

Exponent Rules; Introduction to Factoring

Dividing Monomials

Since $2^3 \cdot 2^4 = 2^7$, we know that $2^7 \div 2^4 = 2^3$.

In general, _____ the exponents when dividing exponential factors with same base.

So, for $n \neq 0$, $n^a \div n^b = n^{a-b}$

Ex 1.

Divide: $x^8 \div x^3$

Notice that $\frac{2^4}{2^4} = 2^{4-4} = 2^0$

but also $\frac{2^4}{2^4} = \frac{16}{16} = 1$

So, $2^0 = 1$.

In general, for $n \neq 0$, $n^0 = 1$

(Note: 0^0 is _____)

Ex 2.

Simplify (assume $y \neq 0$):

$$\frac{y^5}{y^5}$$

Ex 3.

Simplify: 4^0

To divide monomials with same variable:

1. _____ coefficients.
2. _____ exponents of variables (top exponent minus bottom exponent).

Ex 4.

Divide: $14x^6 \div 7x^2$

Ex 5.

Divide: $\frac{32a^{13}}{-4a}$

Divide Polynomial by Monomial

Since $(2x + 3) \cdot 4 = 8x + 12$, we know that $(8x + 12) \div 4 = 2x + 3$.

If we wanted to divide $8x + 12$ by 4 (without knowing the answer), we could divide each term by 4.

It would look like this, $(8x + 12) \div 4 = 8x \div 4 + 12 \div 4 = 2x + 3$.

In general, to divide a polynomial by a monomial, divide each term by the monomial.

Ex 6.

Divide: $(12x^2 + 8x) \div (4x)$

Ex 7.

Divide: $\frac{18x^4 - 24x^3 + 6x^2}{-3x}$

Find Unknown Factor**Ex 8.**

Find the unknown factor: $5x^3 \cdot (?) = 15x^7$

Ex 9.

Find the unknown factor: $35x^4 - 14x^3 + 21x^2 = 7x^2 \cdot (?)$

When a number or expression is written as product of factors it is in _____.

ex: $3(2x + 7)$ is factored form for $6x + 21$

How to factor monomial GCF out of a polynomial

1. Find GCF of terms of polynomial.

2. Rewrite polynomial like this: $\text{polynomial} = \text{GCF} \left(\frac{\text{polynomial}}{\text{GCF}} \right)$

3. Divide inside the parentheses.

Ex 10.

Factor: $18x - 27$

Ex 11.

Factor: $8n^6 - 4n^5 + 10n^3$

Summary:

$$n^a \div n^b = n^{a-b} \quad (\text{ex: } \frac{x^7}{x^2} = x^5)$$

$$n^0 = 1 \quad (\text{ex: } (3x)^0 = 1)$$

Divide monomials: 1. Divide coefficients, 2. Subtract exponents. (ex: $\frac{12x^7}{3x^2} = 4x^5$)

Factor out GCF: 1. Find GCF, 2. $\text{GCF} \left(\frac{\text{polynomial}}{\text{GCF}} \right)$, 3. Divide.