

Consider: $\frac{x^5}{x^3} = \frac{\cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot x \cdot x}{\cancel{x} \cdot \cancel{x} \cdot \cancel{x}} = x^2$

Quotient of Powers Property: To divide powers with the same base, you KEEP the base and SUBTRACT the exponents.

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

Examples:

$\frac{6^5}{6^2}$	$\frac{(-3)^3}{(-3)^2}$	$\frac{8^4}{8^6}$	$\frac{x^3}{x^3}$	$\frac{a^9}{a^5}$	$\frac{x^4}{x^7}$
$6^3 = 216$	$(-3)^1 = -3$	$8^{-2} = \frac{1}{8^2} = \frac{1}{64}$	$x^0 = 1$	a^4	$x^{-3} = \frac{1}{x^3}$

Consider: $\left(\frac{x}{y}\right)^4 = \frac{x}{y} \cdot \frac{x}{y} \cdot \frac{x}{y} \cdot \frac{x}{y} = \frac{x^4}{y^4}$

Power of a Quotient Property: To find the power of a quotient, find the power of the numerator and the power of the denominator, then divide.

$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$$

Examples: $\left(\frac{5}{4}\right)^3$

$$\frac{5^3}{4^3} = \frac{125}{64}$$

$$\frac{\left(\frac{-x}{2}\right)^4}{2^4} = \frac{x^4}{16}$$

$$\left(\frac{3}{5}\right)^{-2} = \frac{3^{-2}}{5^{-2}} = \frac{9}{25}$$

$$\left(\frac{1}{x}\right)^{-5} = \frac{1^{-5}}{x^{-5}} = x^5$$

Ex: Answers must have positive exponents

$$\frac{3xy^4}{x^3} \cdot \frac{y}{xy^3} = \frac{3xy^5}{x^4y^3} = 3x^{-3}y^2 = \boxed{\frac{3y^2}{x^3}}$$

$$\frac{2x^2y}{3x} \cdot \frac{9xy^2}{y^4} = \frac{18x^3y^3}{3x^1y^4} = 6x^2y^{-1} = \boxed{\frac{6x^2}{y}}$$

$$\left(\frac{5x}{y^3}\right)^3 = \frac{5^3 x^3}{y^9} = \frac{125x^3}{y^9}$$

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

$$\frac{y^{-2}}{x^2} \cdot \left(\frac{x^4}{y}\right)^{-1} = \frac{y^{-2}}{x^2} \cdot \frac{x^{-4}}{y^{-1}} = \frac{y^{-2} x^{-4}}{x^2 y^{-1}}$$

$$= y^{-1} x^{-6} = \boxed{\frac{1}{yx^6}}$$