

1. Completely factor each of the following.

a)  $3x^2 - 14x + 15$

c)  $24a^5 - 3a^2$

e)  $9x^2 - 12x + 8$

b)  $ax^2 - 18m - 9a + 2mx^2$

d)  $a^3x^2 - a^3y^2 - b^3x^2 + b^3y^2$

2. Simplify each of the following.

a)  $\frac{ax + ay - 2bx - 2by}{a - 2b}$

c)  $\frac{3x^2 - 3x}{x^2 - 25} \div \frac{x^2 + x - 2}{2x + 10}$

b)  $\frac{4x^2 + 9x + 2}{x^2 + 2x - 8} - \frac{x - 1}{x + 4}$

d)  $\frac{3x^4 - 3x}{x^2 + x + 1}$

3. Simplify each of the following.

a)  $16^{3/4}$

d)  $-16^{-3/4}$

g)  $-(-8)^{-1/3}$

b)  $16^{-3/4}$

e)  $(-16)^{3/4}$

h)  $(x^{2/3})^6$

c)  $-16^{3/4}$

f)  $8^{1/3}$

i)  $\frac{x^{1/2}x^{2/3}}{(x^{-1/12})^{-2}}$

4. Simplify each of the following.

a)  $\frac{\frac{1}{a} + \frac{1}{b}}{\frac{1}{b} - \frac{1}{a}}$

c)  $3\sqrt{4}(4\sqrt{6} + 2\sqrt{2})$

e)  $\frac{\sqrt{5}}{\sqrt{5} - 2}$

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

d)  $\frac{a^2 - 5a - 6}{a^2 - 10a + 16} - \frac{3}{a - 8}$

5. Solve each of the following equations. Make sure to check your solutions.

a)  $3x^2 - 7x = 0$

c)  $6x^2 + x^3 = 567x$

b)  $3x^2 - 7x = 1$

d)  $|3x + 1| - 3 = 5$

e)  $(2x - 1)(x - 2) + 7 = 4 - (3 - x)(x - 5)$

6. Solve the following system of linear equations.

$$3x - 2y = -5$$

$$3x + y = 7$$

7. Solve each of the following the inequalities

a)  $\frac{3 - 4x}{3} - \frac{2x - 3}{7} \geq -x + 7$

b)  $-4(x - 3) + 13 < 9$

c)  $(x - 3)^2 - (x + 1)^2 \leq 7$

8. If  $y = \frac{1}{2}x + 4$ , find the coordinates of the

a)  $x$ -intercept.

b)  $y$ -intercept.

9. a) Find an equation of the straight line that is parallel to  $y = 3x - 7$  and passes through the point  $(3, 11)$ .

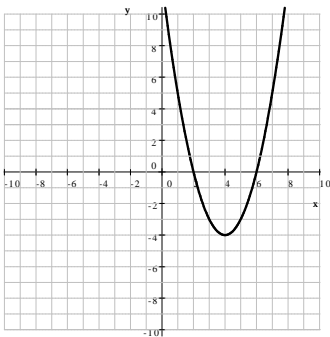
b) Find an equation of the straight line that is perpendicular to  $2x - 7y = 42$  and passes through the point  $(2, 2)$ .

c) Find an equation of the straight line that passes through the points  $(3, -8)$  and  $(-1, 0)$ .

10. Graph the parabola  $y = -8x + x^2 + 12$ . Clearly indicate the coordinates of five points, including vertex and intercepts.
11. There is a farm where chickens and cows live. There are 53 heads and 160 legs. How many chickens, how many cows?
12. The population of a town is currently 60 000. What would be the population after a year if during the next year, there will be a
  - a) 15% decrease
  - b) 15% increasein the population?
13. We invested \$3600 in two bank accounts. One account earns 5% interest per year, the other earns 3% interest per year. How much did we invest into each account if the combined interest of the two accounts was \$146 after one year?
14. The sum of two numbers is 27. Their difference is 11. Find these numbers.
15. Six times a number is sixteen less than the square of a number. Find this number.
16. One side of a rectangle is one meter shorter than four times another side. Find the sides if the area of the rectangle is  $60 \text{ m}^2$ .
17. The attendance in the camp was at first 300. Then, when half of the boys left the camp, the attendance dropped to 220. How many girls were at the camp?

## Answers

1. a)  $(3x - 5)(x - 3)$     b)  $(x + 3)(x - 3)(a + 2m)$     c)  $3a^2(2a - 1)(4a^2 + 2a + 1)$   
 d)  $(a - b)(a^2 + ab + b^2)(x + y)(x - y)$     e) doesn't factor
2. a)  $x + y$     b)  $\frac{3x}{x - 2}$     c)  $\frac{6x}{x^2 - 3x - 10} = \frac{6x}{(x - 5)(x + 2)}$     d)  $3x^2 - 3x = 3x(x - 1)$
3. a) 8    b)  $\frac{1}{8}$     c) -8    d)  $-\frac{1}{8}$     e) undefined    f) 2    g)  $\frac{1}{2}$     h)  $x^4$     i)  $x$
4. a)  $\frac{a + b}{a - b}$     b)  $\frac{4b^{10}}{9a^{10}}$     c)  $12\sqrt{2} + 24\sqrt{6}$     d)  $\frac{a}{a - 2}$     e)  $2\sqrt{5} + 5$
5. a)  $0, \frac{7}{3}$     b)  $\frac{7 + \sqrt{61}}{6}, \frac{7 - \sqrt{61}}{6}$     c) 21, 0, -27    d)  $-3, \frac{7}{3}$     e) -5, 2
6. (1, 4)
7. a)  $(-\infty, -9]$     b)  $(4, \infty)$     c)  $[\frac{1}{8}, \infty)$
8. a)  $(-8, 0)$     b)  $(0, 4)$
9. a)  $y = 3x + 2$     b)  $7x + 2y = 18$     c)  $y = -2x - 2$
10.  $y$ -intercept:  $(0, 12)$      $x$ -intercepts:  $(2, 0)$  and  $(6, 0)$     vertex:  $(4, -4)$ .  
 Additional points:  $(5, -3)$ ,  $(3, -3)$ ,  $(1, 5)$



11. 26 chickens and 27 cows
12. a) 51 000    b) 69 000
13. 1700 at 3% and 1900 at 5%
14. 8 and 19
15. -2 and 8
16. 4 m by 15 m
17. 140