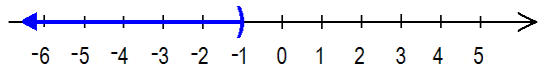
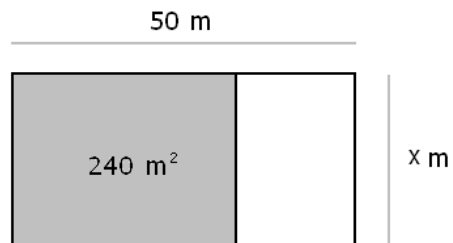


- Label each of the following statements as true or false.
  - 3 is an odd number or 10 is a prime number.
  - 3 is an odd number and 10 is a prime number.
  - $-2$  is a natural number or 5 is an even number.
  - $-\frac{2}{3}$  is an even number or an odd number.
- Suppose that  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ ,  $A = \{1, 4, 9\}$ , and  $B = \{2, 4, 6, 7\}$ . Find each of the following.
  - $A \cap B$
  - $A \cup B$
  - $P = \{x \in U : x > 4 \text{ or } x \leq 7\}$
  - $Q = \{x \in U : x > 4 \text{ and } x \leq 7\}$
- Suppose that  $S$  is the set of all squares and  $R$  is the set of all rectangles. Label each of the following statements as true or false.
  - $S \subseteq R$
  - $R \subseteq S$
  - $R \subseteq R$
  - $\emptyset \subseteq S$
  - $R \cup S = S$
  - $R \cup S = R$
  - $R \cap S = S$
  - $R \cap S = R$
  - $R \cup \emptyset = R$
- Suppose that  $F$  is the set of all integers divisible by four,  $S$  is the set of all integers divisible by six, and  $T$  is the set of all integers divisible by three. Label each of the following statements as true or false.
  - $S \subseteq T$
  - $F \subseteq S$
  - $F \cap T = S$
  - $F \cap T \subseteq S$
  - $F \subseteq S \cup T$
- Perform the division with remainder.  $2018 \div 17$
- List all factors of 84.
- Consider the following numbers.  
2011, 11 060 904, 321, 3106  
Select all the numbers from the list that are divisible
  - by 2
  - by 3
  - by 6
- Which of the following numbers is a prime?  
2007, 143, 151, 91
- Find the prime factorization of 720.
- Find the prime factorization for  $x$  if
  - $x = 12^{100}$
  - $x = 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$
 Note that there is a shorter notation for the product above:  $10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 10!$  (read as ten factorial)
- Find the smallest positive integer that is divisible by 2, 3, 4, 5, and 6.
- Label each of the following statements as true or false.
  - Every integer is a rational number.
  - Every prime number is odd.
  - If  $a$  is divisible by 2 and  $b$  is divisible by 3, then the product  $ab$  is divisible by 6.
  - The sum of two consecutive integers is always an odd number.
  - The product of two consecutive integers is always an odd number.
- Perform the indicated operations and simplify.
  - $-3^2 - 2(5 - 3(2 \cdot 7 - 4^2))$
  - $-6 - 7(-3)$
  - $\frac{5^2 - 4^2}{11 - 3 \cdot 2^2 + 1}$
  - $\frac{48 \div 8 \cdot 6}{-2^2 - 5}$
  - $12 - 2(5 - 2 + 1)$
  - $3^{-2}$
  - $\frac{1}{(-2)^{-3}}$
  - $2^{-1} - 3^{-1}$
  - $\frac{(-2)^{-1} - (-3)^{-1}}{(-2)^{-2} + (-3)^{-2}}$
  - $\frac{5}{8} - \frac{2}{3} + \frac{1}{6} \left(-\frac{1}{2}\right)$
- Re-write the set depicted on the picture in interval notation.
 
