$$\frac{(4x^2y^3)^5}{(2xy)^3} : \frac{x^7}{(y^3)^4} =$$

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

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

$4 = 2^2$

$$\frac{4^5 (x^2)^5 (y^3)^5}{2^3 x^3 y^3} : \frac{x^7}{y^{12}} = \frac{(2^2)^5 x^{10} y^{15}}{2^3 x^3 y^3} : \frac{x^7}{y^{12}}$$

$$\frac{a}{b} : \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c}$$

$$\frac{2^{10} \cdot x^{10} \cdot y^{15}}{2^3 \cdot x^3 \cdot y^3} \cdot \frac{y^{12}}{x^7} = \frac{2^7 y^{24}}{1} = 2^7 y^{24}$$

$$\left(\frac{x}{3}\right)^{-2} \div \left(\frac{x}{9}\right)^{-3} =$$

$$\left(\frac{3}{x}\right)^{2} \div \left(\frac{9}{x}\right)^{3} =$$

$$\frac{3^2}{x^2} \div \frac{9^3}{x^3} \qquad 9 = 3^2$$

$$= \frac{3^2}{x^2} \cdot \frac{x^3}{(3^2)^3}$$

$$= \frac{3^2 x^3}{3^6 x^2} = \frac{x}{3^4}$$

$$a^{-n} = \frac{1}{a^n}$$

$$\left(\frac{a}{b}\right)^{-1} = \frac{b}{a}$$

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

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c}$$

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