2.5b Algebraic Expressions

Parts of an algebraic expression are called terms. **Like terms** are terms that have the same variables raised to the same exponents. A term without a variable, such as 4, is called a *constant*. Constant terms are also like terms.

Like Terms	Unlike Terms
3 and -4	x and 5
$-2x$ and $7x$	$2x$ and $-6y$

EXAMPLE 1 Identifying Terms and Like Terms

Identify the terms and like terms in each expression.

a. $9x - 2 + 7 - x$

$$9x - 2 + 7 - x$$

Terms: $9x$, -2, 7, $-x$

Like terms: $9x$ and $-x$, -2 and 7

> Same variable raised to same exponent

b. $6 + 5z - 3z + z$

$$6 + 5z - 3z + z$$

Terms: 6, $5z$, $-3z$, z

Like terms: $5z$, $-3z$, and z

Remember

The numerical factor of a term that contains a variable is a *coefficient*.

An algebraic expression is in **simplest form** if it has no like terms and no parentheses. To *combine* like terms that have variables, use the Distributive Property to add or subtract the coefficients.

EXAMPLE 2 Simplifying Algebraic Expressions

Simplify $\frac{3}{4}y + 12 - \frac{1}{2}y - 6$.

$\frac{3}{4}y$ and $-\frac{1}{2}y$ are like terms. 12 and -6 are also like terms.

$$\frac{3}{4}y + 12 - \frac{1}{2}y - 6 = \frac{3}{4}y - \frac{1}{2}y + 12 - 6 \qquad \text{Commutative Property of Addition}$$

$$= \left(\frac{3}{4} - \frac{1}{2}\right)y + 12 - 6 \qquad \text{Distributive Property}$$

$$= \frac{1}{4}y + 6 \qquad \text{Simplify.}$$

Practice

Identify the terms and like terms in the expression.

1. $y + 10 - \frac{3}{2}y$

2. $2r + 7r - r - 9$

3. $7 + 4p - 5 + p + 2q$

Simplify the expression.

4. $2.5x + 4.3x - 5$

5. $\frac{3}{8}b - \frac{3}{4}b$

6. $14 - 3z + 8 + z$

Multi-Language Glossary at BigIdeasMath.com.

EXAMPLE 3   Standardized Test Practice

Which expression is equivalent to $5(n - 8) + 4n$?

Ⓐ $49n$ Ⓑ $9n + 40$ Ⓒ $9n - 40$ Ⓓ $5n - 40$

$5(n - 8) + 4n = 5(n) - 5(8) + 4n$	Distributive Property
$= 5n - 40 + 4n$	Multiply.
$= 5n + 4n - 40$	Commutative Property of Addition
$= (5 + 4)n - 40$	Distributive Property
$= 9n - 40$	Add coefficients.

∴ The correct answer is Ⓒ.

EXAMPLE 4   Real-Life Application

Evening Tickets $7.50

REFRESHMENTS

Drinks
Small $1.75
Medium $2.75
Large $3.50

Popcorn
Small $3.00
Large $4.00

Each person in a group buys a ticket, a medium drink, and a large popcorn. Write an expression in simplest form that represents the amount of money the group spends at the movies.

Words   Each ticket is $7.50, each medium drink is $2.75, and each large popcorn is $4.

Variable   The same number of each item is purchased. So, x can represent the number of tickets, the number of medium drinks, and the number of large popcorns.

Expression $7.50\,x$ + $2.75\,x$ + $4\,x$

$7.50x + 2.75x + 4x = (7.50 + 2.75 + 4)x$	Distributive Property
$= 14.25x$	Add coefficients.

∴ The expression $14.25x$ represents the amount of money the group spends at the movies.

Study Tip

In Example 4, rewriting $7.50x + 2.75x + 4x$ as $14.25x$ helps you conclude that the total cost per person is $14.25.

● **Practice**

Simplify the expression.

7. $3(q + 1) - 1$

8. $7x + 4\left(\dfrac{3}{4}x - \dfrac{1}{4}\right)$

9. $2(g + 4) + 5(g - 1)$

10. WHAT IF? In Example 4, each person buys a ticket, a large drink, and a small popcorn. How does the expression change? Explain.