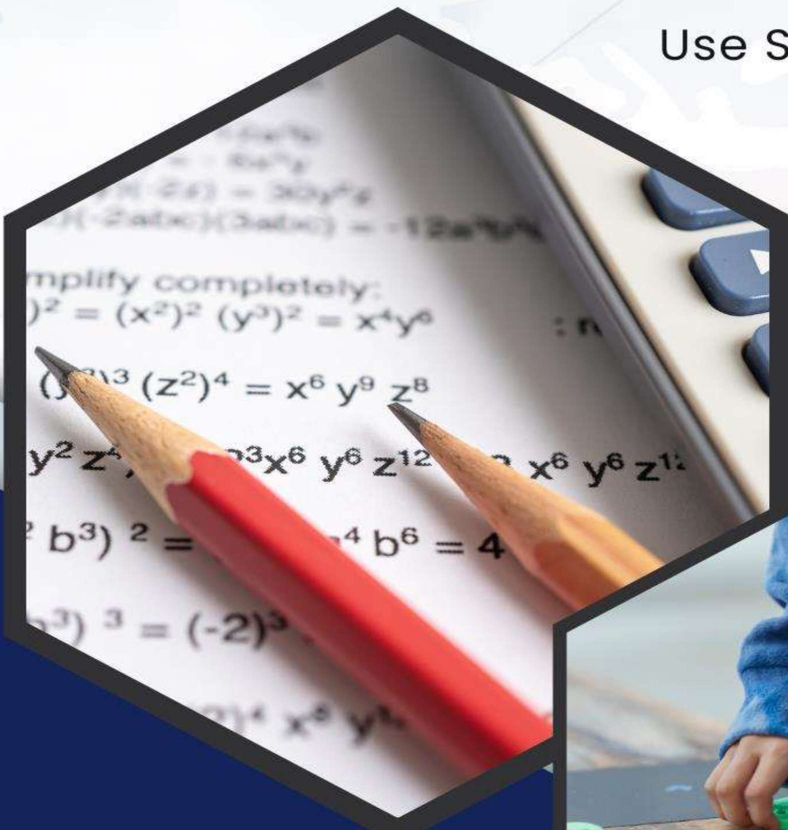
TAILORED LEARNING, PERSONALIZED PROGRESS

GRADE 8

LEARNING MODULE 7

Use Special Product Patterns To Multiply Binomials



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USE SPECIAL PRODUCT PATTERNS TO MULTIPLY BINOMIALS.

Welcome, Grade 8 learners!

Throughout this course, we'll embark on a journey exploring these fascinating mathematical concepts. Get ready to uncover the secrets behind these special patterns and learn how to apply them to multiply binomials effortlessly. We'll break down each step, making sure you understand the ins and outs of this important skill. Through interactive examples, practice problems, and engaging activities, you'll become a pro at using these patterns in no time. mathematical adventure together!

Learning Objectives:

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

1. recall and identify at least three special product patterns used to multiply binomials;
2. explain the correct application of special product patterns in multiplying binomials; and
3. appreciate the significance of special product patterns in simplifying the multiplication of

Definition of Important Terms and Process

- **FOIL Method –** First-Outer-Inner-Last (FOIL) is an acronym for the order of multiplying terms in a product of two binomials. It is a shortcut to multiplying binomials, rather than using the distributive property twice.

"FOIL" means multiply the
First,
Outer,
Inner,
Last
terms in the multiplication of two binomials.

- Binomial - A binomial is a polynomial with two terms.

Example:

$$\underbrace{5y^3 - 3}_{\text{2 terms}}$$

- Product - is the result we get after multiplying.

In Algebra xy means x multiplied by y

And (a+b)(a−b) means (a+b) multiplied by (a−b).

- Special Binomial Products - when we multiply binomials, we get Binomial Products and there are three special cases of it.

Three Special Cases of Multiplying Binomials and Their Patterns

Let a be the first term in the expression and b be the second term.

1. **Square of a Sum (Add times Add)**

When we square a binomial with a plus sign,

$$(a+b)^2 = (a+b)(a+b) = ?$$

the result is

$$(a+b)^2 = a^2 + 2ab + b^2,$$

and it is a "***perfect square trinomial***."

Therefore, to solve this, we will need to get the sum of the square of the first term, twice the product of the first and last term, and the square of the last term.

Example:

$$(x+3)^2 = ?$$

Let a = x (first term) and b = 3 (second term). Substitute into $a^2 + 2ab + b^2$.

$$= (x)^2 + 2(x)(3) + (3)^2$$

$$(x+3)^2 = x^2 + 6x + 9$$

2. **Square of a Difference (Subtract Times Subtract)**

When we square a binomial with a minus sign,

$$(a-b)^2 = (a-b)(a-b) = ?$$

the result is

$$(a-b)^2 = a^2 - 2ab + b^2$$

and it is also a "***perfect square trinomial***."

Therefore, to solve this, we will get the square of the first term minus twice the product of the first and last term plus the square of the last term.

Example:

$$(y-5)^2 = ?$$

Let a = y (first term) and b = 5 (second term). Substitute into $a^2 - 2ab + b^2$.

$$= (y)^2 - 2(y)(5) + (5)^2$$

$$(y-5)^2 = y^2 - 10y + 25$$

3. **Product of the Sum and Difference (Add Times Subtract)**

When we multiply two binomials with different signs, i.e. plus and minus signs,

$$(a+b)(a-b) = ?$$

the result is

$$(a+b)(a-b) = a^2 - b^2$$

And it is called the "***difference of two squares***" (the two squares are a^2 and b^2).

Note:

If (a−b) comes first than (a+b), the answer is still the same.

$$(a-b)(a+b) = a^2 - b^2$$

Therefore, to solve this, we will only need to get the difference between the square of the first term and the square of the last term.

Example:

$$(y+5)(y-5) = ?$$

Let a = y (first term) and b = 5 (second term). Substitute into $a^2 - b^2$.

$$= (y)^2 - (5)^2$$

$$(y+5)(y-5) = y^2 - 25$$

REMEMBER

- $(a+b)^2 \neq a^2 + b^2$
- $(a-b)^2 \neq a^2 - b^2$
- Squaring a binomial creates a **perfect square trinomial**.
- Two binomials are conjugates when they have the same terms but opposite signs in the middle such as the 'Product of Sum and Difference.' Hence, they are called "**binomial conjugates.**"
- The product of conjugate binomial pairs, $(a+b)(a-b) = a^2 - b^2$, produces the **difference of perfect squares**.