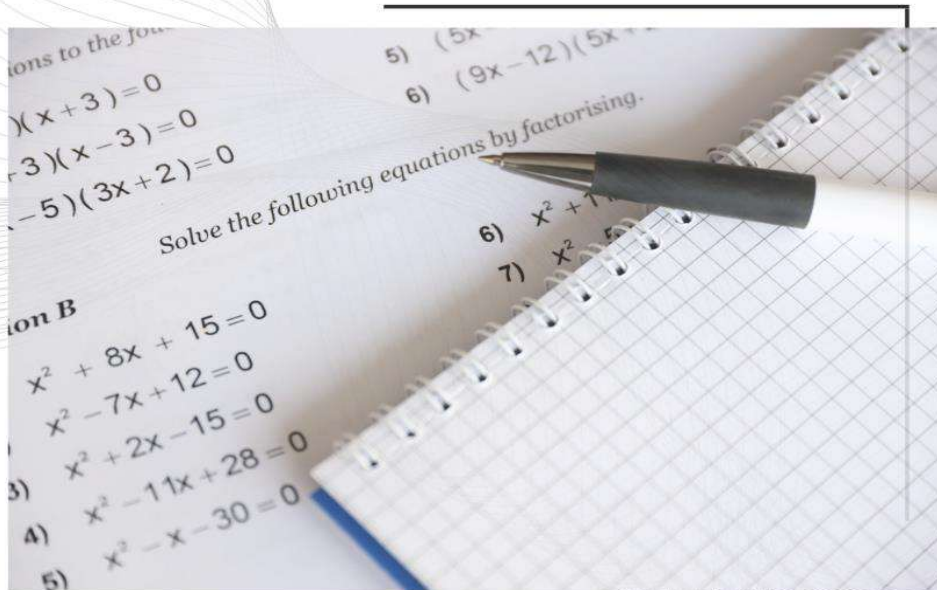


LEARNING MODULE 6

Multiplying Simple Monomials and Binomials with Simple Binomials with Simple Binomials and Multinomials, Using the Distributive Property with Various Techniques and Models



GRADE-8

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MULTIPLYING SIMPLE MONOMIALS AND BINOMIALS WITH SIMPLE BINOMIALS AND MULTINOMIALS, USING THE DISTRIBUTIVE PROPERTY WITH VARIOUS TECHNIQUES AND MODELS

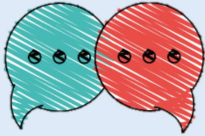
Welcome, grade 8 students, to our exciting journey into the world of multiplying monomials and binomials! Throughout this course, we'll embark on an adventure where we'll learn how to multiply these mathematical expressions using the distributive property. You'll discover various techniques and models to make this process clearer and more manageable. Together, we'll dive into exercises and activities to help you master this fundamental skill. Get ready to flex your math muscles and unlock the power of multiplication!



Learning Objectives:

At the end of this module, students will be able to:

- recall the concepts involved in multiplying simple monomials and binomials with simple binomials and multinomials using the distributive property with various techniques and models;
- enumerate the procedural steps involved in multiplying simple monomials and binomials with simple binomials and multinomials using the distributive property with various techniques and models; and
- demonstrate accuracy in identifying the correct steps involved and methods in multiplying simple monomials and binomials with simple binomials and multinomials using the distributive property with various techniques and models.



Let's start by understanding what these terms mean.

Concepts to Define:

1. Monomials: Monomials are algebraic expressions with only one term, like $5x$ or $-3y$.
2. Binomials: A binomial is defined as an algebraic expression consisting of two terms that are separated by the arithmetic signs, either the addition sign (+) or the subtraction sign (-).
3. Trinomials: A trinomial is defined as an algebraic expression consisting of three terms separated by arithmetic symbols/signs, either the addition sign (+) or the subtraction sign (-).
4. Multinomials: An algebraic expression that contains at least two terms is called a multinomial.
5. Distributive Property: This rule allows us to multiply a term outside parentheses by each term inside the parentheses.

$$a(b \pm c) = ab \pm ac \text{ for all terms } a, b, c$$



What is Multiplying Monomials using Distributive Property?

Multiplying monomials is a method for multiplying a monomial with other polynomials. The monomial is multiplied with the individual terms of the polynomial and then simplified further to get the resultant polynomial. To multiply polynomials, the coefficient is multiplied with a coefficient, and the variable is multiplied with a variable.



$$\begin{aligned} (x)(ax) &= ax^2 \\ (x)(a+b) &= ax + bx \\ (x)(a+b+c) &= ax + bx + cx \end{aligned}$$

- **Monomial by a Binomial**

When multiplying a monomial by a binomial, we follow the distributive law of multiplication.

$$(x)(a+b) = ax + bx$$

- **Monomial by a Trinomial (Multinomial)**

A trinomial is defined as an algebraic expression consisting of three terms separated by arithmetic symbols/signs, either the addition sign (+) or the subtraction sign (-). When multiplying a monomial by a trinomial, we follow the distributive law of multiplication.

$$(x)(a+b+c) = ax + bx + cx$$

How to Multiply Binomials?

Multiplying binomials is similar to the multiplication of any 2-digit number but uses the concept of multiplication of algebraic expressions. The terms of one binomial are multiplied by the terms of the other binomial. After this step, the algebraic sum of these products is taken. Let us learn about the different methods that are used to multiply binomials.



- **Multiplying Binomial using Distributive Property**

One of the methods for multiplying binomials is using the distributive property of multiplication twice. This method is also known as the Horizontal Distributive Method. This method can be applied to any polynomial multiplication.

By binomials:

$$(x+y)(a+b) = x(a+b) + y(a+b) = (ax+bx) + (ay+by)$$

By multinomials:

$$(x+y)(a+b+c) = x(a+b+c) + y(a+b+c) = (ax+bx+cx) + (ay+by+cy)$$

- **Multiplying Binomials Using the FOIL Method**

The word **FOIL** denotes F - First, O - Outer, I - Inner, and L - Last. This method of multiplying binomials is restricted to **binomials only** and hence not applicable to all polynomial multiplications. The general form of the FOIL formula is:

$$(a+b)(c+d) = ac + ad + bc + bd$$

- **Multiplying Binomials Using the Vertical Method**

Multiplying binomial using the vertical method is quite similar to the vertical multiplication of whole numbers. This method applies to all polynomial multiplications.

$$\begin{array}{r} x + a \\ x + b \\ \hline bx + ab \\ x^2 + ax \\ \hline x^2 + ax + bx + ab \end{array}$$



- Multiplying Binomials Using the Box Method Area Model:** The Box Method Area Model for multiplying binomials is a visual technique where a rectangle is divided into smaller boxes to represent each term of the binomials. By multiplying the values in each box and summing them up, we can find the products of the binomials.

	a	b
c	ac	bc
d	ad	bd

$$= ac + bc + ad + bd$$