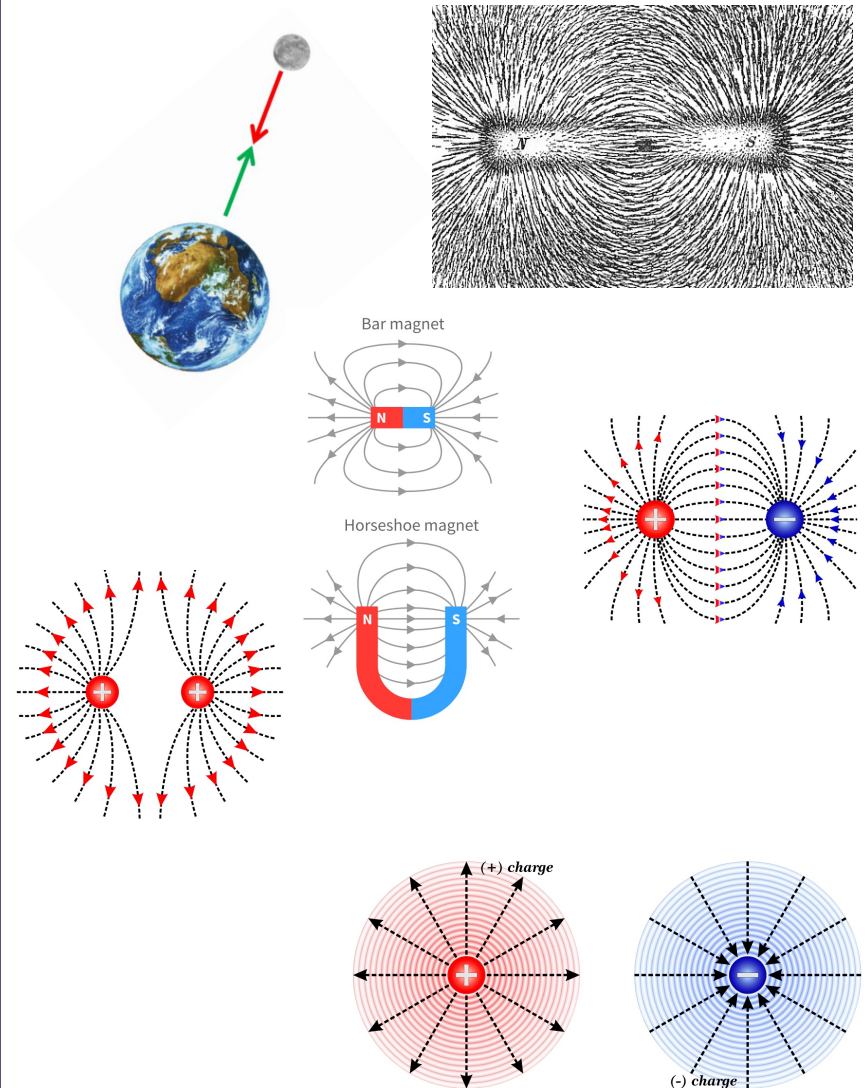


Electric Fields

- Key Terms
- Visualizing Fields of Force Gravitational
- Visualizing Fields of Force Magnetic
- Visualizing Fields of Force Electric
- Rules for Fields
- Electric Fields
- Common Electric Field Diagrams



