8.2: Apply exponent properties using quotients

$$\frac{a^5}{a^3} = \frac{\cancel{a}\cdot\cancel{a}\cdot\cancel{a}\cdot a\cdot a}{\cancel{a}\cdot\cancel{a}\cdot\cancel{a}} = a^2$$

quotient of powers property:

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

ex. $\frac{4^7}{4^2} = 4^{7-2}$

4^5

On your own:

a) $\frac{8^{10}}{8^4} = 8^6$

b) $\frac{(-3)^9}{(-3)^3} \quad (-3)^6$

c) $\frac{5^4 \cdot 5^8}{5^7}$

$\frac{5^{12}}{5^7}$ → 5^5

d) $\frac{1}{x^4} \cdot \frac{x^6}{1}$

$\frac{x^6}{x^4} = x^2$

Power of a quotient property

$$\left(\frac{a}{b}\right)^4 = \frac{a \cdot a \cdot a \cdot a}{b \cdot b \cdot b \cdot b} = \frac{a^4}{b^4}$$

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

example: $\left(\frac{3}{2}\right)^7 = \frac{3^7}{2^7}$

on your own:

a) $\left(\frac{x}{y}\right)^3$

$\frac{x^3}{y^3}$

b) $\left(\frac{-7}{x}\right)^2$

$\frac{49}{x^2}$

More examples:

① $\left(\frac{4x^2}{5y}\right)^3 = \frac{4^3 x^6}{5^3 y^3} = \frac{64x^6}{125y^3}$

② $\left(\frac{a^2}{b}\right)^5 \cdot \frac{1}{2a^2} = \frac{a^{10}}{b^5} \cdot \frac{1}{2a^2}$

$\frac{a^{10}}{2a^2 b^5} = \frac{a^8}{2b^5}$

on your own:

a) $\left(\frac{a}{b}\right)^2 = \frac{a^2}{b^2}$

b) $\left(-\frac{5}{y}\right)^3 = \frac{-125}{y^3}$

c) $\left(\frac{x^2}{4y}\right)^2$

$\frac{x^4}{16y^2}$

d) $\left(\frac{2s}{3t}\right)^3 \cdot \left(\frac{t^5}{16}\right)$

$\frac{8s^3}{27t^3} \cdot \frac{t^5}{16}$

$\frac{8s^3t^5}{27t^3 \cdot 16} = \frac{8s^3t^2}{27 \cdot 16_2} = \frac{s^3t^2}{54}$

$$\left(\frac{3a^4}{5b}\right)^3 = \frac{27a^{12}}{125b^3}$$

$$\left(\frac{x^3}{y}\right)^7 \cdot \frac{1}{3x^8} = \frac{x^{21}}{y^7} \cdot \frac{1}{3x^8} = \frac{x^{21}}{3x^8y^7}$$

$$\frac{x^{13}}{3y^7}$$