

1. Simplify each of the following expressions.

a)  $\frac{x^2 - 10x + 21}{9 - x^2}$

e)  $\frac{3}{x-1} - \frac{5}{x}$

i)  $\frac{2^{-2}3^{-1}}{2^03^{-2}5^{-1}}$

b)  $\frac{5x - 30}{x^2 - 36} \cdot \frac{3x + 18}{5}$

f)  $\sqrt{125} - 3\sqrt{80} + \sqrt{45}$

j)  $\frac{2^{-2} - 3^{-1}}{2^0 - 3^{-2}}$

c)  $\frac{a^3 - 4a}{a^2 + 2a} \div \frac{a^2 - 8a + 12}{a^2 - 6a}$

g)  $(\sqrt{7} - 2)^2$

k)  $\left(\frac{-2a^0ba^{-5}}{3a^{-2}b^2a^{-3}}\right)^{-3}$

d)  $\frac{3x}{x-2} - \frac{x+4}{x-2}$

h)  $(\sqrt{3} - 1)^3$

l)  $\frac{-2a^7b^0(2a^5b^{-3}a^{-1})^{-1}}{b^5(4a^{-3}b^2)^{-3}(-a)^{-4}}$

2. Rationalize the denominator in each of the following expressions.

a)  $\frac{3}{\sqrt{5}}$

b)  $\frac{1}{\sqrt{10-3}}$

c)  $\frac{2}{\sqrt{7+1}}$

d)  $\frac{3+\sqrt{3}}{3-\sqrt{3}}$

e)  $\frac{2\sqrt{x}}{\sqrt{x-3}}$

3. Convert each of the following decimals to a fraction of integers,

a) 1.037

b)  $0.78\overline{70}$

c)  $0.61\overline{8}$

4. Factor completely each of the following:

a)  $3x^2 - 7x - 6$

d)  $x^2 - 6x + 8$

g)  $30x - 3x^2 - 78$

b)  $13x + 2x^2 - 24$

e)  $3a^2 - 5a - 2$

h)  $5a^5 - 80a$

c)  $24x - 9x^2 - 16$

f)  $4b^2 - b - 5$

i)  $2x^2 - 12x + 8$

5. Solve each of the following equations. Make sure to check your solution(s).

a)  $2x^3 = 20x^2 + 1750x$

g)  $8x^3 = 50x^2$

b)  $\frac{3x+17}{2} = x-1 + \frac{x+19}{2}$

h)  $8p^3 = 50p$

c)  $|3-2x| + 2 = 5$

i)  $2 - (3-x)(2x+5) = (x-1)(2x-1)$

d)  $\frac{2}{3}(x-7) = \frac{4}{5}(x+1)$

j)  $x^2 = 4x + 1$

e)  $7x^2 + (x+3)(2x-1) = (3x+1)^2$

k)  $4x^2 + 20x + 7 = 0$

f)  $8a + 2a^2 = 42$

6. Solve each of the following systems of linear equations.

a)  $\begin{cases} 3x - 2y = 19 \\ 2x + y = 1 \end{cases}$

b)  $\begin{cases} 3x - y = 18 \\ y = 3(x+6) \end{cases}$

c)  $\begin{cases} (x+1)^2 + (y-2)^2 = x^2 + (3-y)^2 \\ \frac{1}{2}x - \frac{1}{3}y = -4 \end{cases}$

7. Simplify each of the following compound inequalities.

a)  $3 < a$  and  $a < -1$

c)  $-5 < w$  and  $w \leq 5$

e)  $m > -4$  and  $m \geq 7$

b)  $3 < a$  or  $a < -1$

d)  $-5 < w$  or  $w \leq 5$

f)  $m > -4$  or  $m \geq 7$

8. a) 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.

