

- Simplify each of the following expressions.
  - $\frac{ab - a - b + 1}{b^2 - 1}$
  - $\frac{5x - 30}{x^2 - 36} \cdot \frac{3x + 18}{5}$
  - $\frac{px^2 - 16q - 16p + qx^2}{x^2 + 5x + 6} \cdot \frac{x^2 + 6x + 9}{4px^2 + px^3 + 4qx^2 + qx^3}$
  - $\frac{3x}{x - 2} - \frac{x + 4}{x - 2}$
  - $\sqrt{125} - 3\sqrt{80} + \sqrt{45}$
  - $(\sqrt{7} - 2)^2$
  - $(\sqrt{3} - 1)^3$
- Rationalize the denominator in each of the following expressions.
  - $\frac{3}{\sqrt{5}}$
  - $\frac{1}{\sqrt{10} - 3}$
  - $\frac{2}{\sqrt{7} + 1}$
- Find the exact value of  $x^2 - 4x + 6$  if  $x = 2 - \sqrt{3}$ .
- Factor  $13x + 2x^2 - 24$  by completing the square.
- Factor completely each of the following:
  - $4a^2mn - 15abm^2 - 6abmn + 10a^2m^2$
  - $a^2x^3 - b^2x - a^2x + b^2x^3$
  - $162a + 162b - 2ax^4 - 2bx^4$
  - $x^2 - 6x + 8$
  - $3a^2 - 5a - 2$
  - $4b^2 - b - 5$
- Solve each of the following equations. Make sure to check your solution(s).
  - $2x^3 = 20x^2 + 1750x$
  - $\frac{3x + 17}{2} = x - 1 + \frac{x + 19}{2}$
  - $|3 - 2x| + 2 = 5$
  - $\frac{2}{3}(x - 7) = \frac{4}{5}(x + 1)$
  - $7x^2 + (x + 3)(2x - 1) = (3x + 1)^2$
  - $8a + 2a^2 = 42$
  - $8x^3 = 50x^2$
  - $8p^3 = 50p$
  - $2 - (3 - x)(2x + 5) = (x - 1)(2x - 1)$
  - $x^2 = 4x + 1$
  - $4x^2 + 20x + 7 = 0$
- Graph the straight lines  $3x + 5y = 5$  and  $y = -x - 1$  in the same coordinate system. Use your graph to find the coordinates of the point where the lines intersect.
- Find an equation of the straight line that is perpendicular to  $2x - 3y = -6$  and passes through the point  $(-12, 5)$ .
- Find an equation of the straight line that passes through the points  $(2, 7)$  and  $(-2, -5)$ .
- Graph the parabola  $y = 8x - x^2 - 15$ . Clearly label the coordinates of five points on the parabola, including vertex and intercepts.
- One side of a rectangle is 4 ft shorter than three times the other side. Find the sides if the perimeter is 64 ft.

12. One side of a rectangle is 4 ft shorter than three times the other side. Find the sides if the area is  $84 \text{ ft}^2$ .
13. One side of a rectangle is 4 in shorter than 3 times the other side. Find the sides of the rectangle if its area is  $319 \text{ in}^2$ .
14. A bank teller has 23 more five-dollar bills than ten-dollar bills. The total value of the money is \$610. How much of each denomination of bill does he have?
15. The population of a town has decreased from 80 000 to 68 000. What percent of a decrease does this represent?
16. We invested \$10000 into two bank accounts. One account earns 14% per year, the other account earns 8% per year. How much did we invest into each account if the combined interest from the two accounts is \$1238 after the first year?
17. The hypotenuse of a right triangle is 68 cm. The difference between the other two sides is 28 cm. Find the sides of the triangle.
18. Find the distance between  $(3, 8)$  and  $(8, -4)$ .

## Answers

1. a)  $\frac{a-1}{b+1}$     b) 3    c)  $\frac{(x+3)(x-4)}{x^2(x+2)} = \frac{x^2-x-12}{2x^2+x^3}$     d) 2    e)  $-4\sqrt{5}$

f)  $11 - 4\sqrt{7}$     g)  $-10 + 6\sqrt{3}$

2. a)  $\frac{3}{\sqrt{5}}$     b)  $\sqrt{10} + 3$     c)  $\frac{\sqrt{7}-1}{3}$

3. 5

4.  $2(x+8)\left(x - \frac{3}{2}\right) = (x+8)(2x-3)$

5. a)  $am(2n+5m)(2a-3b)$     b)  $x(a^2+b^2)(x+1)(x-1)$     c)  $2(9+x^2)(3+x)(3-x)(a+b)$

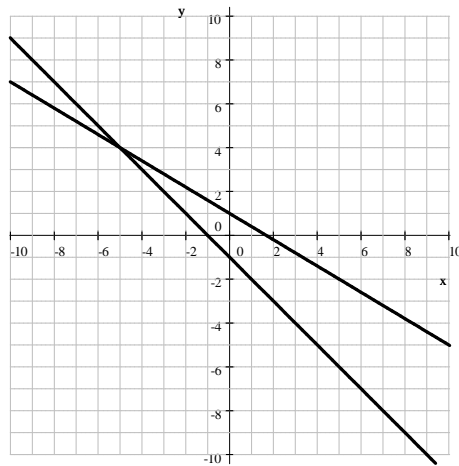
d)  $(x-2)(x-4)$     e)  $(a-2)(3a+1)$     f)  $(4b-5)(b+1)$

6. a)  $-35, 0, 25$     b) identity, all real numbers are solution    c) 0, 3    d)  $-41$     e)  $-4$

f)  $-7, 3$     g)  $\frac{25}{4}, 0$     h)  $-\frac{5}{2}, 0, \frac{5}{2}$     i) 7    j)  $2 + \sqrt{5}, 2 - \sqrt{5}$

k)  $\frac{-5 + \sqrt{18}}{2}, \frac{-5 - \sqrt{18}}{2}$

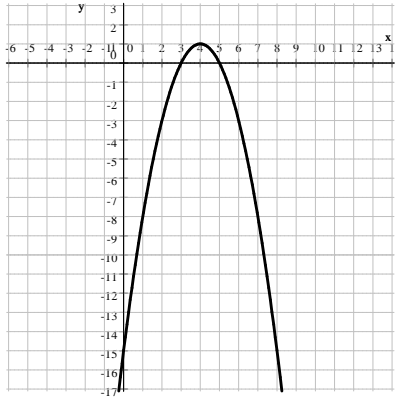
7.  $(-5, 4)$



8.  $y = -\frac{3}{2}x - 13$     or     $y - 5 = -\frac{3}{2}(x + 12)$

9.  $y = 3x + 1$

10.  $y$ -intercept:  $(0, -15)$ . Vertex:  $(4, 1)$ .  $x$ -intercepts:  $(3, 0)$  and  $(5, 0)$ .  
A few more points:  $(2, -3)$  and  $(6, -3)$



11. 9 ft and 23 ft  
12. 6 ft and 14 ft  
13. 11 in by 29 in  
14. 33 ten-dollar bills and 56 five-dollar bills  
15. 15% decrease  
16. \$7300 at 14% and \$2700 at 8%  
17. 32 cm and 60 cm  
18. 13 units