Introduction

Thoughts or feelings in language are often conveyed through expressions; however, mathematical ideas are conveyed through **algebraic expressions**.

Algebraic expressions are **mathematical statements** that include numbers, operations, and variables to represent a number or quantity.

Variables are letters used to represent values or unknown quantities that can change or vary. One example of an algebraic expression is $3x - 4$. Notice the variable, x.

Key Concepts

- Expressions are made up of **terms**. A term is a **number**, a **variable**, or the product of a number and variable(s). An **addition** or **subtraction** sign separates each term of an expression.
- In the expression $4x^2 + 3x + 7$, there are 3 terms: $4x^2$, $3x$, and 7.
- The **factors** of each term are the numbers or expressions that when multiplied produce a given product. In the example above, the factors of $4x^2$ are **4** and $\boldsymbol{x^2}$. The factors of $3x$ are **3** and $\boldsymbol{x}$.

Key Concepts, *continued*

- 4 is also known as the **coefficient** of the term $4x^2$. A coefficient is the number multiplied by a variable in an algebraic expression. The coefficient of $3x$ is 3.
- The term $4x^2$ also has an **exponent**. Exponents indicate the number of times a factor is being **multiplied** by itself. In this term, **2** is the exponent and indicates that x is multiplied by itself 2 times.
- Terms that do not contain a variable are called **constants** because the quantity does not change. In this example, **7** is a constant.

Key Concepts, *continued*

Expression	$4x^2 + 3x + 7$		
Terms	$4x^2$	$3x$	7
Factors	4 and x^2	3 and x	
Coefficients	4	3	
Constants			7

Key Concepts, *continued*

- Terms with the same variable raised to the same exponent are called **like terms**. In the example $5x + 3x - 9$, $5x$ and $3x$ are like terms. Like terms can be combined following the **order of operations** by evaluating grouping symbols, evaluating exponents, completing multiplication and division, and completing addition and subtraction from left to right. In this example, the sum of $5x$ and $3x$ is $\mathbf{8x}$.

Common Errors/Misconceptions

- incorrectly following the order of operations
- incorrectly identifying like terms
- incorrectly combining terms involving subtraction

Example 2

2 times a number plus 5 is 27.

1. Translate the verbal expression into an algebraic expression.

2. Identify all terms

3. Identify the factors.

4. Identify all coefficients.

5. Identify any constants.

Example 2

2 times a number plus 5 is 27.

Expression		
Terms		
Factors		
Coefficients		
Constants		

Guided Practice

Example 2

A smartphone is on sale for 25% off its list price. The sale price of the smartphone is $149.25. What expression can be used to represent the list price of the smartphone? Identify each term, coefficient, constant, and factor of the expression described.

Guided Practice: Example 2, *continued*

1. Translate the verbal expression into an algebraic expression.

Let x represent the unknown list price. Describe the situation. The list price is found by adding the discounted amount to the sale price:

sale price + discount amount

The discount amount is found by multiplying the discount percent by the unknown list price. The expression that represents the list price of the smartphone is $149.25 + 0.25x$.

Guided Practice: Example 2, *continued*

2. Identify all terms.

There are two terms described in the expression: the sale price of $149.25, and the discount of 25% off the list price, or 149.25 and 0.25*x*.

Guided Practice: Example 2, *continued*

3. Identify the factors.

$0.25x$ is the product of the factors 0.25 and x.

Guided Practice: Example 2, *continued*

4. Identify all coefficients.

0.25 is multiplied by the variable, x; therefore, 0.25 is a coefficient.

Guided Practice: Example 2, *continued*

5. Identify any constants.

The number that does not change in the expression is 149.25; therefore, 149.25 is a constant.

Guided Practice: Example 2, *continued*

Expression		
Terms		
Factors		
Coefficients		
Constants		

Guided Practice

Example 3

Helen purchased 3 books from an online bookstore and received a 20% discount. The shipping cost was $10 and was not discounted. Write an expression that can be used to represent the total amount Helen paid for 3 books plus the shipping cost. Identify each term, coefficient, constant, and factor of the expression described.

Guided Practice: Example 3, *continued*

1. Translate the verbal expression into an algebraic expression.

Let x represent the unknown price. The expression used to represent the total amount Helen paid for the 3 books plus shipping is $3x - 0.20(3x) + 10$.

Guided Practice: Example 3, *continued*

2. Simplify the expression.

The expression can be simplified by following the order of operations and combining like terms.

$3x - 0.20(3x) + 10$	Multiply 0.20 and $3x$.
$3x - 0.60x + 10$	Combine like terms: $3x$ and $-0.60x$.
$2.4x + 10$	

Guided Practice: Example 3, *continued*

3. Identify all terms.

There are two terms in the described expression: the product of 2.4 and x, and the shipping charge of $10: $2.4x$ and 10.

Guided Practice: Example 3, *continued*

4. Identify the factors.

$2.4x$ is the product of the factors 2.4 and x.

Guided Practice: Example 3, *continued*

5. Identify all coefficients.

2.4 is multiplied by the variable, x; therefore, 2.4 is a coefficient.

Guided Practice: Example 3, *continued*

6. Identify any constants.

The number that does not change in the expression is 10; therefore, 10 is a constant.

Guided Practice: Example 3, *continued*

Expression		
Terms		
Factors		
Coefficients		
Constants