Equations of Motion, Force, Energy, & Electromagnetism

x_f = Final Position <m> v_f = Final Velocity <m/s> v_{ave} = Average velocity <m/s> c = (speed of light)
x_i = Initial Position <m> v_i = Initial Velocity <m/s> Δ = "Chang In" r = radial distance h = height <m>

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a = Acceleration <m/s^2> m = Mass <kg> t = time <s>

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g_e = Earth's Gravity, 9.81 <m/s^2> p = Momentum <$kg \cdot m/s^2$>

F = Force <*Newton*, N> W_f = Weight <N> W = Work < *Joule*, J> KE = Kinetic Energy <J>
PE = Potential Energy < *Joule*, J> Q = Heat <*Joule*, J> P = Power <Watts>

$T_F = (1.8 \cdot T_C) + 32$ $T_C = 0.55 (T_F + 32)$ $T_K = 273 + T_C$ $(T_K > 0)$ $\Delta T = [T_f] - [T_i]$

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f = frequency <*Hertz*, Hz> T = Period <s> λ = Wave Length <m>

I = Electric Current <*amp,* A> R = Resistance <*ohm,* Ω> V = Volts <V> q = Electric Charge <C, Coulomb>

B = Magnetic Field Strength <*Tesla*, T>

"**Want to find**": "(**given)**" : "**Equation**"

Position

d: (v, t): d = [v][t]
x_f: (x_i, v, t): $x_f = [x_i] + [v][t]$
x_f: (v_i, a, t): $x_f = [v_i][t] + \frac{1}{2} [a][t]^2$

r: (F, m_1, m_2, G): $r = \sqrt{\frac{G m_1 m_2}{F}}$

Velocity

v_{ave}: (x_f, x_i, t): $v = \frac{x_2 - x_1}{t}$

v_{ave}: (v_f, v_i): $v_{ave} = \frac{v_f + v_i}{2}$

v_f: (v_i, a, t): $v_f = [v_i] + [a][t]$
v_f: (v_i, a, x_f): $[v_f]^2 = [v_i]^2 + 2[a][x_f]$
v_i: (v_f, a, t): $v_i = [v_f] - [a][t]$

v_f: (KE, m): $v_f = \sqrt{\frac{2[KE]}{m}}$
v_{emr} = c : (λ, *f*): $v = \lambda \cdot f$

Mass

m: (F, a): m = F/a
m: (p, v): m = p/v
m: (KE, v): $m = 2[KE]/[v]^2$
m: (PE, g, h): m = [PE]/[g][h]
m: (Q, c, ΔT): m = [Q]/ [c][ΔT]

Momentum

p = [m][v]

Acceleration

a: (v_f, v_i, t): $a = \frac{[v_f] - [v_i]}{[t]}$

a: (x_f, v_i, t): $a = \frac{2([x_f] - [v_i][t])}{[t]^2}$

Force

F: (m, a): F = [m][a]
W_f: (m, g): W_f = [m][g]

F_g: (m_1, m_2, G, r): $F = \frac{[G][m_1][m_2]}{[r]^2}$

F_e: (k, q_1, q_2, r): $F = \frac{[k][q_1][q_2]}{[r]^2}$

Energy

w: (F, d): w = [F][d]
w: (m, a, d): w = [m][a][d]
w: (F, d, θ): w = [F][d][cosθ]
PE: (m, g, h): PE = [m][g][h]
KE: (m, v): $KE = [0.5][m][v]^2$
Q: (c, m, ΔT): Q = [c][m][ΔT]
Conservation of:
$\Delta KE + \Delta PE + \Delta Q = 100\%$

Power

P: (w, t): P = [w]/[t]
P: (F, d, t): P = [F][d]/[t]
P: (m, a, d, t): P = [m][a][d]/[t]
P: (I, V): P = [I][V]
P: (I, R): $P = [I]^2[R]$

Frequency, Period, and Wave Length

f: (T): *f* = 1/[T]
f: (v, λ): *f* = [v]/[λ]
λ: (v, *f*): λ = [v]/[f]

Electromagnetic Radiation

f: (c, λ): *f* = [c]/[λ]
λ: (c, *f*): λ = [c]/[f]

Electromagnetism

Ohm's Law

V: (I, R): V = [I][R]
R: (I, V): R = [V]/[I]
I: (V, R): I = [V]/[R]

Series Resistance

$R_T = R_1 + R_2$ (etc.)

Parallel Resistance

$$R_T = \frac{1}{\left[\frac{1}{[R_1]} + \frac{1}{[R_2]}\right]}$$

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