

## Language of Polynomials

*Polynomials* are expressions made up of one or more terms. The terms are connected by addition or subtraction. For example,  $4x^2 - 8x + 2$  has three terms. Some polynomials have specific names depending on the number of terms that are included:

- A *monomial* has one term.
- A *binomial* has two terms.
- A *trinomial* has three terms.

To find the degree of a term, add the exponents of its variables.

Polynomials have a degree the same as the highest degree term.  $7b^2 + 3b - 11$  has degree 2 because the highest degree term,  $7b^2$ , has degree 2.

1. For each expression, state whether it is a monomial (M), binomial (B), or trinomial (T). Then, identify the polynomial's degree.
  - a)  $x^2 - 2x + 5$
  - b)  $3y^2 - 9y$
  - c)  $11c + 14$
  - d)  $24d^2$
2. Create a polynomial that meets these conditions:
  - contains two variables
  - has three terms
  - is of degree 2

## Equivalent Expressions

Like terms differ only by their numerical coefficients. Like terms can be combined. Unlike terms cannot be combined.

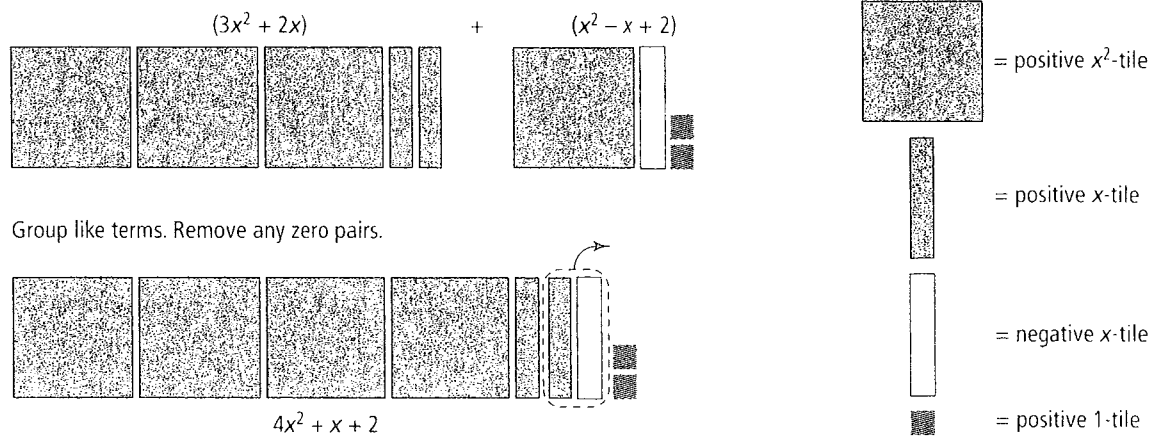
Like terms:  $3x$  and  $-5x$  can be combined as  $-2x$ .  
 $-4k^2$  and  $0.5k^2$  can be combined as  $-3.5k^2$ .

Unlike terms:  $2t$  and  $t^2$  cannot be combined.  
 $-pq$  and  $6p$  cannot be combined.

3. Which of the following expressions are equivalent to  $3n^2$ ?
  - a)  $3n + n$
  - b)  $2n^2 + n^2$
  - c)  $4n^2 - 1$
  - d)  $-7n^2 + 10n^2$
4. Simplify by collecting like terms.
  - a)  $x^2 - 6x + 2x^2 + 5$
  - b)  $4p^2 - 2p + p + 2 - p^2$

## Using a Model to Add and Subtract Polynomials

You can model adding or subtracting polynomials to help simplify the expression.



