

# 8.1: Apply exponent properties involving products

---

$$a^4 = a \cdot a \cdot a \cdot a$$

$$\underbrace{a^4}_{\text{red}} \cdot \underbrace{a^2}_{\text{green}} = \underbrace{a \cdot a \cdot a \cdot a}_{\text{red}} \cdot \underbrace{a \cdot a}_{\text{green}}$$

$$a^{4+2} = a^6$$

# Product of Powers Property

$$\underline{a^m} \cdot \underline{a^n} = a^{m+n} \quad \text{ex. } 5^3 \cdot 5^6 = 5^9$$

$$\textcircled{1} \quad \underline{7^3} \cdot \underline{7^5} = 7^8$$

$$\textcircled{2} \quad \underline{9^1} \cdot \underline{9^8} = 9^9$$

$$\textcircled{3} \quad \underline{x^2} \cdot \underline{x^6} = x^8$$

\* Your bases must be the same

base  $\rightarrow$   $a$   $\rightarrow$  exponent

Power of a power

$$(a^2)^3 = (a^2)(a^2)(a^2) = a^6$$

to find a power of a power you multiply the 2 exponents.

$$(a^m)^n = a^{m \cdot n} \quad \text{ex. } (3^4)^2 = 3^{4 \cdot 2} = 3^8$$

On your own

①  $(2^5)^3$

$$2^{15}$$

②

$[-6]^5$

$$(-6)^{10}$$

③  $(x^2)^4$

$$x^8$$

④

$[(y+2)^6]^2$

$$(y+2)^{12}$$

## Power of a Product Property

$$(ab)^3 = (ab)(ab)(ab) =$$

$$aaabbbb = a^3 \cdot b^3$$

To find a power of a product,  
find the power of each  
factor & multiply.

$$(ab)^m = a^m \cdot b^m \quad \text{ex. } (23 \cdot 17)^5 = 23^5 \cdot 17^5$$

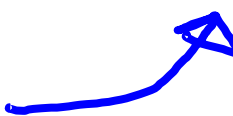
On your Own:

$$(1) (24 \cdot 13)^8 = 24^8 \cdot 13^8 *$$

$$(2) (9xy)^2 = 9^2 x^2 y^2 = 81x^2 y^2$$

$$(3) (-4z)^2 = (-4)^2 z^2 = 16z^2$$

$$(4) -(4z)^2 = -(16z^2) = -16z^2$$

$4^2$  

example: Use all 3 properties

Simplify  $(2x^3)^2 \cdot x^4$

$$2^2 \underline{x^6} \cdot \underline{x^4}$$
$$4x^{10}$$

PEMDAS

$$\text{ex. } 5 \cdot (5x^2)^4$$

$$\underbrace{5^1} \cdot \underbrace{5^4} x^8$$

$$5^5 x^8$$

$$\textcircled{1} 5 \cdot 5^9 \quad \textcircled{2} (-7)^2 (-7)$$

$$\textcircled{3} x^2 \cdot x^6 \cdot x \quad \textcircled{4} (4^2)^7 \quad \textcircled{5} [(-2)^4]^5$$

$$\textcircled{6} (n^3)^6 \quad \textcircled{7} [(m+1)^5]^4$$

$$\textcircled{8} (42 \cdot 12)^2 \quad \textcircled{9} (-3n)^2$$

$$\textcircled{10} (9m^3n)^4 \quad \textcircled{11} (3d^5)^3 \cdot d$$

$$\textcircled{12} (-10x^6)^2 \cdot x^2$$