

2.3

Simplifying Variable Expressions

Goal: Simplify variable expressions.

Vocabulary

Terms of an expression:

The parts of an expression that are added together are called terms.

Coefficient of a term:

The coefficient of a term with a variable is the number part of the term.

Constant term:

A constant term has a number but no variable.

Like terms:

Like terms are terms that have identical variable parts.

Example 1 Identifying Parts of an Expression

Identify the terms, like terms, coefficients, and constant terms of the expression $5 - 2x - 3 + x$.

Solution

1. Write the expression as a sum: $5 + (-2x) + (-3) + x$.

2. Identify the parts of the expression. Note that because $x = 1x$, the coefficient of x is 1 .

Terms: $5, -2x, -3, x$

Like terms: 5 and -3 ; $-2x$ and x

Coefficients: $-2, 1$

Constant terms: $5, -3$

✔ **Checkpoint** Identify the terms, like terms, coefficients, and constant terms of the expression.

1. $4y - 6 + 3y$

Terms: $4y, -6, 3y$

Like terms: $4y$ and $3y$

Coefficients: $4, 3$

Constant term: -6

2. $9 + w - 5 - 8w$

Terms: $9, w, -5, -8w$

Like terms: 9 and -5 ;
 w and $-8w$

Coefficients: $1, -8$

Constant terms: $9, -5$

Example 2 Simplifying an Expression

$$\begin{aligned}
5m + 8 - 3m - 7 &= 5m + 8 + (-3m) + (-7) && \text{Write as a sum.} \\
&= 5m + (-3m) + 8 + (-7) && \text{Commutative property} \\
&= [5 + (-3)]m + 8 + (-7) && \text{Distributive property} \\
&= 2m + 1 && \text{Simplify.}
\end{aligned}$$

Example 3 Simplifying Expressions with Parentheses

a. $3(x + 2) - x + 9 = 3x + 6 - x + 9$ Distributive property
 $= 3x - x + 6 + 9$ Group like terms.
 $= 2x + 15$ Combine like terms.

b. $2k - 5(k + 4) = 2k - 5k - 20$ Distributive property
 $= -3k - 20$ Combine like terms.

c. $5a - (5a - 7) = 5a - 1(5a - 7)$ Identity property
 $= 5a - 5a + 7$ Distributive property
 $= 0 + 7$ Combine like terms.
 $= 7$ Simplify.

Checkpoint Simplify the expression.

3. $4y - 6 + 3y$ $7y - 6$	4. $9 + w - 5 - 8w$ $-7w + 4$
5. $4(x - 1) - 2x - 7$ $2x - 11$	6. $-6(k + 3) + 5k$ $-k - 18$