

If n is a positive integer and $a \neq 0$

$$a^0 = 1$$

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

The expression 0^0 is undefined.

Ex 1) Write in simplest form without negative or zero exponents. Assume all variables are nonzero.

$$1a) 5^{-3}$$

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

$$= \frac{1}{125}$$

$$1b) -4x^{-3}$$

$$= (-4)(x^{-3})$$

$$= -4 \cdot \frac{1}{x^3}$$

$$= \frac{-4}{x^3}$$

$$1c) 5^{-1} x^0 y^{-5}$$

$$= \frac{1}{5} \cdot 1 \cdot \frac{1}{y^5}$$

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

$$1d) (4x)^{-3}$$

$$= \frac{1}{(4x)^3}$$

$$= \frac{1}{64x^3}$$

Ex 2) Write in simplest form without negative or zero exponents.

$$2a) 10^{-3} \times 10^{-4}$$

$$= 10^{-7}$$

$$= \frac{1}{10^7}$$

$$2b) (-2x^{-3})^{-2}$$

$$= (-2)^{-2} (x^{-3})^{-2}$$

$$= \frac{1}{(-2)^2} \cdot x^6$$

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

$$2c) \frac{2^0 x^{-2} y}{3 x^{-3} y^{-2}}$$

$$= \frac{1}{3} \cdot x^{-2+3} \cdot y^{1+2}$$

$$= \frac{1}{3} x^1 y^3$$

$$= \frac{xy^3}{3}$$

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

Ex 4) Write without using any fractions:

$$\frac{3x^2}{4y^3} \rightarrow 3x^2 \cdot \frac{1}{4y^3} \rightarrow 3x^2 \cdot 4^{-1} y^{-3}$$

$$= 3 \cdot 4^{-1} x^2 y^{-3}$$