

Answers

Rules: $a \in \mathbb{R}, a \neq 0, b \in \mathbb{R}, b \neq 0$

$a^{-1} = \frac{a^{-1}}{1} = \frac{1}{a^1} = \frac{1}{a}$	$\frac{a^{-2}}{b^{-3}} = \frac{b^3}{a^2}$	$\left(\frac{a}{b}\right)^{-3} = \frac{a^{-3}}{b^{-3}} = \frac{b^3}{a^3}$ $= \left(\frac{b}{a}\right)^{+3}$
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Examples: $x \neq 0, y \neq 0, c \neq 0, z \neq 0$ All variables stand for \mathbb{R} numbers

$\frac{27x}{54x^2} = \frac{27}{54} \cdot \frac{x^1}{x^2} = \frac{1}{2} \cdot x^{1-2}$ $= \frac{1}{2} \cdot x^{-1}$ $= \frac{1}{2} \cdot \frac{1}{x}$ $= \boxed{\frac{1}{2x}}$	$\frac{2a^3b^5}{1ab^1} = \frac{2}{1} \cdot \frac{a^3}{a^1} \cdot \frac{b^5}{b^1}$ $= 2 \cdot a^{3-1} \cdot b^{5-1}$ $= \boxed{2a^2b^4}$	$\frac{1}{3}x^{-6} = \frac{1}{3} \cdot \frac{x^{-6}}{1} = \frac{1}{3} \cdot \frac{1}{x^6}$ $= \boxed{\frac{1}{3x^6}}$
$\frac{14x^5}{7x^3} = \frac{14}{7} \cdot \frac{x^5}{x^3} = \frac{2}{1} \cdot x^{5-3}$ $= 2 \cdot x^2$ $= \boxed{2x^2}$	$\frac{2 \cdot 1}{y^3z^2} = \frac{2}{y^3} \cdot \frac{1}{z^2}$ $= \frac{2 \cdot y^3}{1} \cdot \frac{1}{z^2}$ $= \boxed{\frac{2y^3}{z^2}}$	$\frac{1 \cdot a^{-4}}{b^3c^{-2}} = \frac{1}{b^3} \cdot \frac{a^{-4}}{c^{-2}}$ $= \frac{1}{b^3} \cdot \frac{c^{+2}}{a^{+4}}$ $= \boxed{\frac{c^2}{a^4b^3}}$

$$\textcircled{\text{OR}} \left[\frac{1}{3} x^{-6} \right]^3 = \left[\frac{1}{3} \cdot \frac{x^{-6}}{1} \right]^3 = \left[\frac{1 \cdot 1}{3 x^6} \right]^3 = \left[\frac{1}{3x^6} \right]^3$$

$$= \frac{1^3}{3^3 \cdot (x^6)^3} = \frac{1}{27x^{18}}$$

Examples continued:

$\left(\frac{2x}{6y^2} \right)^{-2} = \left(\frac{6y^2}{12x} \right)^{-2} = \left(\frac{3y^2}{x} \right)^{-2}$ $= \frac{3^2 (y^2)^2}{(x)^2} = \frac{9y^4}{x^2}$	$\frac{(a^3 b^4)^3}{ab^{22}} = \frac{(a^3)^3 \cdot (b^4)^3}{a^1 \cdot b^{22}}$ $= \frac{a^9 \cdot b^{12}}{a^1 \cdot b^{22}} = a^{9-1} \cdot b^{12-22}$ $= a^8 \cdot b^{-10} = \frac{a^8}{b^{10}}$	$\left[\frac{1}{3} x^{-6} \right]^3 = \frac{1^3}{3^3} \cdot (x^{-6})^3$ $= \frac{1}{27} \cdot x^{-18}$ $= \frac{1}{27} \cdot \frac{x^{-18}}{1}$ $= \frac{1}{27x^{18}}$
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$\frac{3(x^5)^2}{12x^{30}} = \frac{3x^{5 \times 2}}{4 \cdot 12x^{30}}$ $= \frac{1 \cdot x^{10}}{4x^{30}} = \frac{1}{4} \cdot \frac{x^{10}}{x^{30}}$ $= \frac{1}{4} \cdot x^{10-30} = \frac{1}{4} x^{-20} = \frac{1}{4x^{20}}$	$\left(\frac{-yz}{y^{-3}z^2} \right)^{-4} = \left[\frac{y^{-3}z^2}{-y^1z^1} \right]^4$ $= \left[\frac{y^{-3}}{-y^1} \cdot \frac{z^2}{z^1} \right]^4 = \left[-y^{-3-1} \cdot z^{2-1} \right]^4$ $= \left[\frac{-y^{-4}}{1} \cdot \frac{z^1}{1} \right]^4 = \left[\frac{-1}{y^4} \cdot \frac{z}{1} \right]^4$ $= \left(\frac{-z}{y^4} \right)^4 = \frac{z^4}{y^{16}}$	$\frac{1a^4}{(b^3c^{-2})^{-1}} = \frac{1a^4}{(b^3)^{-1} \cdot (c^{-2})^{-1}}$ $= \frac{1 \cdot a^4}{b^{-3} \cdot c^{+2}} = \frac{1 \cdot a^4}{b^{-3} \cdot c^{+2}}$ $= \frac{1}{b^{-3}} \cdot \frac{a^4}{c^2} = \frac{b^3 \cdot a^4}{1 \cdot c^2} = \frac{a^4 b^3}{c^2}$
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Name the Exponent Law (Rule) and simplify using the rule:

$(2^3)^4$ Power Law $2^{3 \times 4}$	$b^2 \times b^1$ Product Law b^{2+1}	-100^0 Exponent of zero	$\frac{x^5}{x^3}$ Quotient Law x^{5-3} x^2	$2x^{-2}$ Negative Exponent Law $\frac{2x^{-2}}{1} = 2 \cdot \frac{1}{x^2}$ $= \frac{2}{x^2}$
2^{12}	b^3	$-(100^0)$ $= - (1)$	x^2	$\frac{2}{x^2}$

$$= \boxed{-1}$$