Preview File

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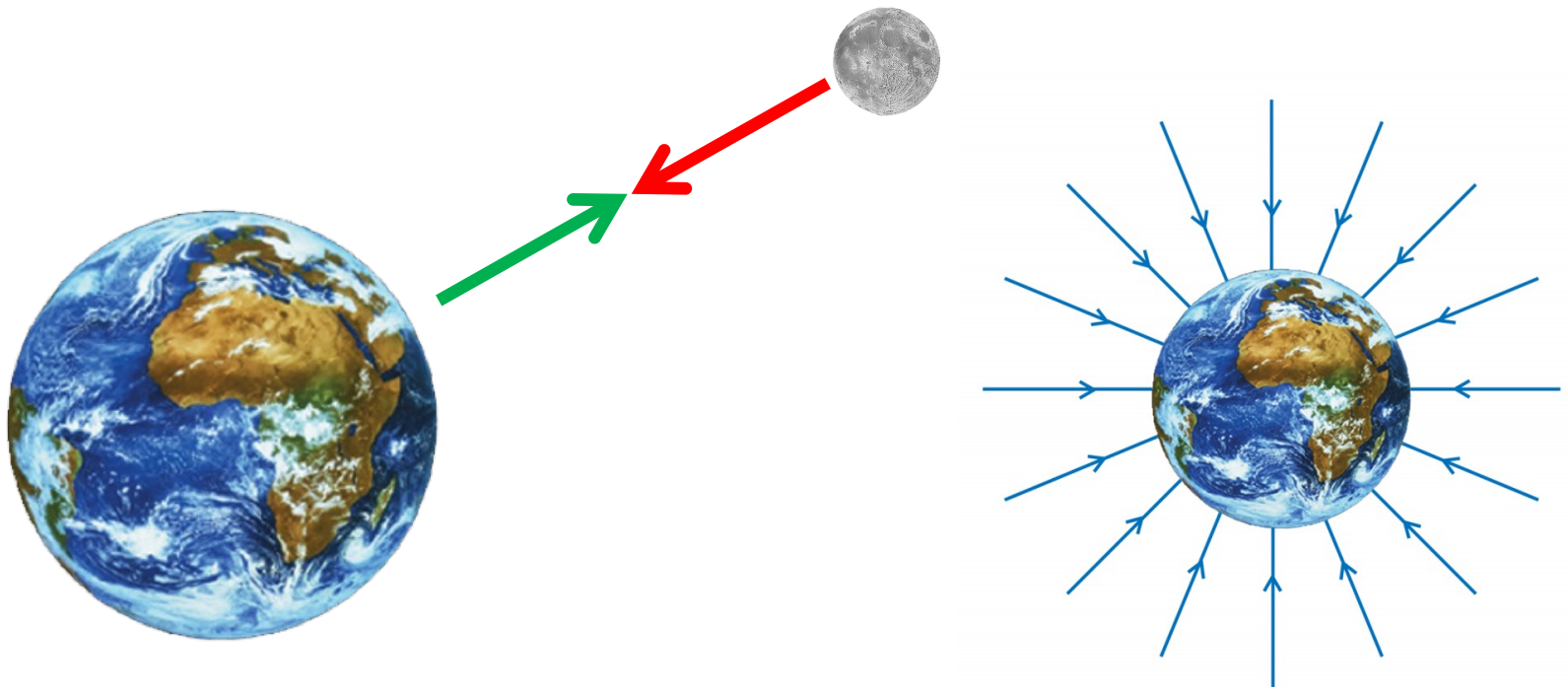


Key Terms

- What is meant by “action-at-a-distance”?
 - _____
- What is meant by “field theory”?
 - The theory that explains interactions between bodies or particles in terms of fields
- What is meant by “field of force”?
 - _____

Visualizing Fields of Force

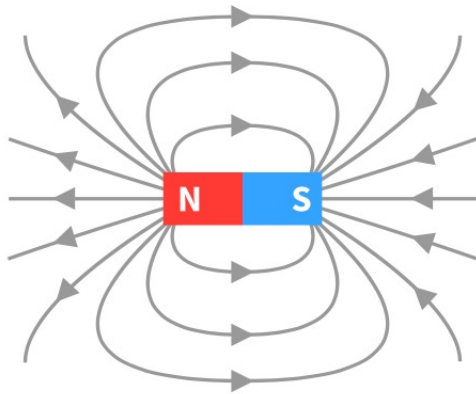
Gravitational



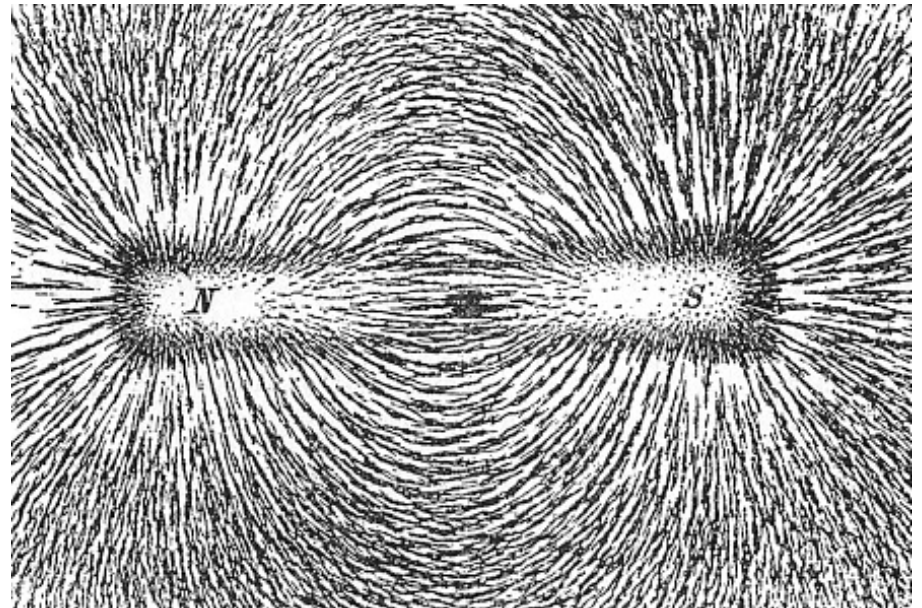
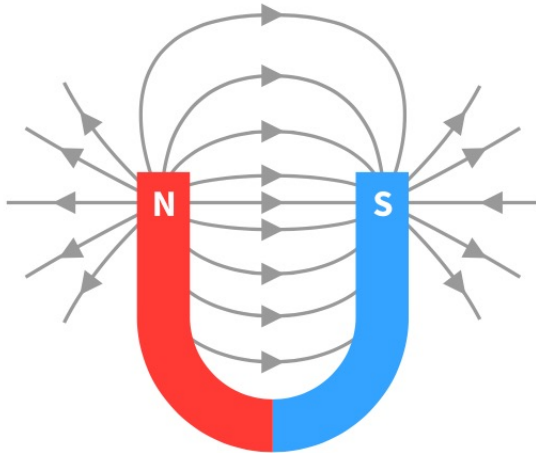
Visualizing Fields of Force

