

# Physics

Semester 2

Weeks 3 - 4

## Tuesday / Wednesday (Jan 20 & 21)

- PhET Simulation (Exploring Electric Charges)
- Substitute on Wednesday

# Thursday / Friday (Jan 22 & 23)

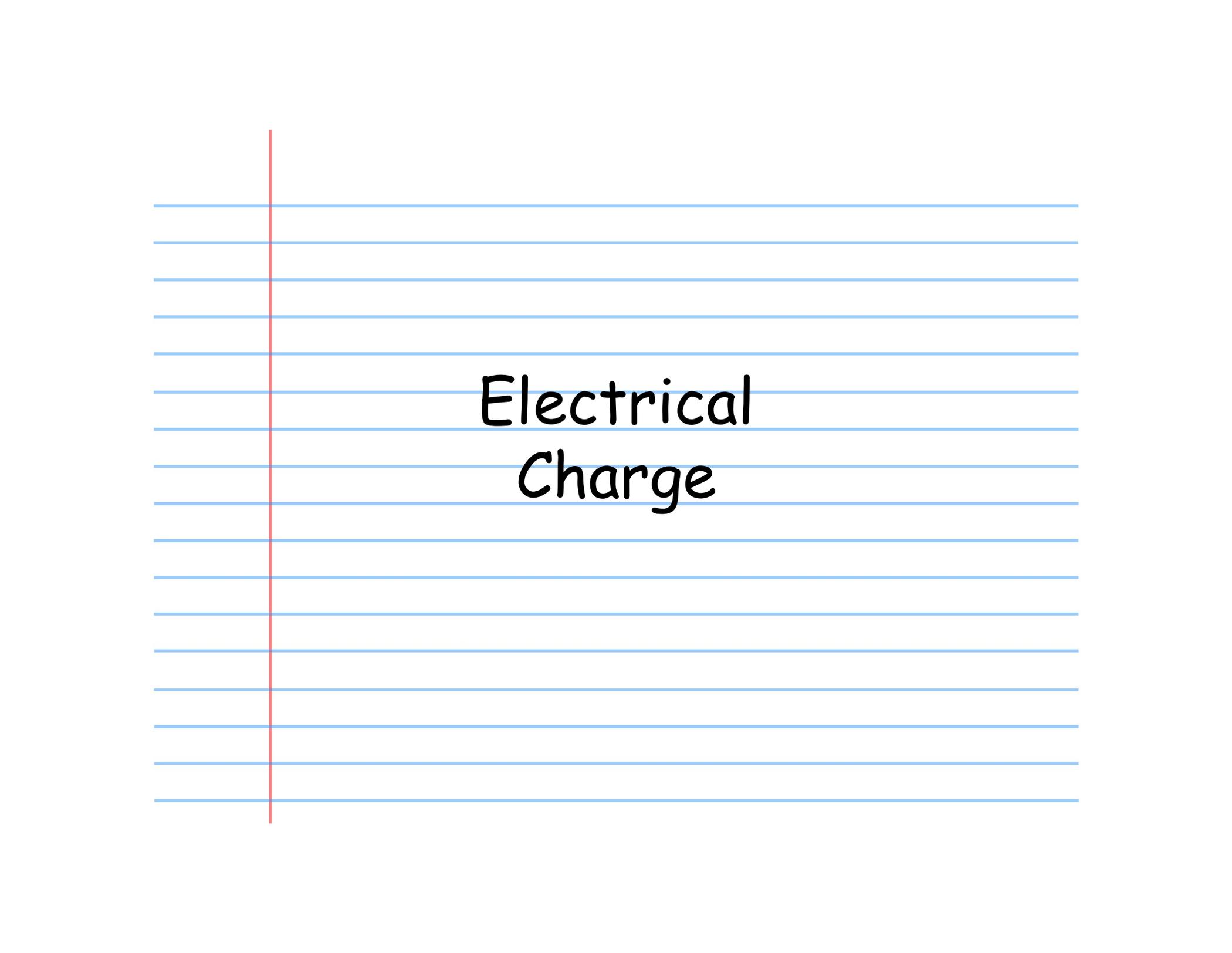
- Test Unit 5
  - DCA

Monday / Tuesday (Jan 26 & 27)

- **T:** [6A](#) - Use scientific notation and predict how the magnitude of the electric force between two objects depends on their charges and the distance between their centers using Coulomb's law.
- **O:** I will begin exploring electrostatics
- **D:** by completing a Page Keeley, a lab, and a close read including drawing a diagram.
- **A:** electrostatics, Coulomb's Law
- **Y:** How is Coulomb's law similar to the Universal Gravitational law?

Wednesday / Thursday (Jan 28 & 29)

- T: electrostatics
- O: I will be able to explain the concepts of electrostatics
- D: by taking notes, working on problems with my partner, and completing a worksheet.
- A: proton, electron, insulators, conductors (taking notes and discussing with peers)
- Y: How is electrostatic charge calculated?



Electrical  
Charge

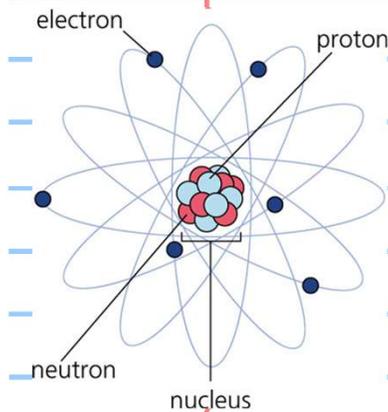
Electric Charge

Basic property of elementary particles of which all matter is composed (electrons, protons).

