lawns, which earns him $20 per hour. He can work no more than 50 hours per week, but he wants to earn at least $900 per week. Which of the following systems of inequalities represents this situation in terms of x and y, where x is the number of hours he works on clay figurines, and y is the number of hours he mows lawns?

(A) $15x + 20y \geq 900$
$x + y \leq 50$

(B) $15x + 20y \leq 900$
$x + y \leq 50$

(C) $15x + 20y \leq 900$
$x + y \geq 50$

(D) $15x + 20y \geq 900$
$x + y \geq 50$

14. If $\dfrac{x}{y - 2x} = \dfrac{2}{13}$, which of the following must also be true?

(A) $\dfrac{x}{y} = \dfrac{2}{17}$

(B) $\dfrac{x}{y} = \dfrac{17}{2}$

(C) $\dfrac{x}{y + 2x} = \dfrac{15}{13}$

(D) $\dfrac{y + 2x}{y - 2x} = -\dfrac{2}{13}$

15. FREE RESPONSE: At a certain restaurant, each steak has 400 more calories than each order of mashed potatoes. If 3 steaks and 2 orders of mashed potatoes have a total of 2750 calories, how many calories does a steak have?

16. FREE RESPONSE: In the xy-plane, the equations $2x+y=7$ and $8x+4y=p$ represent the same line for some constant p. What is the value of p?

$$11x-15y=212$$
$$10x-15y=205$$

19. CALCULATOR: For the solution (x,y) to the system of equations above, what is the value of $x-y$?

(A) -2

(B) 2

(C) 7

(D) 16

17. FREE RESPONSE: If $n=2\sqrt{3}$ and $2n=\sqrt{6x}$, what is the value of x?

$$y=2x^2-2x+1$$
$$y-4x+3.5=0$$

20. How many solutions are there to the system of equations above?

(A) There are exactly 4 solutions

(B) There are exactly 2 solutions.

(C) There is exactly 1 solution.

(D) There are no solutions.

$$x+y=2$$
$$-x+4y=.5$$

18. FREE RESPONSE: If (x,y) satisfies the system of equations above, what is the value of y?

$$4x - 5y = 8$$
$$5x - 4y = 28$$

21. If (x, y) is a solution to the system of equations above, what is the value of $x + y$?

(A) 8

(B) 12

(C) 20

(D) 36

$$y \leq -16x + 600$$
$$y \leq 4x$$

22. FREE RESPONSE: In the xy-plane, if a point with coordinates (a, b) lies in the solution set of the system of inequalities shown above, what is the maximum possible value of b?

23. Christian needs to hire at least 8 staff members for an upcoming project. The staff members will be made of art designers, who will be paid $850 per week, and copywriters, who will be paid $900 per week. His budget for paying the new staff members is no more than $8,800 per week. He must hire at least 3 art designers and 2 copywriters. Which of the following systems of inequalities represents the conditions described if x is the number of art designers and y is the number of copywriters?