Magnetic

Bar magnet



Horseshoe magnet



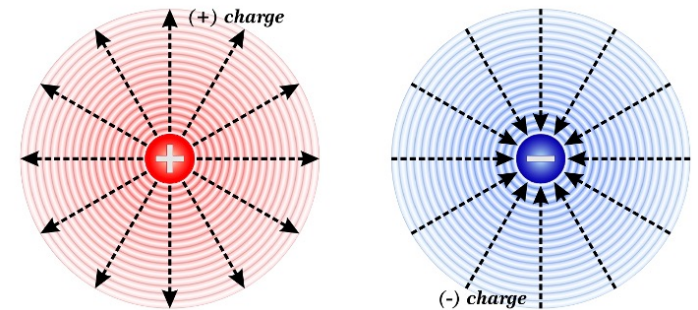
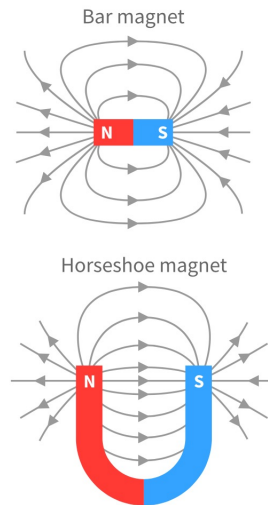
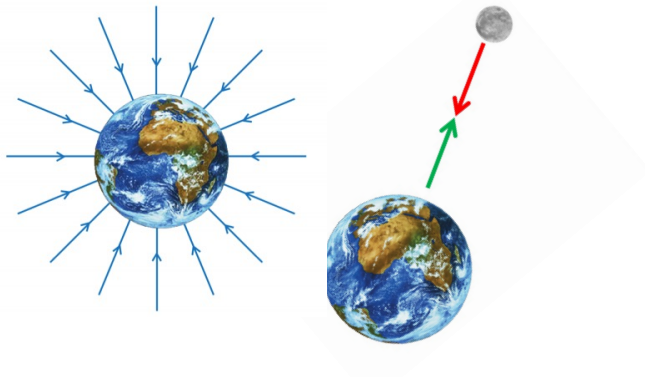
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Rules for Fields

Gravitational

Magnetic

Electric



For all

- Field lines do not cross
- The density of the field lines indicates the strength of the field

Electric Field

An Electric Field is quantified by the amount of force on a charge (N/C).

$$\varepsilon = \frac{F_E}{q}$$

Electric Field Equations

$$\varepsilon = \frac{F_E}{q}$$

$$\varepsilon = \frac{kq_1}{r^2}$$

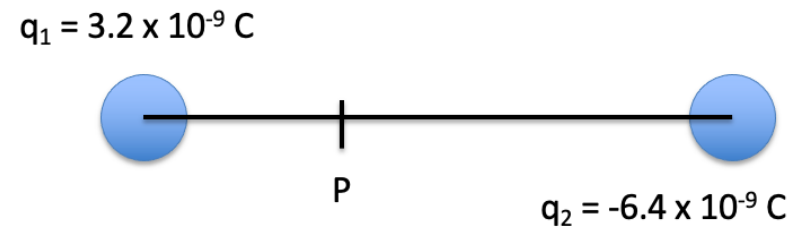
$$F_E = \frac{kq_1q_2}{r^2}$$

$k = 9.0 \times 10^9 \text{ Nm}^2/\text{C}^2$, units must be in N, m and C

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Check Your Understanding

Two charges, one of $3.2 \times 10^{-9} \text{ C}$, the other of $-6.4 \times 10^{-9} \text{ C}$, are 42 cm apart. Calculate the net electric field at a point P (assume p to be +), 15 cm from the positive charge, on the line connecting the charges.



