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Algebra 2
5.1 Operations with Polynomials (Day 1)

Notes

Property	Definition	Examples
Product of Powers	$x^a \cdot x^b = x^{a+b}$	$3^2 \cdot 3^4 = 3^{2+4}$ *or* 3^6
Quotient of Powers	$\frac{x^a}{x^b} = x^{a-b}, x \neq 0$	$\frac{9^5}{9^2} = 9^{5-2}$ *or* 9^3
Negative Exponent	$x^{-a} = \frac{1}{x^a}$ *and* $\frac{1}{x^{-a}} = x^a, x \neq 0$	$3^{-5} = \frac{1}{3^5}$
Power of a Power	$(x^a)^b = x^{ab}$	$(3^3)^2 = 3^{3 \cdot 2}$
Power of a Product	$(xy)^a = x^a y^a$	$(2k)^4 = 2^4 k^4$ *or* $16k^4$
Power of a Quotient	$\left(\frac{x}{y}\right)^a = \frac{x^a}{y^a}, y \neq 0,$ *and* $\left(\frac{x}{y}\right)^{-a} = \left(\frac{y}{x}\right)^a$ *or* $\frac{y^a}{x^a}, x \neq 0, y \neq 0$	$\left(\frac{x}{y}\right)^2 = \frac{x^2}{y^2}$
Zero Power	$x^0 = 1, x \neq 0$	$7^0 = 1$

An expression is in simplified form when:

- There are no powers of powers,
- Each base appears exactly once,
- All fractions are in simplest form,
- There are no negative exponents

Example 1: Simplify each expression. Assume that no variable equals 0.

$$(2a^{-2})(3a^3b^2)(c^{-2})$$

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Example 2: Simplify each expression. Assume that no variable equals 0.

$$\frac{q^2r^4}{q^7r^3}$$

Homework:

Simplify. Assume that no variable equals 0.

1. $(2a^3b^{-2})(-4a^2b^4)$
2. $\frac{12x^4y^2}{2xy^5}$
3. $\left(\frac{2a^2}{3b}\right)^3$
4. $(6g^5h^{-4})^3$
5. $(5x^3y^{-5})(4xy^3)$
6. $(-2b^3c)(4b^2c^2)$
7. $\frac{a^3n^7}{an^4}$
8. $\frac{-y^3z^5}{y^2z^3}$
9. $\frac{-7x^5y^5z^4}{21x^7y^5z^2}$
10. $\frac{9z^7b^5c^5}{18a^5b^9c^3}$
11. $(n^5)^4$
12. $(z^3)^6$