(A)
$$850x + 900y \geq 8,800$$
$$x + y \geq 8$$
$$x \leq 3$$
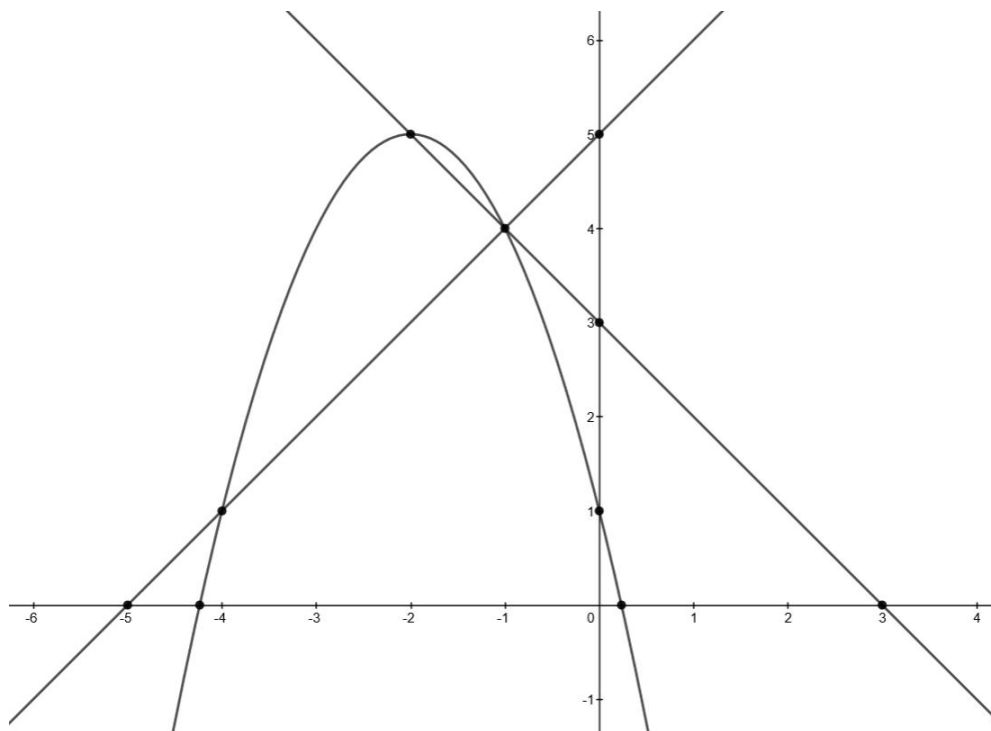$$y \leq 2$$

(B)
$$850x + 900y \leq 8,800$$
$$x + y \geq 8$$
$$x \leq 3$$
$$y \leq 2$$

(C)
$$850x + 900y \leq 8,800$$
$$x + y \geq 8$$
$$x \geq 3$$
$$y \geq 2$$

(D)
$$850x + 900y \geq 8,800$$
$$x + y \geq 8$$
$$x \geq 3$$
$$y \geq 2$$

24. A system of three equations is graphed in the xy-plane above. How many solutions does the system have?

(A) None

(B) One

(C) Two

(D) Three

25. A tour group of 94 people went on a horse and carriage ride, using a total of 39 carriages. Some of the carriages held 2 people each, and the rest held 3 people each. Assuming all the carriages were filled to capacity and every person on the tour had a seat in a carriage, exactly how many of the carriages were 3-person carriages?

(A) 13

(B) 16

(C) 22

(D) 23

$$-2x + 3y = -12$$
$$6x + 2y = 47$$

26. (CALCULATOR) FREE RESPONSE: If (x, y) is a solution to the system of equations above, what is the value of x?

$$y > 2x + m$$
$$y > -3x - n$$

$$a = 450 - 25w$$
$$b = 330 - 5w$$

27. If the xy-plane, if $(0,0)$ is a solution to the system of inequalities above, which of the following relationships between m and n must be true?

(A) $m < n$

(B) $n < m$

(C) $m = -n$

(D) $|m| = |n|$

30. In the equations above, a and b represent the price in dollars of two competing computer processors, Processor A and Processor B, respectively, w weeks after January 1 of last year. What was the price of Processor A when it was equal to the price of Processor B?

(A) $6

(B) $30

(C) $150

(D) $300

28. (CALCULATOR) A snack stand sells drinks for $3.50 each and candy bars for $2 each. The snack stand's revenue from selling a total of 87 drinks and candy bars in one day was $235.50. How many drinks were sold that day?

(A) 41

(B) 43

(C) 44

(D) 46

$$2x + 3y = 10$$
$$ax + 4y = 2$$

31. In the system of equations above, b is a constant. For which of the following values of a does the system have no solution?