$$\varepsilon = \frac{kq_1}{r^2}$$

Check Your Understanding

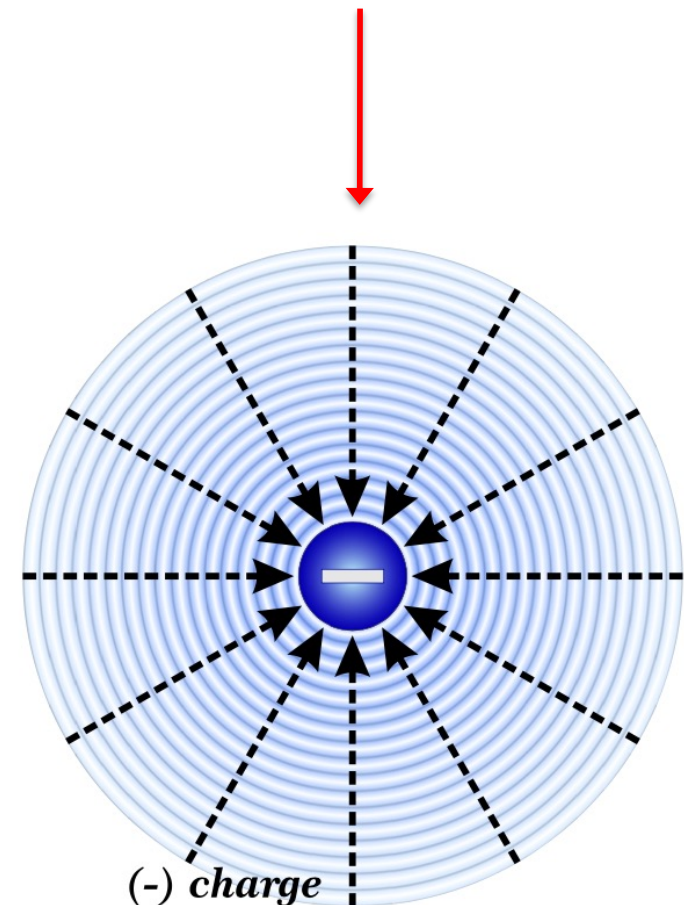
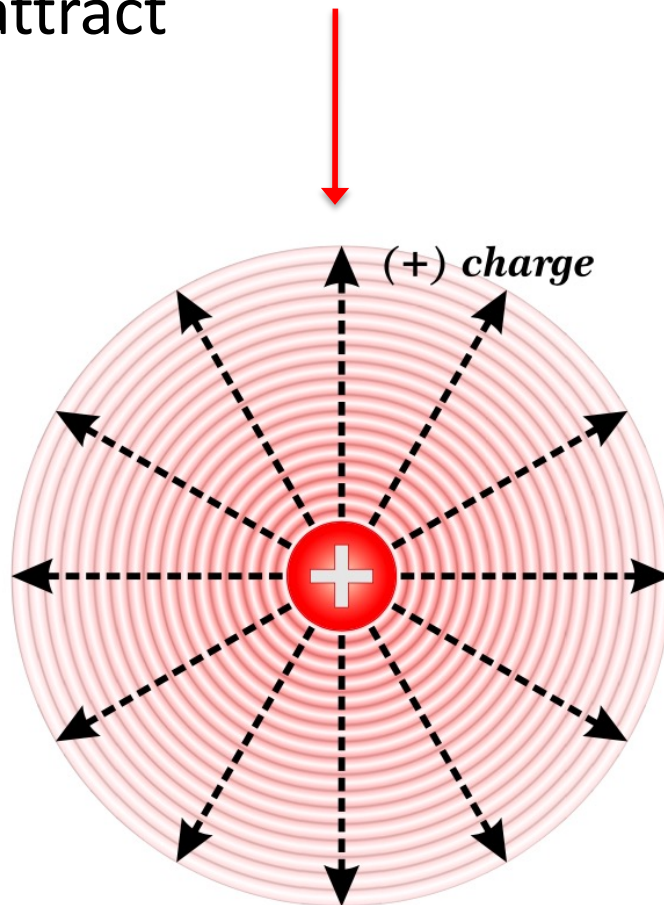
At a certain point P in an electric field, the magnitude of the electric field is 12 N/C. Calculate the magnitude of the electric force that would be exerted on a point charge of 2.5×10^{-7} C, located at P.

$$F_E = \frac{kq_1q_2}{r^2} \quad \varepsilon = \frac{F_E}{q} \quad \varepsilon = \frac{kq_1}{r^2}$$

Common Electric Field Diagrams

Point charge/uniformly charged spheres.

- The charge we are comparing our sphere to is always positive
- Therefore, positive spheres would repel, and negative spheres would attract



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Common Electric Fields

Dipole (two poles) attract.

