

Exponent Rules - Integers

Objective 1: Using the Product Rule

$$a^m \cdot a^n = a^{m+n}$$

Example: Simplify. $5^6 \cdot 5^3$

Example: Simplify. $x^2 \cdot x^8 \cdot x$

Example: Simplify. $(9x^3y)(-7x^4)$

Example: Simplify. $(-4x^8y^3)(-6x^{10}y)$

Pause the video and try these problems.

Simplify.

1. $4 \cdot 4^3 \cdot 4^9$

2. $(-8x^4)(3x^7y)$

3. $(-2x^5y)(-13x^3y^9)$

Objective 2: Evaluating Expressions Raised to the Zero Power

$$a^0 = 1, \text{ for } a \neq 0$$

Example: Simplify. 8^0

Example: Simplify. $4x^0$

Example: Simplify. $(6x - 7)^0$

Example: Simplify. -8^0

Pause the video and try these problems.

Simplify.

1. $(8x + 11)^0$

2. $-10x^0 + 3$

Objective 3: Using the Quotient Rule

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

Example: Simplify. $\frac{x^9}{x^4}$

Example: Simplify. $\frac{7^5}{7^3}$

Example: Simplify. $\frac{14x^8y^7}{6x^4y^2}$

Pause the video and try these problems.

Simplify.

1. $\frac{x^{12}}{x^4}$

2. $\frac{3^9}{3^2}$

3. $-\frac{15y^8}{10y^3}$

4. $\frac{20a^5b^{12}c^7}{-5ab^9c^6}$

Objective 4: Evaluating Negative Exponents

$$a^{-m} = \frac{1}{a^m}, a \neq 0$$

Example: Simplify and write with positive exponents only. 6^{-2}

Example: Simplify and write with positive exponents only. $(-4)^{-3}$

Example: Simplify and write with positive exponents only. $3x^{-2}y^4$

Example: Simplify and write with positive exponents only. $\frac{x^3}{x^7}$

Example: Simplify and write with positive exponents only. $\frac{a^{-5}}{b^{-2}}$

Example: Simplify and write with positive exponents only. $\frac{x^{-20}x^5}{x^{-8}}$

Example: Simplify and write with positive exponents only. $\frac{12^{-8}a^{14}b^{-1}}{12^{-6}a^{18}b^{-3}}$

Example: Simplify and write with positive exponents only. $\frac{14x^{15}y^{-4}}{4x^3y^{-2}}$

Pause the video and try these problems.

Simplify. Leave the answer with positive exponents only.

1. $(-5)^{-3}$

2. $12a^{-7}$

3. $3^{-2}a^{10}b^{-8}$

4. $\frac{x^3x^{-15}}{x^{-9}}$

$$5. \frac{5^{-7} a^3 b^{-8}}{5^{-4} a^{11} b^{-13}}$$

$$6. \frac{12x^{19} y^{-7}}{9x^8 y^{-2}}$$

Objective 5: Using the Power Rules

$$\begin{aligned} (a^m)^n &= a^{mn} \\ (ab)^m &= a^m b^m \\ \left(\frac{a}{b}\right)^m &= \frac{a^m}{b^m} \end{aligned}$$

Example: Simplify and write with positive exponents only. $(x^4)^3$

Example: Simplify and write with positive exponents only. $(6^2)^{-1}$

Example: Simplify and write with positive exponents only. $(x^{-5})^{-3}$

Example: Simplify and write with positive exponents only. $(7x^5)^2$

Example: Simplify and write with positive exponents only. $(x^3y^{-4}z^5)^6$

Example: Simplify and write with positive exponents only. $\left(\frac{5a^4}{b^{-2}}\right)^3$

Example: Simplify and write with positive exponents only. $(2x^3y^4)^3(3x^3y^5)^{-2}$

Example: Simplify and write with positive exponents only. $\left(\frac{72x^7y^5}{12x^3y^3}\right)^2$

Example: Simplify and write with positive exponents only. $\left(\frac{18x^{-4}y^5}{24x^{-9}y^{-2}z}\right)^{-4}$

Pause the video and try these problems. Simplify.

1. $(3^{-2})^2$

2. $(x^4)^{-3}$

$$3. \left(5x^2y^{-3}\right)^{-4}$$

$$4. \left(\frac{8m^4}{n^{-3}}\right)^2$$

$$5. \left(4x^2y^5\right)^3\left(5x^7y^3\right)^{-2}$$

$$6. \left(\frac{12x^{-9}y^2}{4x^3y^{-5}}\right)^3$$

$$7. \left(\frac{20x^{-8}y^{-4}}{15x^{-3}y^5}\right)^{-3}$$