- Find the multiplicative inverse of  $-0.75$ .
- If  $A = \left\{-\sqrt{9}, \pi, -\frac{3}{16}, 0.67, \sqrt{3}\right\}$ , then  $A$  contains how many irrational numbers?
- Re-write 0.000 000 314 using scientific notation.
  - Express the number 14 800 000 000 in scientific notation.
- Perform the indicated operations.
  - $(2.5 \times 10^{-7})(80 \times 10^4)$
  - $\frac{3.6 \times 10^{-3}}{4.8 \times 10^{-9}}$
- You thought that dinner and a movie would cost \$35, but your estimate was \$17 less than the actual cost. If the movie was \$10, how much was dinner?
- Evaluate each of the given expressions.
  - $b^2 - 4ac$  if  $a = -1$ ,  $b = -2$ , and  $c = -3$
  - $\frac{|2x - 8|}{2x + 1}$  if  $x = -5$
  - $\frac{3a + b}{2a - b}$  if  $a = -3$  and  $b = -6$

21. Compute the value of the expression  $-12p + 3$  when  $p = \frac{5}{6}$ .
22. Simplify each of the given expressions.
- a)  $8t - (-6t + 2)$       c)  $\frac{-10x + 24}{2}$
- b)  $2x - 4(y - x) - 3y$       d)  $2(x - 3y) - 5(2x - 4y)$
23. Solve each of the given linear equations.
- a)  $5x - (x + 4) = -8$
- b)  $-2(x - 5) + 3x = 4x - 2$
- c)  $3(x - 7) - 2(x - 5) = x + 11$
- d)  $\frac{2}{3}(x - 6) - \frac{3}{4}(x + 8) = x - 10$
- e)  $x + \frac{4}{3} = \frac{5}{6}$
- f)  $x - \frac{2x - 1}{3} = \frac{x + 5}{2} - \frac{1}{6}$
- g)  $\frac{2x - 3}{8} + \frac{x}{4} = \frac{10}{16}$
24. Solve each of the given linear inequalities. Present your answer in interval notation.
- a)  $\frac{3x - 5}{-2} > 4$
- b)  $3(x - 2) - 5(2x - 1) \leq 4(3x - 5)$
- c)  $\frac{x - 6}{5} - \frac{2x + 3}{3} \leq x + 11$
25. Solve each of the formulas for the indicated variable.
- a)  $A = \frac{(a + c)h}{2}$  for  $c$       c)  $V = \frac{1}{3}bh$  for  $h$
- b)  $y = mx + b$  for  $x$
26. Graph each of the following.
- a)  $y = 2x + 4$       d)  $2x - 3y = -12$
- b)  $y = -\frac{2}{3}x + 1$       e)  $y = 3$
- c)  $x = -2$       f)  $x + 3y = -6$
27. a) Find the  $x$ -intercept of  $x - 2y = 4$ .  
b) Find the  $y$ -intercept of  $4x - 3y = 12$ .
28. Find the slope of the straight line passing through the indicated points.
- a)  $(1, -2)$  and  $(3, -4)$       b)  $(-1, -3)$  and  $(-4, 5)$ .
29. Solve each of the given system of linear equations.
- a)  $\begin{cases} \frac{x}{3} + 6y = 4 \\ y = -5 - x \end{cases}$       c)  $\begin{cases} 2x + 3y = 11 \\ x - 4y = 0 \end{cases}$
- b)  $\begin{cases} 12x - 2y = 10 \\ y = 6x - 5 \end{cases}$       d)  $\begin{cases} 3x + 5y = 20 \\ 2x - 10y = 0 \end{cases}$
30. Simplify each of the given expressions. Assume all variables represent positive numbers.
- a)  $\frac{5x^5y^4z}{30x^3yz^2}$       b)  $(x^4)^2(x^{-2})^3$       c)  $\left(\frac{-2ab^{-3}}{b^{-2}}\right)^{-4}$
31. Expand each of the following.
- a)  $(2x - 1)^2$       b)  $(2x - 1)^3$
32. Simplify each of the given expressions.
- a)  $(x - 3)^2 - (x - 2)(3x + 1)$
- b)  $(3y - 2)(y - 1) - (2y - 1)^2$
33. Completely factor each of the following.
- a)  $p^2 - 4p - 32$       d)  $2x^2 - 2x - 12$
- b)  $3t^2 - 5t - 2$
- c)  $9x^2 - 25$       e)  $2x^4 - 32$
34. Completely factor  $x^2 + x - 2$  and  $x^2 - 4$ . What is the factor they have in common?
35. Solve each of the given quadratic equations.
- a)  $5x + 2x^2 = 3$
- b)  $x^2 - 18 = -7x$
- c)  $6x^2 - 11x = 10$
- d)  $(x - 5)(x + 2) = x - 10$
36. Simplify each of the given rational expressions.
- a)  $\frac{2x - 3}{3 - 2x}$       c)  $\frac{(x + 1)^2}{x^2 - 1}$
- b)  $\frac{x^2 - 36}{x^2 - 4x - 12}$       d)  $\frac{3ax - 6ay - bx + 2by}{3a - b}$
37. Perform the indicated operations and simplify.
- a)  $\frac{x^2 - 2x - 3}{x^2 - 1} \cdot \frac{x^2 - x}{x^2 + 2x - 15}$
- b)  $\frac{x}{x^2 - 2x} \div \frac{3x + 6}{4x - 8}$
38. Suppose that  $x$  represents a number. Write an algebraic expression expressing "5 less than twice a number".
39. If James drives 72 miles in 5 hours, how far can he drive in 8.5 hours?

