Multiplication of algebraic expressions

Understanding of Multiplication of Algebraic Expressions

- Multiplication of algebraic expressions means multiplying variables, constants, and terms following mathematical rules.
- Multiply the coefficients (numbers) together and apply the laws of exponents to the variables.
- When multiplying variables with the same base, add their powers.

Important Points

- Multiply coefficients (numbers) directly.
- **Add exponents of like variables using the law:** $a^m \times a^n = a^{m+n}$
- Always arrange the terms in standard form (highest degree first).
- Multiplication can be between two monomials, a monomial and a binomial, or two polynomials.

Examples with Solutions

Example: Multiplying Two Monomials

➢ **Multiply: $3x \times 4x^2$**

Solution: Multiply coefficients: $3 \times 4 = 12$

Add powers of x: $x^1 \times x^2 = x^3$

Answer: $12x^3$

Example: Multiplying a Monomial and a Binomial

➢ **Multiply: $5a \times (3a + 2)$**

Solution: $5a \times 3a = 15a^2$

$5a \times 2 = 10a$

Answer: $15a^2 + 10a$

Example: Multiplying Two Binomials (Using distributive property)

➢ **Multiply: $(x + 3)(x + 5)$**

Solution: $x \times x = x^2$

$x \times 5 = 5x$

$3 \times x = 3x$

$3 \times 5 = 15$

Add all: $x^2 + 5x + 3x + 15$

Combine like terms: $x^2 + 8x + 15$

Example: Multiplying a Monomial and a Trinomial

➢ **Multiply: $2m \times (m^2 + 3m + 4)$**

Solution: $2m \times m^2 = 2m^3$

$2m \times 3m = 6m^2$

$2m \times 4 = 8m$

Answer: $2m^3 + 6m^2 + 8m$

Example: Multiplication with Different Variables

➢ **Multiply: $2x \times 3y$**

Solution: Multiply coefficients: $2 \times 3 = 6$

Variables stay as they are: $x \times y = xy$

Answer: $6xy$

Summary Points

- Multiply numbers (coefficients) normally.
- **Apply exponent laws for variables:** add the powers if the base is same.
- Use distributive property when multiplying binomials or larger expressions.
- Always arrange the final expression neatly.
- Be careful with the signs while multiplying positive and negative terms.