

## Dividing a Polynomial by a Monomial

### Objective 1: Divide a Monomial by a Monomial

Recall: A **monomial** is a one-term polynomial.

**Rules of Exponents.** For any non-zero real number  $a$ ,

**Quotient Rule**

$$\frac{a^m}{a^n} = a^{m-n}$$

**Zero Exponent**

$$a^0 = 1$$

**Negative Exponent**

$$a^{-n} = \frac{1}{a^n}$$

Ex) Divide each monomial by a monomial.

$$(8x^5) \div (2x^2)$$

$$\frac{20m^7n^2}{4m^3n^5}$$

$$\frac{10x^5y^2z^3}{6x^2y^7z^3}$$

Objective 1 Extra Practice

Divide each polynomial by a monomial.

1.  $(24x^9) \div (8x^4)$

2.  $\frac{18m^2n^5}{2m^7n^3}$

3.  $\frac{20x^6y^3z^7}{12x^3y^5z^7}$

## Objective 2: Divide a Polynomial by a Monomial (with one variable)

Recall: Adding or Subtracting Fractions with the same denominators:

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c} \quad \text{and} \quad \frac{a}{c} - \frac{b}{c} = \frac{a-b}{c}$$

Dividing a polynomial by a monomial is just the reverse of this process.

### Dividing a Polynomial by a Monomial

Divide each term in the polynomial by the monomial, where  $c \neq 0$ .

$$(a+b) \div c = \frac{a+b}{c} = \frac{a}{c} + \frac{b}{c} \quad \text{and} \quad (a-b) \div c = \frac{a-b}{c} = \frac{a}{c} - \frac{b}{c}$$

Ex) Divide each polynomial by a monomial.

$$(10x^6 + 15x^5) \div (5x^3)$$

$$\frac{18h^4 + 12h^3 + 6h^2}{6h^2}$$

$$\frac{8y^7 - 6y^5 + 12y^3 - 10y^2}{4y^2}$$

$$\frac{6k^6 + 12k^4 - 18k^2 + 8k}{6k^3}$$

Objective 2 Extra Practice

Divide each polynomial by a monomial.

1.  $(12x^7 - 6x^6) \div (3x^3)$

2.  $\frac{12k^7 - 8k^5 + 6k^2}{4k^2}$

3.  $\frac{18a^9 + 9a^6 - 6a^4 + 12a^2}{3a^4}$

### Objective 3: Divide a Polynomial by a Monomial (with more than one variable)

Ex) Divide each polynomial by a monomial.

$$(6x^5y^3 + 12x^4y^4 - 9x^3y^5) \div (3x^2y)$$

$$\frac{24p^7q^5 - 6p^3q^4 + 8p^2q^3}{4p^2q^3}$$

$$\frac{6x^3y^4 + 2x^2y^2 - 5xy^3 + 10xy^2}{2x^2y^2}$$

Objective 3 Extra Practice

Divide each polynomial by a monomial.

1.  $(8x^5y^6 - 12x^5y^4 + 16x^3y^5) \div (4xy^3)$

2. 
$$\frac{12a^5b^4 - 8a^4b^3 - 18a^2b^3}{6a^2b^3}$$

3. 
$$\frac{20t^6v^5 + 4t^3v^2 - 6t^4v + 8tv^2}{4t^3v^2}$$