40. There is an animal farm where chickens and cows live. All together, there are 73 heads and 204 legs. How many chickens and how many cows are there on the farm?
41. What is the area of the rectangle whose longer side is twice the length of the shorter side, and whose perimeter is 36 in?
42. If Jupiter is 483,800,000 miles from the sun, what is its distance from the sun in inches? Round to the nearest hundredths and answer in scientific notation. (1 mile = 5,280 feet and 1 foot = 12 inches)
43. Most countries measure temperature in either Celsius or in Fahrenheit. The connection between these two measurements is  $C = \frac{5}{9}(F - 32)$ . Solve this formula for  $F$ .
44. A coat is on a special sale at a 20% discount. If the sale price is \$96, what was the price of the coat before the discount?
45. A sweater originally cost \$65 and is now \$39. What is the percent change of the price of the shirt? Round your answers to the nearest percentage.
46. Find the  $x$ -coordinate of the point where the lines  $x + 3y = -8$  and  $4x - 3y = 23$  intersect.
47. A school purchases tickets to a show. A child ticket costs \$8 and an adult ticket costs \$14. The school has paid a total of \$610 for 65 tickets. How many of the 65 tickets were for adults?
48. The area of the shaded region of the rectangle shown below is 240 square meters. Express the area of the unshaded region in terms of  $x$ .

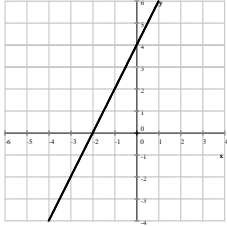


49. One side of a rectangle is 2 inches shorter than three times another side. How long is the longer side in the rectangle if its area is 96 square inches?
50. Find an expression that describes the area in square meters of a rectangle that has width  $4x^2y^2$  meters and length  $3x^3y^3$  meters. Simplify your answer.
51. The formula for the volume of a rectangular box  $V = lwh$ ; where  $l$  is the length,  $w$  is the width, and  $h$  is the height. If  $V = 64$ ,  $l = 8$ , and  $w = 4$ , find the value of  $h$ .
52. Find the value of  $k$  so that the line connecting the points  $(2, 3)$  and  $(5, k)$  has a slope of  $\frac{1}{3}$ .
53. Monico invests a total of \$12 500 in two accounts paying 4% and 3% annual interest, respectively. How much was invested in each account if, after one year, the total interest was \$455?

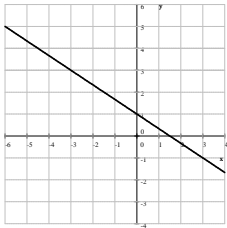
## Answers

1. a) true   b) false   c) false   d) false
2. a) {4}   b) {1, 2, 4, 6, 7, 9}  
c) {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}   d) {5, 6, 7}
3. a) true   b) false   c) true   d) true   e) false  
f) true   g) true   h) false   i) true
4. a) true   b) false   c) false   d) true   e) false
5. 118 R 12   6. 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84
7. a) 11 060 904, 3106   b) 11 060 904, 321  
c) 11 060 904
8. 151   9.  $720 = 2^4 \cdot 3^2 \cdot 5$
10. a)  $2^{200} \cdot 3^{100}$    b)  $2^8 \cdot 3^4 \cdot 5^2 \cdot 7$    11. 60
12. a) true   b) false   c) true   d) true   e) false
13. a) -31   b) 15   c) undefined   d) -4   e) 4  
f)  $\frac{1}{9}$    g) -8   h)  $\frac{1}{6}$    i)  $-\frac{6}{13}$    j)  $-\frac{1}{8}$
14.  $(-\infty, -1)$    15.  $-\frac{4}{3}$    16. two
17. a)  $3.14 \times 10^{-7}$    b)  $1.48 \times 10^{10}$
18. a) 0.2   b) 750 000   19. \$42