5. Add the polynomials, using models.

a)  $(5x - 7) + (2x - 3)$

b)  $(2t^2 - 5) + (3t + 6)$

6. Subtract the polynomials, using models.

a)  $(2s - 4) - (2s + 3)$

b)  $(-y^2 + 3y - 2) - (-2y^2 - 2y)$

## Using Opposites to Subtract Polynomials

To subtract polynomials, you can add the opposite. The opposite of a polynomial is found by taking the opposite of each term. For example, the opposite of  $(2x^2 + 3x - 7)$  is  $(-2x^2 - 3x + 7)$ .

$$\begin{aligned} (4x^2 + x + 2) - (2x^2 + 3x - 7) &= (4x^2 + x + 2) + (-2x^2 - 3x + 7) \\ &= 4x^2 - 2x^2 + x - 3x + 2 + 7 \\ &= 2x^2 - 2x + 9 \end{aligned}$$

7. Subtract the polynomials.

a)  $(5x^2 + 3x - 7) - (2x^2 - 5x + 3)$

b)  $(2y^2 + 3y - 3) - (2y^2 + 4y + 6)$

## 5.3 Adding and Subtracting Polynomials

MathLinks 9, pages 190–199

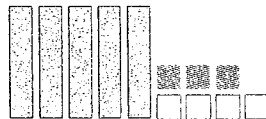
### Key Ideas Review

1. Which equation does the algebra tile model represent? \_\_\_\_\_

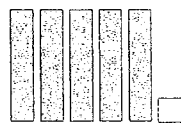
A  $(4x - 4) + (x + 3) = 5x - 1$



B  $(4x + 4) - (-x + 3) = 5x + 1$



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



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

2. One word can replace the question marks in the following sentences: The ? of a polynomial is found by taking the ? of each of the terms. To subtract polynomials, you can add the ?.

The word is \_\_\_\_\_.

### Check Your Understanding

3. Add the polynomials.

a)  $(6y - 4) + (2y + 2)$

b)  $(b^2 + 5) + (-2b^2 - 3)$

c)  $(-3s^2 + 7s) + (-s^2 - 6)$

4. Perform the indicated operation. Then, simplify by combining like terms.

a)  $(8 + 5d) + (-d - 9)$

b)  $(-4m^2 - 4) + (-2m^2 - 1)$

c)  $(-6r^2 + 3r - 7) + (5r^2 - 2r - 2)$

5. Which of the statements do the algebra tiles represent? \_\_\_\_\_



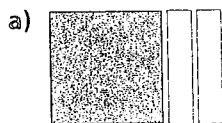
A  $(x^2 + x - 3) + (x^2 - 2x + 3)$

B  $(x^2 + x - 3) + (-x^2 - 2x + 3)$

C  $(x^2 - x - 3) + (-x^2 - 2x + 3)$

D  $(x^2 + x + 3) + (-x^2 - 2x + 3)$

6. Give the opposite of the expression. Express your answer using both diagrams and symbols.



7. What is the opposite of each expression?

a)  $-3y^2$

b)  $6g - 3$

c)  $2b^2 - 4b + 7$

d)  $-4d^2 - 3d - 6$

e)  $-k^2 - 8k + \frac{1}{2}$

8. Change the subtraction operation to adding the opposite. Then, combine like terms.

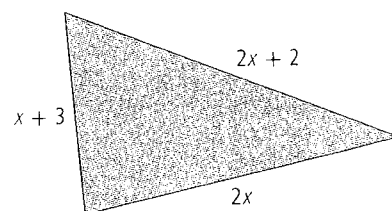
a)  $(3r - 5) - (5r + 2)$

b)  $(6 - 3f) - (4 - 5f)$

c)  $(-4n^2 + 5) - (-n^2 - 9)$

d)  $(6a^2 + 2a - 5) - (4a^2 + 5a + 7)$

9. Consider the triangle below.



- a) Write the unsimplified expression for the perimeter.
- b) Simplify the expression from part a) by combining like terms.
- c) If the perimeter of the triangle is 25 cm, calculate the value of  $x$ . Verify that your answer is correct.

10. José, Tyler, and Mike split some money they made working on the weekend. They each worked a different number of hours, so they have to split the money fairly. José receives twice the amount that Tyler receives, and Mike receives \$10 less than Tyler. Let  $x$  represent the amount that Tyler receives.

- a) Write the expression that represents the total amount that they receive.

- b) Simplify the expression in part a) by combining like terms.