(A) $-\dfrac{8}{3}$

(B) -6

(C) $\dfrac{8}{3}$

(D) 6

$$y = x(x - 2)$$
$$y - 3x = 14$$

29. If (x, y) is a solution to the system of equations above and $x \le 0$, what is the value of x?

(A) -2

(B) 0

(C) -7

(D) -14

$$x = 4y + 32$$
$$y = (x+2)(x+1)$$

32. (CALCULATOR) How many ordered pairs (x, y) satisfy the system of equations above?

(A) 0

(B) 1

(C) 2

(D) Infinitely many

33. A nutrition company is releasing a new protein powder in a standard version and an elite version. The box for the standard version has a volume of 30 cubic inches, and the box for the elite version has a volume of 45 cubic inches. The company receives a bulk order for 60 boxes of the protein powder, and the total volume of the order to be shipped is 2,100 cubic inches. Which of the following systems of equations can be used to determine the number of standard version boxes, s, and elite version boxes, e, that were ordered?

(A)
$$30s + 45e = 60$$
$$e + s = 2100$$

(B)
$$60 - e = s$$
$$30e + 45s = 2100$$

(C)
$$e + s = 60$$
$$30s = 2100 + 45e$$

(D)
$$60 - s = e$$
$$30s + 45e = 2100$$

$$\frac{3}{2}x - \frac{3}{4}y = 16$$
$$ax - by = 6$$

34. FREE RESPONSE: The system of equations above has infinite solutions. If a and b are constants, what is the value of $\frac{b}{a}$?

$$y = x^2 - 2x - 15$$
$$y = 3 + x$$

35. FREE RESPONSE: If the ordered pair (x, y) satisfies the system of equations above and $x > 0$, what is the value of x?

36. (CALCULATOR) FREE RESPONSE: In a study of wolf pack behavior, 78 female wolves and 110 male wolves have been tagged with tracking devices. If 60 more female wolves are tagged, how many more male wolves must be tagged so that $\dfrac{5}{8}$ of the total number of wolves in the study are male?

$$5x - 8y = 20$$
$$6bx - 6y = 15$$

37. In the system of equations above, b is a constant and x and y are variables. For what value of b will the system of equations have infinitely many solutions?

(A) $\dfrac{5}{8}$

(B) $\dfrac{8}{5}$

(C) $-\dfrac{8}{5}$

(D) $-\dfrac{5}{8}$
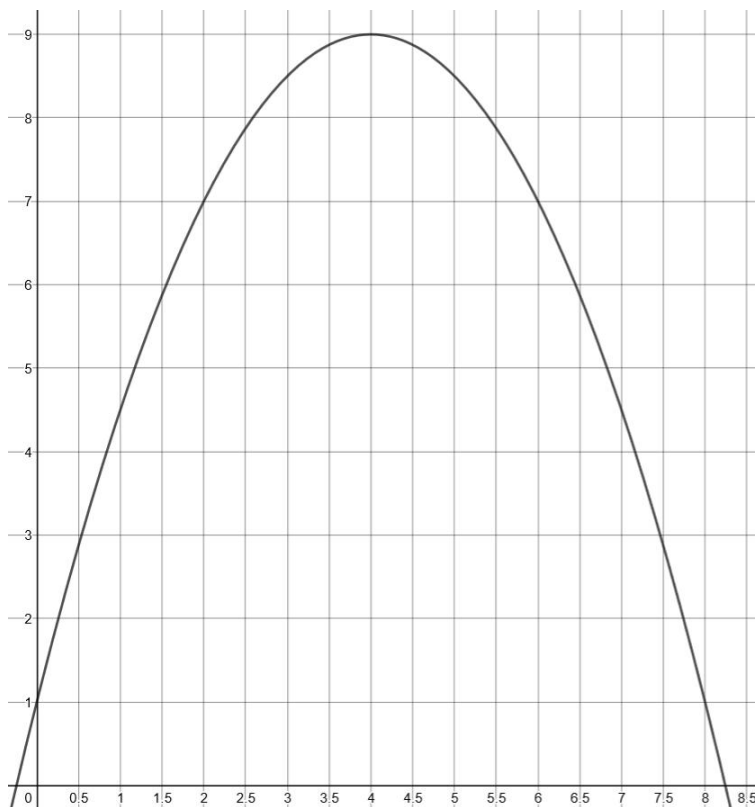
38. The graph of the function f, defined by $f(x) = -\dfrac{1}{2}(x-4)^2 + 9$, is shown in the xy-plane above. If the function g (not shown) is defined by $g(x) = -x + 9$, what is one possible value of n such that $f(n) = g(n)$?

