PHYSICS FORMULAE High School Physics 2-19-2018

MECHANICS

$$\bar{v} = \frac{\Delta x}{\Delta t}$$
$$\bar{a} = \frac{\Delta v}{\Delta t}$$
$$v_f = v_i + at$$
$$\Delta x = v_i t + \tfrac{1}{2} a t^2$$
$$2a\Delta x = v_f^2 - v_i^2$$
$$\Sigma F = ma$$
$$W = mg$$
$$F_g = G\frac{m_1 m_2}{r^2}$$
$$p = mv$$
$$F\Delta t = m\Delta v$$
$$\mu = \frac{F_f}{F_N}$$

Δx = displacement (change of position)

$\bar{v}$ = average velocity

$\bar{a}$ = average acceleration

v_i = initial velocity

v_f = final velocity

F = force

F_f = force of friction

F_N = normal force

F_g = gravitational force

G = Universal Gravitational Constant

p = momentum

μ = coefficient of friction

r = distance between center of masses

W = weight

ELECTRICITY AND MAGNETISM

$$F_e = k\frac{q_1 q_2}{r^2}$$
$$E = \frac{F}{q}$$
$$V = \frac{W}{q} = Ed$$
$$I = \frac{\Delta q}{\Delta t}$$
$$V = IR$$
$$P = VI = I^2 R = \frac{V^2}{R}$$

SERIES CIRCUIT

$$I_T = I_1 = I_2 = I_3 = \ldots$$
$$V_T = V_1 + V_2 + V_3 + \ldots$$
$$R_T = R_1 + R_2 + R_3 + \ldots$$

PARALLEL CIRCUITS

$$I_T = I_1 + I_2 + I_3 + \ldots$$
$$V_T = V_1 = V_2 = V_3 = \ldots$$
$$R_T = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots}$$

E = electric field intensity

I = electric current

k = electrostatic constant

$k = \frac{9 \times 10^9 \text{ Nm}^2}{\text{C}^2}$

$G = 6.67 x 10^{-11} \frac{Nm^2}{kg^2}$

P = Power

q = charge

R = resistance

V = electric potential difference

W = Work

Fundamental particle electron

$e^{-1} = -1.60 \times 10^{-19}$ C

e mass 9.11×10^{-31} kg

ENERGY

$$W = F\Delta x$$
$$P = \frac{W}{\Delta t} = \frac{\Delta E}{\Delta t} = Fv$$
$$PE_g = mgh$$
$$KE = \tfrac{1}{2} m v^2$$
$$F = -kx$$
$$PE_s = \tfrac{1}{2} k x^2$$

h = height

k = spring constant

KE = kinetic energy

PE_g = gravitational potential energy

PE_s = potential energy stored in a spring

P = power

W = work

x = change in spring length from the equilibrium position

MOTION IN 2-D

$$a_c = \frac{v^2}{r}$$
$$F_c = m\frac{v^2}{r}$$
$$1 \text{ rev} = 2\pi \text{ rad} = 360^\circ$$
$$\tau = r \times F$$
$$L = I\omega$$
$$KE = \frac{1}{2} I \omega^2$$

a_c = centripetal acceleration

F_c = centripetal force

τ = Torque

L = Angular Momentum

I = Moment of Inertia

ω = angular velocity

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HEAT ENERGY

$Q = mc\Delta T$

$Q = mL_f$

$Q = mL_V$

$\Delta L = \alpha L_o \Delta T$

c = specific heat

L_f = latent heat of fusion

L_V = latent heat of vaporization

Q = amount of heat

ΔT = change in temperature

α = coefficient of linear expansion

L_o = original length

$c_{water} = 4186 \frac{J}{kg^\circ K}$

1 cal = 4.184 joules

WAVE PHENOMENA

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

$v = f\lambda$ OR $= \nu\lambda$

$n = \frac{c}{v}$

$n_i \sin\theta_i = n_r \sin\theta_r$

$\lambda = \frac{xd}{L}$

$n\ \lambda$ = d sin θ

$\sin\theta_c = \frac{1}{n}$

c = speed of light in a vacuum = 3 x 10^8m/s

Speed of sound in air at 0^oC = 331 m/s at 20^oC 343 m/s

d = distance between slits

$f = \nu$ = frequency

L = distance from slit to screen

n = index of absolute refraction

T = period

v = speed

x = distance from central maximum to first-order maximum

λ = wavelength

θ = angle

θ_c = critical angle relative to air

GEOMETRIC OPTICS

$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$

$\frac{h_i}{h_o} = -\frac{d_i}{d_o} = m$

f = focal length

d_i = image distance

d_o = object distance

h_o = object size

h_i = image size

m = magnification

ELECTROMAGNETIC APPLICATIONS

F = Bqv

$F = BIL$

$V = BLv$

$\frac{N_P}{N_S} = \frac{V_P}{V_S}$

$V_P I_P = V_S I_s$ (ideal)

$efficiency = \frac{V_S I_S}{V_P I_P}$

B = magnetic field strength

I_P = current in primary

I_S = current in secondary

N_P = number of turns in primary coil

N_S = number of turns in secondary coil

V_P = voltage of primary

V_S = voltage of secondary

L = length of conductor

V = electric potential difference