

# Maxwell's Equations in English

Gauss's Law:  $\oint_S \vec{E} \cdot d\vec{A} = \frac{q_{\text{enc}}}{\epsilon_0}$

Gauss's Law for B:  $\oint_S \vec{B} \cdot d\vec{A} = 0$

Faraday's Law:  $\oint_L \vec{E} \cdot d\vec{s} = - \frac{d\Phi_B}{dt}$

Ampere's Law:  $\oint_L \vec{B} \cdot d\vec{s} = \mu_0 I_{\text{enc}} + \mu_0 \epsilon_0 \frac{d\Phi_E}{dt}$

# Maxwell's Equations in English

Left side is  
the field  
that is being  
produced.

$$\oint_S \vec{E} \cdot d\vec{A} = \frac{q_{\text{enc}}}{\epsilon_0}$$

$$\oint_S \vec{B} \cdot d\vec{A} = 0$$

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Right side  
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$$\oint_S \vec{E} \cdot d\vec{A} = \frac{q_{\text{enc}}}{\epsilon_0}$$

Right side  
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Charges produce electric field.

# Maxwell's Equations in English

Left side is  
the field  
that is being  
produced.

$$\oint_S \vec{B} \cdot d\vec{A} = 0$$

Right side  
is the  
source.

There is no charge-like source of magnetic field.

# Maxwell's Equations in English

Changing magnetic flux produces electric field.

The diagram illustrates Faraday's Law of Induction. It features a central equation with two rounded rectangular boxes on either side. The left box, outlined in red, contains the text "Left side is the field that is being produced." in red. The right box, outlined in blue, contains the text "Right side is the source." in blue. A black arrow points from the right box to the left box, indicating the causal relationship between the source and the field.

$$\oint_L \vec{E} \cdot d\vec{s} = - \frac{d\Phi_B}{dt}$$

Left side is the field that is being produced.

Right side is the source.

# Maxwell's Equations in English

currents (moving charges) produce magnetic field  
and  
changing electric flux produces magnetic field.

Left side is  
the field  
that is being  
produced.

$$\oint_L \vec{B} \cdot d\vec{s} = \mu_0 I_{\text{enc}} + \mu_0 \epsilon_0 \frac{d\Phi_E}{dt}$$

Right side  
is the  
source.

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