PHYSICS FORMULAS

SCIENTIFIC NOTATION

Prefixes and symbols to form decimal multiples and/or submultiples.

Power of ten	E Notation	Decimal Equivalent	Prefix	Phonic	Symbol
10^{12}	E + 12	1 000 000 000 000	tera	ter'a	T
10^{9}	E + 09	1 000 000 000	giga	ji'ga	G
10^{6}	E + 06	1 000 000	mega	meg'a	M
10^{3}	E + 03	1 000	kilo	kil'o	k
10^{2}	E + 02	100	hecto	hek'to	h
10	E + 01	10	deka	dek'a	da
10^{-1}	E - 01	0.1	deci	des'i	d
10^{-2}	E - 02	0.01	centi	sen'ti	c
10^{-3}	E - 03	0.001	milli	mil'i	m
10^{-6}	E - 06	0.000 001	micro	mi'kro	μ
10^{-9}	E - 09	0.000 000 001	nano	nan'o	n
10^{-12}	E - 12	0.000 000 000 001	pico	pe'ko	p
10^{-15}	E - 15	0.000 000 000 000 001	femto	fem'to	f
10^{-18}	E - 18	0.000 000 000 000 000 001	atto	at'to	a

KINEMATIC FORMULAS

Coefficient of Friction: $\mu = \frac{F}{N}$

μ = coefficient of friction
F = force of friction N = force normal to surface

Velocity: $v_{av} = \frac{d}{t}$

v_{av} = average velocity
d = distance t = elapsed time

Acceleration: $a_{av} = \frac{v_f - v_i}{t}$

a_{av} = average acceleration v_i = initial velocity
v_f = final velocity t = elapsed time

Newton's 2nd Law of Motion: $F = m \cdot a$
F = force m = mass a = acceleration

Law of Universal Gravitation: $F = G\frac{m_1 \cdot m_2}{d^2}$

F = force of attraction $m_1 \cdot m_2$ = product of masses
G = gravitational constant d = distance between their centers

Centripetal Force: $F = \frac{m \cdot v^2}{r}$

F = cetripetal force
m = mass v = velocity r = radius of path

Pendulum: $T = 2\pi\sqrt{\frac{l}{g}}$

T = period l = length g = acceleration of gravity

Work: $W = F \cdot d$
W = work F = force d = distance

Ideal Mechanical Advantage: IMA = d_A/d_L
d_A = distance through which applied force F acts
d_L = distance load moves against force W without friction
Actual Mechanical Advantage: AMA = W/F

Mechanical Equivalent of Heat: $W = J \cdot Q$
W = work J = mechanical equivalent of heat Q = heat

ENERGY RELATIONSHIPS

Kinetic Energy: $K = {}^1/_2\, m \cdot v^2$
K = kinetic energy m = mass v = velocity

Potential Energy: $V = m \cdot g \cdot h$
V = potential g = acceleration of gravity
W = mass h = vertical distance (height)

Relationship between Mass and Energy: $E = m \cdot c^2$
E = energy m = mass c = velocity of light

OPTICAL RELATIONSHIPS

Wave Formula: $v = f \cdot \lambda$
v = wave speed f = frequency λ = wave length

Uniformly Illuminated Surface: $E = \frac{lm}{A}$
E = illumination
lm = luminous flux A = uniformly illuminated area

Images in Mirrors and Lenses: $\frac{S_o}{S_i} = \frac{D_o}{D_i}$

S_o = object size D_o = object distance
S_i = image size D_i = image distance

Focal Length of Mirrors and Lenses: $\frac{1}{f} = \frac{1}{D_o} + \frac{1}{D_i}$
f = focal length
D_o = object distance D_i = image distance

Snell's Law: $n_i \sin\Theta_i = n_2 \sin\Theta_2$
n_i = refractive index of ith material
Θ_i = angle between ray and normal to surface

ELECTRICITY AND MAGNETISM

Electric Current: $I = \frac{q}{t}$

I = current q = quantity of charge t = time

Coulomb's Law of Electrostatics: $F = k\frac{q_1 \cdot q_2}{d^2}$
F = force between two charges
k = proportionality constant
$q_1 \cdot q_2$ = product of charges
d = distance separating charges

Capacitance of a Capacitor: $C = \frac{q}{V}$
C = capacitance of a capacitor
V = potential difference between plates
q = charge on either plate

Ohm's Law of Resistance: $E = I \cdot R$
E = emf of source I = current in the circuit
R = resistance of the circuit

Joule's Law: $Q = I^2 \cdot R \cdot t$
Q = heat energy I = current R = resistance t = time

Faraday's Law of Electrolysis: $m = z \cdot I \cdot t$
m = mass z = electrochemical equivalent
I = current t = time

Induced emf: Coil in a Magnetic Field: $E = -N\frac{\Delta\Phi}{\Delta t}$
E = induced emf N = number of turns
$\Delta\Phi/\Delta t$ = the change in flux linkage in a given interval of time

Induced emf: Conductor in a Magnetic Field: $E = B \cdot l \cdot v$
E = induced emf B = flux density of the magnetic field
l = length of conductor
v = velocity of conductor across magnetic field

Instantaneous Voltage: $e = E_{max} \sin\Theta$
e = instantaneous voltage
E_{max} = maximum voltage
Θ = angle between the plane of the conducting loop and the perpendicular to the magnetic flux (displacement angle)

Instantaneous Current: $i = I_{max} \sin\Theta$
i = instantaneous current
I_{max} = maximum current
Θ = displacement angle

Math/Physics