

Name: _____

Combinations of Exponent Rules

Example 1.

$$\frac{(12x^2)(6x^3y)}{4x^4y^2}$$

1.

$$\frac{(3x^5y)(4x^5y)}{18xy^{12}}$$

2.

$$\frac{x^5z(18xy^4z^2)}{24x^5y^2z^7}$$

Example 2.

$$(2xy^4)(-2xy^3)^2$$

3.

$$(3x^2y^4)^4(-x^2y)$$

4.

$$(4x^3y^4)(-x^3y^2)^2$$

Example 3.

$$(7x^9y^{-3})(10x^{-2}y)$$

5.

$$(5x^{-2}y^2)(-x^5y^{-6})$$

6.

$$(3x^{-2}y^4z^3)(x^5y^{-5}z^{-7})$$

Example 4.

$$\frac{(2x^2y)^2}{8x^5y}$$

7.

$$\frac{(3x^4)^3}{x^6y^2}$$

8.

$$\frac{(2^3y^2)^5}{2^{10}y^{16}}$$

Example 5.

$$(5x)^{-1}$$

9.

$$(7x)^{-2}$$

10.

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

<p>Example 6.</p> $\frac{6y^{-5}}{10y^{-9}}$	<p>11.</p> $\frac{5x^{-10}}{30x^{-7}}$	<p>12.</p> $\frac{34x^{-1}y}{12x^5y^{-4}}$
<p>Example 7.</p> $\left(\frac{2x^5}{4x}\right)^2$	<p>13.</p> $\left(\frac{3y^4}{-x}\right)^2$	<p>14.</p> $\left(\frac{4x^4y^6}{6x^5y^3}\right)^3$
<p>Example 8.</p> $\left(\frac{x^{-4}y}{z^{-3}}\right)^{-3}$	<p>15.</p> $\left(\frac{x^{-2}}{y^2z^{-1}}\right)^{-5}$	<p>16.</p> $\left(\frac{8x^6}{y^2z^2}\right)^{-1}$
<p>Example 9.</p> $16x(4x^4y^{-5})^0$	<p>17.</p> $(-5x^{-4}y^3)^0(2x^3y^4)$	<p>18.</p> $(4x^2y)^3(x^{-8}y^9z)^0$
<p>Example 10.</p> $\frac{(3x^5y)^3(-x^2y)}{3x^{-1}}$	<p>19.</p> $\left(\frac{-x}{2x^3y}\right)^4$	<p>20.</p> $\frac{(10x^{-2}y^{10})^3}{2y^{14}}$

Exponent Rules (Laws of Exponents) Summary Chart

Properties	General Form	Application	Example
Product Rule <i>Same base add exponents</i>	$a^m a^n$	a^{m+n}	$x^5 x^3 = x^{5+3} = x^8$
Quotient Rule <i>Same base subtract exponents</i>	$\frac{a^m}{a^n}$	a^{m-n}	$\frac{x^9}{x^5} = x^{9-5} = x^4$
Power Rule I <i>Power raised to a power multiply exponents.</i>	$(a^m)^n$	a^{mn}	$(x^3)^4 = x^{3 \cdot 4} = x^{12}$
Power Rule II <i>Product to power distribute to each base</i>	$(ab)^m$	$a^m a^n$	$(4x^3)^2 = 4^2 x^{3 \cdot 2} = 16x^6$
Negative Exponent I <i>Flip and change sign to positive</i>	a^{-m}	$\frac{1}{a^m}$	$x^{-3} = \frac{1}{x^3}$
Negative Exponent II <i>Flip and change sign to positive</i>	$\frac{1}{a^{-m}}$	a^m	$\frac{1}{x^{-5}} = x^5$
Zero Exponent <i>Anything to the zero power (except 0) is one</i>	a^0	$a^0 = 1$	$(-4x)^0 = 1$

- It is important to note that none of these applications can occur if the bases are not the same.

For example, $\frac{x^5}{y^3}$ cannot be simplified.