



Massachusetts Comprehensive Assessment System

Introductory Physics Formula Sheet

Formulas

$$\text{Average Speed} = \frac{d}{\Delta t}$$

$$\text{Average Acceleration} = \frac{\Delta v}{\Delta t}$$

$$\text{Average Velocity} = \frac{\Delta x}{\Delta t}$$

$$v_f = v_i + a\Delta t$$

$$\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2$$

$$v_f^2 = v_i^2 + 2a\Delta x$$

$$\text{Average Velocity} = \frac{v_i + v_f}{2}$$

$$F = ma$$

$$F = G \frac{m_1 m_2}{d^2}$$

$$F = k \frac{q_1 q_2}{d^2}$$

$$KE = \frac{1}{2} mv^2$$

$$PE = mg\Delta h$$

$$W = Fd$$

$$P = \frac{W}{\Delta t}$$

$$p = mv$$

$$V = IR$$

$$P = IV$$

$$Q = mc\Delta T$$

$$v = f\lambda$$

$$\lambda = \frac{c}{f}$$

$$T = \frac{1}{f}$$

Variables

a = acceleration	q = charge of particle
c = specific heat	Q = heat
d = distance	R = resistance
f = frequency	Δt = change in time
F = force	ΔT = change in temperature
Δh = change in height	T = period
I = current	v = velocity
KE = kinetic energy	v_i = initial velocity
λ = wavelength	v_f = final velocity
m = mass	Δv = change in velocity
p = momentum	V = voltage
P = power	W = work
PE = gravitational potential energy	Δx = displacement

Definitions

$$c = \text{speed of electromagnetic waves} = 3.00 \times 10^8 \text{ m/s}$$

$$G = \text{Universal gravitational constant} = 6.67 \times 10^{-11} \frac{\text{N} \cdot \text{m}^2}{\text{kg}^2}$$

$$k = \text{Coulomb constant} = 8.99 \times 10^9 \frac{\text{N} \cdot \text{m}^2}{\text{C}^2}$$

$$g \approx 10 \text{ m/s}^2 \quad 1 \text{ N} = 1 \frac{\text{kg} \cdot \text{m}}{\text{s}^2} \quad 1 \text{ J} = 1 \text{ N} \cdot \text{m} \quad 1 \text{ W (watt)} = 1 \frac{\text{J}}{\text{s}}$$