MPS Physics II Formulas

FORMULAS	VARIABLES	UNITS
Electricity & Magnetism		
$E = \frac{F_e}{q}$	F_e = electric force	Newtons, N
$V = \frac{U_e}{q}$	q = electric charge in the field	Coulomb, C
	E = electric field	Newtons per Coulomb, N/C
$V = IR$ (*Ohm's Law*)	V = electric potential	Volts, V
	U_e = electric potential energy	Joules, J
$P = IV = I^2R = \frac{V^2}{R}$	I = electric current	Amperes, A
$R_{eq\ series} = R_1 + R_2 + R_3 \ldots$	R = electric resistance	Ohms, Ω
$R_{eq\ par} = [\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \ldots .]^{-1}$	P = power	Watts, W
	V_p, V_s = primary & secondary V	Volts, V
$\frac{V_p}{N_p} = \frac{V_s}{N_s}$	N_p, N_s = primary & secondary number of turns/coils	(n/a)
Universal Gravitation		
$F_g = \frac{Gm_1m_2}{d^2}$	F_g = gravitational force	Newtons, N
	m_1, m_2 = mass #1 and mass #2	kilograms, kg
	d = distance between masses	meters, m
$g = \frac{Gm_p}{r^2}$	m_p = mass of planet	kilograms, kg
	r = radius of planet	meters, m
	g = acceleration due to gravity	m/s^2
Circular Motion		
$C = 2\pi r$	C = circumference	meters, m
	r = radius	meters, m
$a_c = \frac{v^2}{r}$	a_c = centripetal acceleration	m/s^2
	F_c = centripetal force	Newtons, N
$F_c = ma_c = m\frac{v^2}{r}$	m = mass of circling object	kilograms, kg
Conservation of Momentum		
$m_1v_1 + m_2v_2 = m_1v_1' + m_2v_2'$	m_1, m_2 = m of objects 1, 2	kilograms, kg
	v_1, v_2 = initial v of objects 1, 2	meters per second, m/s
	v_1', v_2' = final v of objects 1, 2	meters per second, m/s

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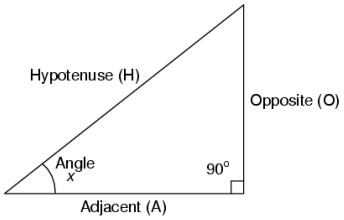
Light		
$n = \frac{c}{v}$ $n_i \sin\theta_i = n_r \sin\theta_r$ (*Snell's Law*) $\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$ (*Thin Lens Equation*) $E = mc^2$	n = index of refraction	(n/a)
	v = speed of light in the medium	meters per second, m/s
	Θ_i, Θ_r = angle of incidence and refraction	degrees, °
	f = focal length of lens	meters, m
	d_o = distance between object and lens	meters, m
	d_i = distance between image and lens	meters, m
	E = energy	Joules, J
	m = mass	kilogram, kg

Trigonometry Functions

$\sin x = \frac{O}{H}$

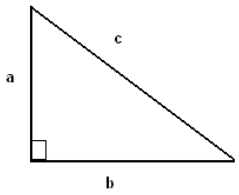
$\cos x = \frac{A}{H}$

$\tan x = \frac{O}{A}$



Pythagorean Theorem

$a^2 + b^2 = c^2$



Physical Constants

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

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

g = average acceleration due to gravity on Earth at sea level = $9.81\ m/s^2 \approx 10\ m/s^2$

c = speed of light in a vacuum = 3.00×10^8 m/s