Summary of Maxwell's Equations

Maxwell's Equations (Point Form)

$$\nabla \times \vec{H} = \vec{J} + \frac{\partial \vec{D}}{\partial t} \qquad \nabla \cdot \vec{B} = 0$$

$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t} \qquad \nabla \cdot \vec{D} = \rho_V$$

Maxwell's Equations (Integral Form)

$$\oint_L \vec{H} \cdot d\vec{L} = \iint_A \left[\vec{J} + \frac{\partial \vec{D}}{\partial t} \right] \cdot d\hat{n} \qquad \oiint_A \vec{B} \cdot d\hat{n} = 0$$

$$\oint_L \vec{E} \cdot d\vec{L} = -\iint_A \frac{\partial \vec{B}}{\partial t} \cdot d\hat{n} \qquad \oiint_A \vec{D} \cdot d\hat{n} = \iiint_V \rho_V \, dV$$

Maxwell's Equations (Word Form)

Magnetic fields circulate around currents and changing electric flux densities.	There are no magnetic charges (monopoles) in the universe.
A change in magnetic flux excites a voltage around the flux perimeter.	Electric charges spawn electric flux.

Quantities and Units

Variable	Units	Technical Name
$\vec{E}$	Volts/m	Electric Field
$\vec{H}$	Amps/m	Magnetic Field
$\vec{D}$	Coulombs/m^2	Electric Flux Density
$\vec{B}$	Webers/m^2	Magnetic Flux Density
$\vec{J}$	Amps/m^2	Current Density
ρ_V	Coulombs/m^3	Charge Density (Volume)

Note: Also be able to *recognize* the various forms of Ampere's Law, Faraday's Law, Coulomb's Law, Gauss's Law, the Biot-Savart Law, the Vector Wave Equation, and the Scalar Wave Equation.