

1. Simplify each of the following expressions.

$$(a) \frac{2ax - 3b - 3a + 2bx}{a^2 - b^2} \div \frac{x^2 - 2x - 3}{3b - 3a + ax - bx} =$$

$$(b) 3\sqrt{8} + 2\sqrt{18} - \sqrt{50} =$$

$$(c) (7 - 3\sqrt{2})^2 =$$

$$(d) (6 - 5\sqrt{2})(6 + 5\sqrt{2}) =$$

$$(e) \frac{2}{\sqrt{29} + 5} =$$

2. Multiply each of the following expressions.

$$(a) (2a - 3b)(5a + 2b) =$$

$$(b) (2x - 3)(5x + 2) =$$

$$(c) (2\sqrt{2} - 3)(5\sqrt{2} + 2) =$$

$$(d) (2\sqrt{5} - 3)(5\sqrt{5} + 2) =$$

3. Find the exact value of  $a^2 - 6a - 2$  if  $a = 3 - \sqrt{2}$

4. Completely factor each of the following expressions.

$$(a) 12ax - 4ay + 24bx - 8by =$$

$$(b) 3a^6b - 243a^2b =$$

$$(c) 2amxy - 2anxy + 6bmxxy - 6bnxy =$$

$$(d) 5a^2x - 5b^2x + 10a^2cx - 10b^2cx =$$

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

$$(a) x^3 = 12x^2 + 3213x$$

$$(b) 3|x + 3| - 5 = 10$$

$$(c) 2x^2 - 32x = 0$$

$$(d) \left| \frac{1}{3}x - 2 \right| + 1 = 3$$

$$(e) x^2 + 11 = 8x$$

6. Solve each of the following formulas.

$$(a) PV = nRT \text{ for } T$$

$$(b) A = \frac{1}{2}h(B + b) \text{ for } h$$

$$(c) 2x + 3y = 12 \text{ for } y$$

7. Graph the straight lines determined by the equations  $3x + 2y = 6$  and  $x + y = 4$ .
- Use your graph to find the coordinates of the point where the lines intersect.
  - Use algebraic methods to check your answer.
8. Graph the straight lines determined by the equations  $y = 2x - 6$  and  $y = -2x + 6$  in the same coordinate system. What symmetry do you notice? Can you explain it?
9. Find the equation of the straight line if
- The line passes through the points  $(2, 7)$  and  $(4, 1)$ .
  - The line passes through  $(-6, 2)$  and is perpendicular to the line  $2x + 3y = 5$ .
10. There is a farm where chickens and cows live. There are 79 heads and 262 legs. How many chickens, how many cows?
11. Fraction Problems.
- Find  $\frac{2}{7}$  of 56.
  - 15 is what fraction of 70?
  - $\frac{3}{8}$  of a number is 48. Find this number.
12. Basic Percent Problems.
- Find 14% of 1500.
  - 135 is what percent of 500?
  - 8% of what number is 240?
13. 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
- 15% decrease
  - 15% increase in the population?
14. We invested \$ 5000 in two bank accounts. One account earns 5% interest per year, the other earns 8% interest per year. How much did we invest into each account if the combined interest of the two accounts was \$ 337 after one year?
15. A coat went on an 18% sale. The sale price is \$ 328. Find the original price.
16. Sally got a 6% raise. Now she is making \$ 2650 per month. How much was she making before the raise?
17. The sum of two numbers is 27. Their difference is 11. Find these numbers.