

Introduction:

$$10 \times 10 \times 10 = 10^3 = 1000$$

$$(5 \times 2) \times (5 \times 2) \times (5 \times 2) = (5 \times 2)^3 = 10^3 = 1000$$

$$(5 \times 5 \times 5) \times (2 \times 2 \times 2) = 5^3 \times 2^3 = 125 \times 8 = 1000$$

Therefore..... $(5 \times 2)^3 = 5^3 \times 2^3$

Power of a Product Law

$$(ab)^m = a^m \times b^m$$

share the exponent

$$(3 \times 7)^2 \text{ or } = 3^2 \times 7^2$$

Quotient Law

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

share the exponent

$$\left(\frac{3}{4}\right)^2 \text{ or } = \frac{3^2}{4^2}$$

Note: $2^4 \times 3^5$ cannot be simplified using Exponent Laws so.....evaluate first then simplify..... $16 \times 243 = 3888$

/ \
evaluate
separately

Examples: Simplify in power form

$$1) (3^4 \times 2^5)^2 \\ 3^{4 \times 2} \times 2^{5 \times 2} \\ = 3^8 \times 2^{10}$$

$$2) (10 \times 3^2)^6 \\ 10^6 \times 3^{2 \times 6} \\ 10^6 \times 3^{12}$$

$$3) (10^4 \times 7)^2 \\ 10^8 \times 7^2$$

$$4) (5^3 \times 25)^3, \text{ as a single base} \\ 5^9 \times 25^3 = 5^9 \times 5^6 \\ = 5^9 \times (5^2)^3 = 5^{15}$$

$$5) \left(\frac{3}{5}\right)^2 \\ = \frac{3^2}{5^2}$$

$$6) \left(\frac{2^3}{5^2}\right)^4 = \frac{2^{3 \times 4}}{5^{2 \times 4}} = \frac{2^{12}}{5^8}$$

$$7) \left(\frac{3^8 \times 5^3}{3^7 \times 5}\right)^2 = \frac{3^{16}}{3^{14}} \times \frac{5^6}{5^2} \\ = 3^2 \times 5^4$$

$$8) \left(\frac{10^2}{3^4}\right)^2 \times \left(\frac{10^2}{3}\right)^3 \\ \frac{10^4 \times 10^6}{3^8 \times 3^3} \quad / \quad \frac{10^{10}}{3^{11}}$$

9) Show that $15^2 = 5^2 \times 3^2$

$$(5 \times 3)^2 = 5^2 \times 3^2$$