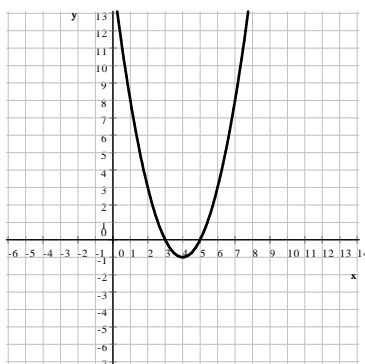
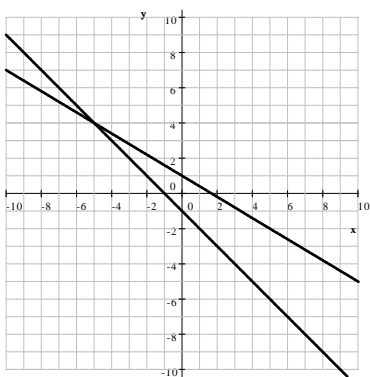
b) Graph the parabola  $y = -8x + x^2 + 15$ . Clearly label the coordinates of five points on the parabola, including vertex and intercepts.

9. Solve the following word problems.

- a) One side of a rectangle is 4 ft shorter than three times the other side. Find the sides if the perimeter is 64 ft.
- b) One side of a rectangle is 4 ft shorter than three times the other side. Find the sides if the area is  $84 \text{ ft}^2$ .
- c) 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  $319 \text{ in}^2$ .
- d) 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?
- e) We have some coins in a jar, all dimes and quarters. How many of each type of coins do we have if all together, we have 84 coins worth \$16.20?
- f) 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?

## Answers

1. a)  $\frac{-x+7}{x+3}$     b) 3    c)  $a$     d) 2    e)  $\frac{-2x+5}{x(x-1)}$     f)  $-4\sqrt{5}$     g)  $11-4\sqrt{7}$   
 h)  $-10+6\sqrt{3}$     i)  $\frac{15}{4}$     j)  $-\frac{3}{32}$     k)  $-\frac{27b^3}{8}$     l)  $-\frac{64b^4}{a^2}$
2. a)  $\frac{3}{\sqrt{5}}$     b)  $\sqrt{10}+3$     c)  $\frac{\sqrt{7}-1}{3}$     d)  $2+\sqrt{3}$     e)  $\frac{2x+6\sqrt{x}}{x-9}$
3. a)  $\frac{1037}{1000}$     b)  $\frac{7792}{9900}$     c)  $\frac{557}{900}$
4. a)  $3\left(x+\frac{2}{3}\right)(x-3)$     b)  $2(x+8)\left(x-\frac{3}{2}\right) = (x+8)(2x-3)$     c)  $-9\left(x-\frac{4}{3}\right)^2$   
 d)  $(x-2)(x-4)$     e)  $(a-2)(3a+1)$     f)  $(4b-5)(b+1)$     g)  $-3(x^2-10x+26)$   
 h)  $5a(a^2+4)(a+2)(a-2)$     i)  $2(x-3+\sqrt{5})(x-3-\sqrt{5})$
5. 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)  $\frac{-5+\sqrt{18}}{2}, \frac{-5-\sqrt{18}}{2}$
6. a)  $x=3, y=-5$     b) no solution    c)  $x=-4, y=6$
7. a) no solution    b) can not be simplified    c)  $-5 < w \leq 5$     d)  $\mathbb{R}$     e)  $m \geq 7$     f)  $m > -4$
8. a)  $(-5, 4)$



b)  $y$ -intercept:  $(0, 15)$ .    Vertex:  $(4, -1)$ .     $x$ -intercepts:  $(3, 0)$  and  $(5, 0)$ .  
 A few more points:  $(2, 3)$ ,  $(6, 3)$ ,  $(1, 8)$  and  $(7, 8)$

9. a) 9 ft and 23 ft    b) 6 ft and 14 ft    c) 11 in by 29 in  
 d) 33 ten-dollar bills and 56 five-dollar bills    e) 52 quarters and 32 dimes  
 f) \$7300 at 14% and \$2700 at 8%