39. (CALCULATOR) Tara is mixing two of her favorite trail mixes. A one-third cup serving of Happy Hiker trail mix contains 120 calories and a two-cup serving of Adventure Animal trail mix contains 480 calories. If the total number of calories in one cup of Tara's mixture is 315 calories, how much Happy Hiker trail mix is in one cup of the mixture?

(A) $\dfrac{3}{8}$ cup

(B) $\dfrac{1}{2}$ cup

(C) $\dfrac{5}{8}$ cup

(D) $\dfrac{3}{4}$ cup

40. If $x - 4y = 8$, what is the value of $\dfrac{2^x}{16^y}$?

(A) 2^{-3}

(B) 4^3

(C) 2^8

(D) The value cannot be determined from the information given.

41. (CALCULATOR) The sum of three numbers is 544. One of the numbers, n, is 30% less than the sum of the other two numbers. What is the value of n?

(A) 109

(B) 224

(C) 320

(D) 381

$$qx + sy = 3$$
$$10x + 2y = 60$$

42. (CALCULATOR) FREE RESPONSE: In the system of equations above, q and s are constants. If the system has infinitely many solutions, what is the value of $\dfrac{q}{s}$?

43. (CALCULATOR) Jeff and Yanik each order a bowl of ramen at a restaurant. The price of Jeff's bowl was j dollars, and the price of Yanik's bowl was $3 less than the price of Jeff's bowl. If Jeff and Yanik split the total cost of the ramen bowls equally and each paid an 18% tip, which of the following represents the amount, in dollars, each of them paid? (Assume there is no sales tax.)

(A) $.18j + .54$

(B) $1.18j - 1.77$

(C) $1.18j + .54$

(D) $2.36j - 3.54$

44. If $\dfrac{n^{x^3}}{n^{y^3}} = n^{15}$, $n > 1$, and $x + y = 7$, what is the value of $x - y$?

(A) 5

(B) 9

(C) 12

(D) 18

45. If $(ax-3)(bx+6)=14x^2+cx-18$ for all values of x, and $a+b=9$, what are the two possible values for c?

(A) 4 and 3

(B) 2 and 7

(C) 9 and 14

(D) 36 and -9

	Pattern	
Color	Solid	Swirled
Red		
Blue		
Total	26	22

46. (CALCULATOR) The incomplete table above summarizes the number of red and blue marbles in a child's marble collection. There are three times as many red swirled marbles as there are red solid marbles, and there are five times as many blue solid marbles as there are blue swirled marbles. If there is a total of 26 solid marbles and 22 swirled marbles in the child's marble collection, which of the following is closest to the probability that a swirled marble selected at random is blue? (Note: assume that none of the marbles are a mixture of blue and red, or of swirled and solid.)

(A) .083

(B) .125

(C) .181

(D) .200

$$4x - a = 8x - 5$$
$$4y - b = 8y - 5$$

47. In the equations above, a and b are constants. If a is b plus $\dfrac{1}{2}$, which of the following is true?

(A) x is y minus $\dfrac{1}{8}$.

(B) x is y minus $\dfrac{1}{4}$.

(C) x is y minus $\dfrac{1}{2}$.

(D) x is y plus $\dfrac{1}{2}$.