

8.1- 8.3 Rules for Exponents

PRODUCT OF POWERS:

$$a^m \cdot a^n = a^{m+n}$$

$$\text{ex} \rightarrow 2^7 \cdot 2^{-3} = 2^{7+(-3)} = 2^4$$

POWER OF A POWER:

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

$$\text{ex} \rightarrow (5^{-2})^2 = 5^{(-2 \cdot 2)} = 5^4$$

POWER OF A PRODUCT:

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

$$\text{ex} \rightarrow (2x^3)^2 = 2^2 \cdot x^6 = 4x^6$$

$$2x^3 \cdot 2x^3 = 4x^6$$

$$\text{ex. 1} \quad (-2)(-2)^4 = (-2)^5 = -32$$

$$-2 \cdot 16 = -32$$

$$-2 \cdot (2)^4 \cdot (2)^4 \quad 16 = -32$$

$$\text{ex. 2} \quad [(-3)^3]^2$$

$$[(-)^3 \cdot 3^3]^2$$

$$[-27]^2$$

$$(-)^2 \cdot (27)^2 = 729$$

$$\boxed{\text{ex 3}} \quad [(a+1)^2]^5 = (a+1)^{10}$$

$$\boxed{\text{ex 4}} \quad (4x^2y^3) \cdot X^5$$

$$4^5 \cdot x^6 \cdot y^3 \cdot x^5$$

$$\boxed{64x^{11}y^3}$$

$$\boxed{\text{ex 5}} \quad (r^2st^3)^2 (s^4t^3)$$

$$r^4 \cdot s^2 \cdot t^6 \cdot s^4 \cdot t^3$$

$$\boxed{-r^4 s^4 t^9} \quad +/i$$

* Any nonzero number to the zero power is 1.

$$\text{ex} \rightarrow a^0 = 1 \text{ when } a \neq 0.$$

* a^{-n} is the reciprocal of a^n .

$$2^{-1} = \frac{1}{2} \quad 3^{-2} = \frac{1}{3^2} = \frac{1}{9}$$

$$4^{-2} = \frac{1}{4^2} = \frac{1}{16} \quad \frac{1}{2^{-2}} = 2^2 = 4$$

$$\boxed{\text{ex 6}} \quad \text{a. } (5a^{-2})^2$$

$$5^2 \cdot a^{-4} \\ 25a^{-4} = \frac{25}{a^4}$$

$$\text{b. } \frac{1}{2^{-3}n}$$

$$\frac{2^3}{n} = \frac{8}{n}$$

Ex. 7

$$\cancel{(2x^{-1})^0} \cdot \left(\frac{-4x^2y^{-1}}{2x^{-1}} \right)$$

$$\frac{1 \cdot \cancel{(-)^1} \cdot \cancel{4^1} \cdot \cancel{x^{-2}} \cdot y^{-1}}{2^{-1} \cdot x^1}$$

$$= \frac{2^1}{4^1 x^2 y^1 x^1}$$

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