

Equations for Midterm

Chapter 2:

velocity:

$$v = \frac{d}{t}$$

acceleration:

$$a = \frac{v_f - v_i}{t}$$

Acceleration due to gravity (or g)

is equal to -9.80 m/s^2 .

$$d = v_{ave} \cdot t$$

$$v_f = v_i + a t$$

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

$$v_f^2 = v_i^2 + 2 a d$$

$$v_{ave} = (v_i + v_f) / 2$$

Force:

$$F = m a$$

Force due to gravity:

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

Chapter 3

Work

$$W = \text{force} \times \text{distance} \quad \text{or} \quad W = F \times d \quad \text{or}$$

$$W = F_{par} \times d$$

$$W = mgh \quad \text{where } m \text{ is mass in kg, } g \text{ is } 9.8 \text{ m/s}^2$$

and h is the height of the object.

Power

$$\text{power} = \frac{\text{work}}{\text{time}} \quad \text{or} \quad P = \frac{W}{t}$$

Energy

$$KE = \frac{1}{2} m v^2$$

Momentum

$$p = m v$$

where p is momentum, m is mass in kg, and v is velocity in m/s

Chapter 4

Temperature

$$F = \frac{9}{5} C + 32 \quad \text{and} \quad C = \frac{5}{9} (F - 32) \quad \text{and}$$

$$K = C + 273$$

heating and cooling

when temperature is changing

$$E = m \times SH \times \Delta T$$

$$\text{specific heat of water} = \frac{4.184 \text{ kJ}}{\text{kg } ^\circ\text{C}}$$

phase change solid to liquid

$$\text{Energy} = m \times L_f$$

heat of fusion (L_f) for H_2O is 333 kJ/kg at 0°C

phase change liquid to gas

$$\text{Energy} = m \times L_f$$

heat of vaporization for H_2O is 2260 kJ/kg at 100°C

Density

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}} \quad \text{or} \quad D = \frac{M}{V}$$

Pressure

$$P = \frac{F}{A}$$

Combined ideal gas law

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \quad \text{and} \quad PV = nRT \quad \text{remember } T \text{ in Kelvin}$$

Chapter 5

Coulombs Law

$$F = K \frac{Q_1 Q_2}{R^2} = 9 \times 10^9 \frac{Q_1 Q_2}{R^2}$$

Ohm's Law

$$I = \frac{V}{R} \quad \text{or} \quad V = I \cdot R$$

I is current in amps(A)

V is voltage in volts (V)

R is resistance in ohms (Ω)

power

$$P = I V \quad P \text{ is in Watts (W)}$$

Transformers

$$\frac{N_1}{N_2} = \frac{V_1}{V_2} = \frac{I_2}{I_1}$$

Chapter 6

$$v = f \lambda \quad \text{The speed of sound is } 3 \times 10^8 \text{ m/s}$$

Where v is speed, f is frequency and lambda is wavelength.

$$T = 1/f \quad \text{where } T \text{ is the period.}$$

