*instantaneous current & q is charge in coulombs*

$$i = \frac{dq}{dt} \qquad q = \int i\,dt$$

*instantaneous power & energy (or work) w*

$$p = \frac{dw}{dt} \qquad w = \int p\,dt$$

*instantaneous Capacitor current & voltage*

$$i_C = C\frac{dv}{dt} \qquad v_C = \frac{1}{C}\int i\,dt$$

*instantaneous induced voltage & flux*

$$v_{ind} = -N\frac{d\emptyset}{dt} \qquad \emptyset = (-1/N)\int v_{ind}\,dt$$

*instantaneous induced voltage & current*

$$v_{ind} = -L\frac{di}{dt} \qquad i = (-1/L)\int v_{ind}\,dt$$

*instantaneous mutual inductance*

$$v_2 = -M\frac{di_1}{dt} \qquad i_1 = (-1/M)\int v_2\,dt$$

*Kirchhoff's Current Law*

$$i_g = C\frac{dv}{dt} + \frac{v}{R} \ - (1/L)\int v_{ind}\, dt$$

*Kirchhoff's Voltage Law*

$$v_g = -L\frac{di}{dt} + Ri + (1/C)\int i\, dt$$

*Acceleration due to gravity*

$$a = -32ft/s^2 \qquad a = -9.8m/s^2$$

*velocity*

$$v = \int a\, dt$$

*distance*

$$s = \int v\, dt$$

*Logarithms*

$$\log N = X \qquad 10^X = N$$

*Circles*

$$(x-h)^2 + (y-k)^2 = r^2$$

*Parabolas*

$$(y-k)^2 = 4p(x-h) \qquad (x-h)^2 = 4p(y-k)$$

*Area of a Circle*

$$A = \pi r^2$$

*Area & Circumference of a Circle*

$$A = \pi r^2 \qquad C = 2\pi r$$

*Volume of a Cylinder*

$$V = \pi r^2 h$$

*Volume of a Sphere*

$$V = \frac{4}{3}\pi r^3$$

Trig Functions Formulas:

$\Theta = \frac{s}{r}$

- angle Θ is in radians, s is the distance along the arc and r is the radius of the arc.

  $\omega = \frac{d\Theta}{dt}$
  - $\omega$ is angular speed

  $\alpha = \frac{d\omega}{dt} = \frac{d^2\theta}{dt^2}$
  - $\alpha$ is angular acceleration

$S = \theta r$

- $S$ is the linear distance along an arc, Θ is the angle in radians, and r is the radius of the arc.

  $v = \frac{ds}{dt} = r\frac{d\theta}{dt}, or\ v = r\omega$
  - $v$ is linear speed

  $a = \frac{dv}{dt} = \frac{d^2s}{dt^2} = r\frac{dw}{dt} = r\frac{d^2\theta}{dt^2}, or\ a = r\alpha$
  - $a$ is linear acceleration

$v_x = \frac{dx}{dt} = r\omega \sin\theta$

- $v_x$ is the velocity or speed of the x or horizontal component

$v_y = \frac{dy}{dt} = r\omega \cos\theta$

- $v_y$ is the velocity or speed of the y or vertical component

$$\frac{d}{dx} \sin u = \cos u \frac{du}{dx}$$

$$\frac{d}{dx} \cos u = -\sin u \frac{du}{dx}$$