

Multiplying Exponents

① Commutative Property

$$2 \cdot 3 \cdot 4 = 4 \cdot 3 \cdot 2$$

② Commutative property can be used to re-arrange

$$(15x)(2) = 15 \cdot 2 \cdot x = 30x$$

$$x^2 \cdot x^3 = x \cdot x \cdot x \cdot x \cdot x = x^5$$

$$y^4 \cdot y^3 = yyy \cdot yyy = y^7$$

When multiplying exponents of same base, you can add their exponents

$$4x^2y \cdot 3x^3y^3 = 4 \cdot 3 \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y = 12x^3y^4$$

③ What about power to a power?

$$(x^2)^2 = (x^2)(x^2) = (x \cdot x) \cdot (x \cdot x) = x^4$$

$$(y^3)^4 = (y^3)(y^3)(y^3)(y^3) = (yyy)(yyy)(yyy)(yyy) = y^{12}$$

When you are taking a power to a power you multiply exponents together.

$$(a^2b^3)^4 = (a^2b^3)(a^2b^3)(a^2b^3)(a^2b^3)$$

$$a^2b^3 a^2b^3 a^2b^3 a^2b^3 = a^8 b^{12}$$

$$(2xy^4)^3 = (2xy^4)(2xy^4)(2xy^4) = \boxed{8x^3y^{12}}$$

$$\begin{array}{ccc} \downarrow & \downarrow & \downarrow \\ 2^3 & x^3 & y^{12} \\ \hline 8x^3y^{12} \end{array}$$

$$2xy^4 \quad 2xy^4 \quad 2xy^4$$