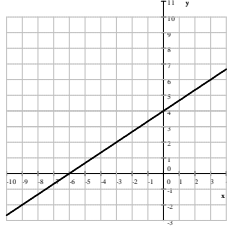
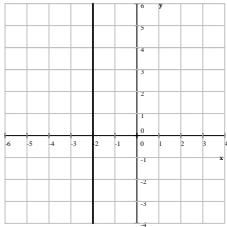
20. a)  $-8$  b)  $-2$  c) undefined 21.  $-7$   
 22. a)  $14t - 2$  b)  $6x - 7y$  c)  $-5x + 12$  d)  $-8x + 14y$   
 23. a)  $-1$  b)  $4$  c) there is no solution d)  $0$   
 e)  $-\frac{1}{2}$  f)  $-12$  g)  $2$   
 24. a)  $(-\infty, -1)$  b)  $[1, \infty)$  c)  $[-9, \infty)$   
 25. a)  $c = \frac{2A - ah}{h}$  b)  $x = \frac{y - b}{m}$  c)  $h = \frac{3V}{b}$   
 26. a)  $y = 2x + 4$  d)  $2x - 3y = -12$



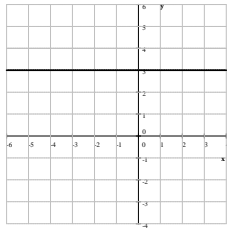
b)  $y = -\frac{2}{3}x + 1$



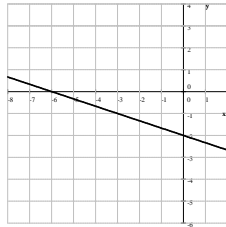
c)  $x = -2$



e)  $y = 3$



f)  $x + 3y = -6$



27. a)  $(4, 0)$  b)  $(0, -4)$  28. a)  $-1$  b)  $-\frac{8}{3}$   
 29. a)  $(-6, 1)$  b) There are infinitely many solutions, in the form of  $(x, 6x - 5)$   
 c)  $(4, 1)$  d)  $(5, 1)$   
 30. a)  $\frac{x^2 y^3}{6z}$  b)  $x^2$  c)  $\frac{b^4}{16a^4}$   
 31. a)  $4x^2 - 4x + 1$  b)  $8x^3 - 12x^2 + 6x - 1$   
 32. a)  $-2x^2 - x + 11$  b)  $-y^2 - y + 1$   
 33. a)  $(p + 4)(p - 8)$  b)  $(3t + 1)(t - 2)$   
 c)  $(3x - 5)(3x + 5)$  d)  $2(x + 2)(x - 3)$   
 e)  $2(x - 2)(x + 2)(x^2 + 4)$  34.  $x + 2$   
 35. a)  $x = -3$  or  $x = \frac{1}{2}$  b)  $x = -9$  or  $x = 2$   
 c)  $x_1 = -\frac{2}{3}$  and  $x_2 = \frac{5}{2}$  d)  $x_1 = 0$  and  $x_2 = 4$   
 36. a)  $-1$  b)  $\frac{x + 6}{x + 2}$  c)  $\frac{x + 1}{x - 1}$  d)  $x - 2y$   
 37. a)  $\frac{x}{x + 5}$  b)  $\frac{4}{3(x + 2)}$  38.  $2x - 5$  39.  $122.4$  mi  
 40.  $44$  chickens and  $29$  cows 41.  $72$  in<sup>2</sup>  
 42.  $3.07 \times 10^{13}$  in 43.  $F = \frac{9}{5}C + 32$  44.  $\$120$   
 45.  $40\%$  decrease 46.  $3$  47.  $15$   
 48.  $50x - 240$  or  $(50x - 240)$  m<sup>2</sup> 49.  $16$  in  
 50.  $12x^5 y^5$  or  $12x^5 y^5$  m<sup>2</sup> 51.  $2$  52.  $4$   
 53.  $\$8000$  at  $4\%$  and  $\$4500$  at  $3\%$