Division Of Algebraic Expressions

Understanding of Division of Algebraic Expressions

- Division of algebraic expressions means dividing one algebraic expression by another.
- When dividing, divide the coefficients and apply the laws of exponents for variables.
- If variables with the same base are divided, subtract the powers: $a^m \div a^n = a^{m-n}$

Important Points

- Divide the numerical coefficients normally.
- Subtract the powers of variables with the same base.
- Arrange variables properly in the final expression.
- Watch out for division by 0 — it is undefined.
- Simplify the final expression fully.

Examples with Solutions

Example: Simple Division of Monomials

➢ **$8x^3 \div 2x$**

Solution: Divide coefficients: $8 \div 2 = 4$

Subtract exponents of x: $x^3 \div x^1 = x^2$

Final Answer: $4x^2$

Example: Division with Multiple Variables

➢ **$6a^2b^3 \div 2ab$**

Solution: Divide coefficients: $6 \div 2 = 3$

Subtract exponents: $a^2 \div a^1 = a^1$, $b^3 \div b^1 = b^2$

Final Answer: $3ab^2$

Example: Division Involving Negative Sign

➢ **$(-12x^2y^3) \div (3xy)$**

Solution: Divide coefficients: $-12 \div 3 = -4$

Subtract exponents: $x^2 \div x^1 = x^1$, $y^3 \div y^1 = y^2$

Final Answer: $-4xy^2$

Example: Division of Polynomials by Monomials

➢ **$(6x^2 + 9x) \div 3x$**

Solution: Divide each term separately:

$6x^2 \div 3x = 2x$

$9x \div 3x = 3$

Final Answer: $2x + 3$

Example: Division with Fractions

➢ **Divide: $\left(\frac{1}{2}\right)x^2 \div \left(\frac{1}{4}\right)x$**

Solution: Divide coefficients: $\left(\frac{1}{2}\right) \div \left(\frac{1}{4}\right) = 2$

Subtract exponents: $x^2 \div x^1 = x^1$

Final Answer: $2x$

Summary Points

- Divide the coefficients as in normal numbers.
- Subtract the exponents of like variables.
- Divide each term separately if dividing a polynomial by a monomial.
- Always simplify the final expression.
- Division by 0 is not allowed.