Types of charge

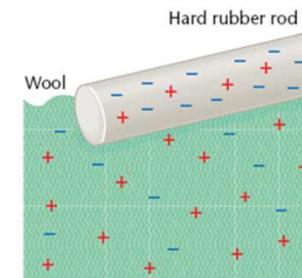
Positive - carried by protons

Negative - carried by electrons



Charging up...

Acquiring charge is the process of transferring electrons.



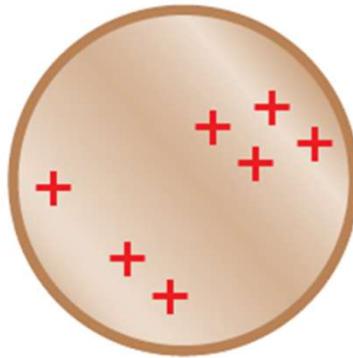
**FIGURE 20-3** As the rubber rod strokes the wool, electrons are removed from the wool atoms and cling to the rubber atoms. In this way, both objects become charged.

Charge is conserved!

Combined total charge is constant (individual charges are never created or destroyed).

Electrical Insulators

Materials through which electric charges do not move easily (glass, dry wood, dry air, plastics).

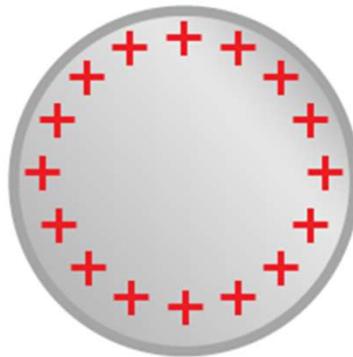


Insulator



Electrical  
Conductors

Materials that allow electric charge to move about easily (copper, aluminum, graphite).

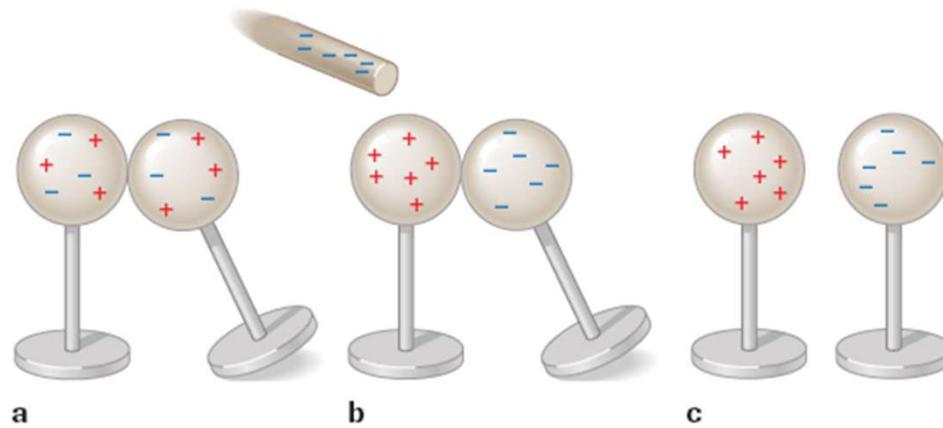


Conductor



Charging by  
Conduction

Charging a neutral body by touching it  
with a charge body.



*Electroscope: a device used to detect  
electric charge*

Charging by  
Induction

Charging an object without touching it!



a



b



c

Electric  
Force

Charges exert force on other charges  
over a distance.

Like charges repel, opposite charges  
attract.



Coulomb

SI unit of charge. The symbol for charge is  $q$ .

One Coulomb is the charge of  $6.25 \times 10^{18}$  electrons or protons.



Charles-Augustin de Coulomb

Coulomb's  
Law

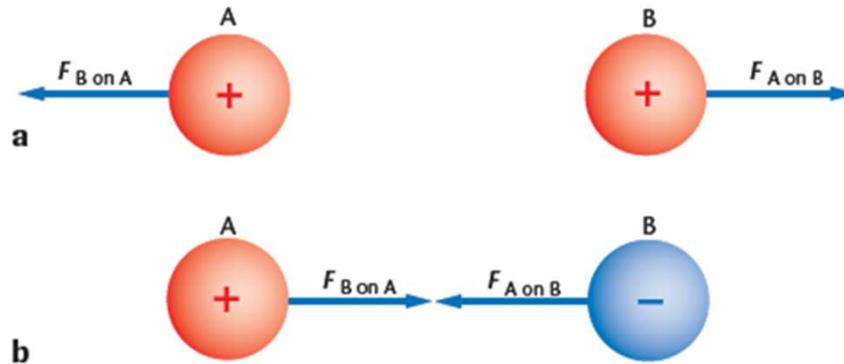
The magnitude of the force between charges  $q_A$  and  $q_B$ , separated by distance  $d$  is proportional to the magnitude of the charges and inversely proportional to the square of the distance:

$$F = K \frac{q_A q_B}{d^2}$$

where  $K = 9.0 \times 10^9 \text{ N m}^2 / \text{C}^2$

## Electric Force

A vector quantity: magnitude and direction.



*Always draw a diagram when trying to determine the direction of the electric force.*

# Friday (January 30)

- C-day