

Multiplying Monomials and Binomials

by Sophia



WHAT'S COVERED

In this lesson, you will learn how to multiply a monomial by a binomial. Specifically, this lesson will cover:

1. Distribution Review

Multiplying a monomial into a binomial or other polynomial is a lot like distribution. All of the factors of the monomial are multiplied into each term of the polynomial. Before we complicate things with several variables and exponents, let's briefly review a simple distribution problem.

→ EXAMPLE Distribute $2(x+5)$.

$2(x+5)$ Distribute 2 into each term in the parentheses

$2 \cdot x + 2 \cdot 5$ Evaluate the multiplication

$2x + 10$ Our solution

2. Multiplying a Monomial by a Monomial

When we multiply two terms that contain different coefficients, variables, or powers, we need to make sure that all coefficients are multiplied together, and if the variables are the same, we can increase the exponent power. If variables are not the same, we just write them next to each other to show they have been multiplied.

→ EXAMPLE Multiply $2x \cdot 3x^2$.

$2x \cdot 3x^2$ Multiply the coefficients 2 and 3 together

$6x \cdot x^2$ Multiply the x terms together by adding their exponents

$6x^3$ Our solutions

→ EXAMPLE Multiply $-2x^4 \cdot 7y$.

$$-2x^4 \cdot 7y$$

Multiply the coefficients -2 and 7 together

$$-14x^4 \cdot y$$

Since they are not the same variable, write x^4 and y next to each other to show they have been multiplied.

$$-14x^4y$$

Our solution

3. Multiplying a Monomial by a Binomial

Finally, let's see how we can use the distribute rule and our process for multiplying coefficients and variables with a more complicated example:

➔ EXAMPLE Multiply $3y(2xy + y^2)$.

$$3y(2xy + y^2)$$

Distribute $3y$ into each term in the parentheses

$$3y \cdot 2xy + 3y \cdot y^2$$

Evaluate the multiplication

$$6xy^2 + 3y^3$$

Our solution



SUMMARY

To multiply monomials and binomials, it is helpful to have a **distribution review**. Recall that when distributing, we multiply the term outside the parentheses by each term inside the parentheses. This is the same as doing each multiplication separately. When **multiplying a monomial by a monomial**, multiply the coefficients and then multiply the variables. When multiplying variables that are the same, use the product of powers property to add the exponents. When **multiplying a monomial by a binomial**, multiply the factors of the monomial into each term of the binomial. Remember that polynomials are written in standard form when the terms are in order by degree from largest to smallest.

Source: ADAPTED FROM "BEGINNING AND INTERMEDIATE ALGEBRA" BY TYLER WALLACE, AN OPEN SOURCE TEXTBOOK AVAILABLE AT www.wallace.ccfaculty.org/book/book.html. License: Creative Commons Attribution 3.0 Unported License