

More Multiplication Properties of Exponents

$$\textcircled{a} (a^m)^n = a^{mn} \quad \textcircled{b} (ab)^n = a^n b^n$$

Simplify.

$$\textcircled{1} (x^3)^7 = \boxed{x^{21}} \quad \textcircled{2} (m^{\frac{2}{3}})^{\frac{1}{3}} = \boxed{m^{\frac{2}{9}}}$$

$$\textcircled{3} x^2(x^6)^{-4} = x^2(x^{-24}) = x^{-22} = \boxed{\frac{1}{x^{22}}}$$

$$\textcircled{4} (2b)^{-4} = 2^{-4} b^{-4} = \boxed{\frac{1}{16b^4}}$$

$$\textcircled{5} (n^{\frac{1}{2}})^{10} (4mn^{-\frac{2}{3}})^3 = (n^5)(4^3 m^3 n^{-2}) \\ = \boxed{64m^3 n^3}$$

Scientific Notation Example

$\swarrow$ Kinetic energy

$$\textcircled{6} \frac{1}{2} m v^2$$

$$m = 1.3 \times 10^3 \text{ kg}$$

$$v = 3.1 \times 10^3 \text{ m/s}$$

$$\frac{1}{2} (1.3 \times 10^3) (3.1 \times 10^3)^2$$

$$\frac{1}{2} (1.3) (10^3) (3.1^2) (10^6)$$

$$(\frac{1}{2} \times 1.3 \times 3.1 \times 3.1) (10^3 \cdot 10^6)$$

$$\boxed{6.2465 \times 10^9 \text{ joules}}$$