

1-2 Exponent Rules
Simplify (Show why)

$$x^2 \cdot x^4 = x^6$$

Nov 19-7:36 AM

Product Rule for exponents
 $a^m \cdot a^n = a^{m+n}$

Simplify

$$2^2 \cdot 2^3 = 2^5 = 32$$

$$3z^2 \cdot 4z^4 = 12z^6$$

Nov 19-7:42 AM

You try

$$(-3)^2 \cdot (-3)^3 = (-3)^5 = -243$$

$$5x^2 \cdot (-2x^5) = -10x^7$$

Nov 19-8:10 AM

Simplify (Show Why)

$$\frac{y^6}{y^2} = \frac{\cancel{y \cdot y \cdot y \cdot y \cdot y \cdot y}}{\cancel{y \cdot y}} = y^4$$

Nov 19-7:42 AM

Quotient Rule for exponents
 $\frac{a^m}{a^n} = a^{m-n}$ if $a \neq 0$

Simplify

$$\frac{8^5}{8^3} = 8^2 = 64$$

$$\frac{27z^9}{12z^4} = \frac{27z^5}{12}$$

Nov 19-7:43 AM

You try

$$\frac{y^8}{y^6} = y^2$$

$$\frac{-24b^5}{16b^3} = \frac{-3b^2}{2}$$

Nov 19-7:46 AM

** Anything to the 0 power equals 1*

Zero-exponent Rule

$$a^0 = 1 \quad \text{if } a \neq 0$$

Simplify

$$3^0 = 1 \quad \pi^0 = 1 \quad (\partial\theta + \Phi\Omega - \rho^0)^0 = 1$$

Nov 19-8:13 AM

Negative-exponent Rule

$$a^{-n} = \frac{1}{a^n} \quad \text{or} \quad \frac{1}{a^{-n}} = a^n \quad \text{if } a \neq 0$$

Simplify

$$3^{-4} = \frac{1}{3^4} = \frac{1}{81} \quad 4x^{-5} = \frac{4}{x^5} \quad \frac{1}{3^{-2}} = \frac{1}{3^2} = \frac{1}{9}$$

Nov 19-8:47 AM

You try

$$5^{-3} = \frac{1}{5^3} = \frac{1}{125}$$

$$\frac{5}{y^{-3}} = \frac{5y^3}{1} = 5y^3$$

Nov 19-8:51 AM

Simplify ** 1 piece at a time*

$$\frac{-24b^5}{16b^3} = \frac{-3b^2}{2}$$

$$\frac{50s^2t}{15s^5t^{-4}} = \frac{10t^5}{3s^3}$$

Nov 19-8:52 AM

Simplify (Show Why)

$$(3^2)^4 \quad 2 \cdot 4 = 8$$

$$= (3^2) \cdot (3^2) \cdot (3^2) \cdot (3^2)$$

$$= 3^8$$

Nov 19-8:56 AM

Power rule for exponential expressions

$$(a^m)^n = a^{m \cdot n}$$

Simplify

$$(4^3)^5 = 4^{15} \quad [(-3)^3]^2 = (-3)^6 \quad (6^3)^0 = 6^0 = 1$$

Nov 19-8:54 AM

You try

$$(2^2)^3 \quad (z^3)^{-6} \quad (s^{-3})^{-7}$$

Nov 19-8:58 AM

Product to a power

$$(a \cdot b)^n = a^n \cdot b^n$$

Simplify

$$(3z)^4 = 3^4 z^4 = 81z^4$$

$$(3y^{-2})^{-3} = 3^{-3} y^6 = \frac{y^6}{3^3} = \frac{y^6}{27}$$

$$(-3a^2)^2 = -3^2 a^4 = -9a^4$$

Nov 19-9:01 AM

You try

$$(5y)^3 \quad (4a^3)^{-2}$$

Nov 19-9:08 AM

Quotient to a power

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n} \text{ if } b \neq 0$$

$$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n \text{ if } a \neq 0, b \neq 0$$

Nov 19-9:13 AM

Simplify

$$\left(\frac{w}{4}\right)^3 = \frac{w^3}{4^3} = \frac{w^3}{64}$$

$$\left(\frac{2w^2}{y^3}\right)^4 = \frac{2^4 w^8}{y^{12}} = \frac{16w^8}{y^{12}}$$

$$\left(\frac{x}{2}\right)^5 = \frac{x^5}{2^5} = \frac{x^5}{32}$$

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You try

$$\left(\frac{z}{3}\right)^4 \quad \left(\frac{4}{3}\right)^{-2} \quad \left(\frac{3a^{-2}}{b^4}\right)^3$$

Nov 19-9:18 AM

Simplify

$$\frac{a^3 b^{-1}}{(a^2 b)^3} = \frac{a^3 b^{-1}}{a^6 b^3} = \frac{1}{a^3 b^4}$$

Nov 19-9:24 AM

Simplify (Honors)

~~$$\left(\frac{3xy}{x^2 y^{-2}} \right) \left(\frac{9x^2 y^{-3}}{x^3 y^2} \right)^{-1}$$~~

Nov 19-9:26 AM

Rules

$$a^0 = 1 \quad \text{if } a \neq 0$$

$$a^{-n} = \frac{1}{a^n} \quad \text{or} \quad \frac{1}{a^{-n}} = a^n \quad \text{if } a \neq 0$$

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

$$\frac{a^m}{a^n} = a^{m-n} \quad \text{if } a \neq 0$$

$$(a^m)^n = a^{m \cdot n}$$

$$(a \cdot b)^n = a^n \cdot b^n$$

$$\left(\frac{a}{b} \right)^n = \frac{a^n}{b^n} \quad \text{if } b \neq 0$$

$$\left(\frac{a}{b} \right)^{-n} = \left(\frac{b}{a} \right)^n \quad \text{if } a \neq 0, b \neq 0$$

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