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Unit 5A
Introduction to Electricity
Note-Taking Guide TEACHER

Main Ideas, Key Points, Questions:

After watching the video segment, write down key points, main ideas, and big questions.

Objective(s):

- ***Develop both a conceptual and an applied understanding of electric charge and force.***
- ***Understand static and current electricity based on knowledge of atomic structure.***

Notes:

During the video segment, use words, phrases, or drawings to take notes.

Summary:

After watching the video segment, write at least three sentences explaining what you learned.
You may ask yourself: "If I was going to explain this to someone else, what would I say?"

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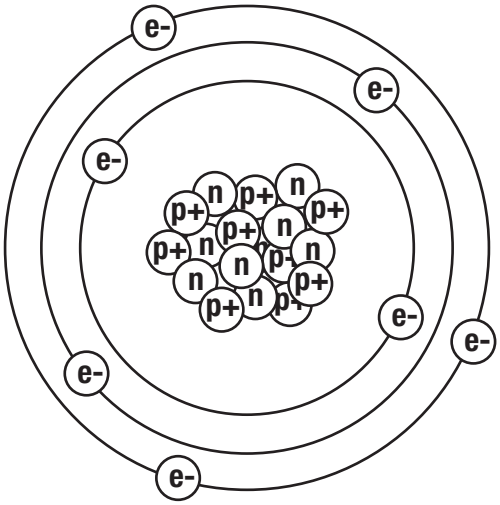
Questions to Consider TEACHER

Answer the following.

1. **Draw a picture of an atom. Include protons, neutrons, and electrons.**



Key elements of the picture will include: protons and neutrons grouped in a central core; electrons moving around the center of the atom; protons labeled with a positive charge, electrons labeled with a negative charge, and neutrons with no charge. Variations on other aspects, such as the shape of electron orbitals/regions, and the proportion of protons to neutrons, are generally acceptable and ultimately based on the teacher's judgment.

2. **All mass is positive because nothing weighs less than zero. Why do we believe that charge is different from mass – that there is only positive mass but there are both positive and negative charges?**

While we have only seen gravitational attraction and never repulsion, we do observe both electrical attraction and repulsion. Therefore, we believe there are two types of charge, each with the opposite behavior.

3. **Name two ways to decrease the electric force between two charged objects.**

To decrease the electric force between two charged objects, either move them farther apart or remove the charge from either or both objects.

questions continued on next page

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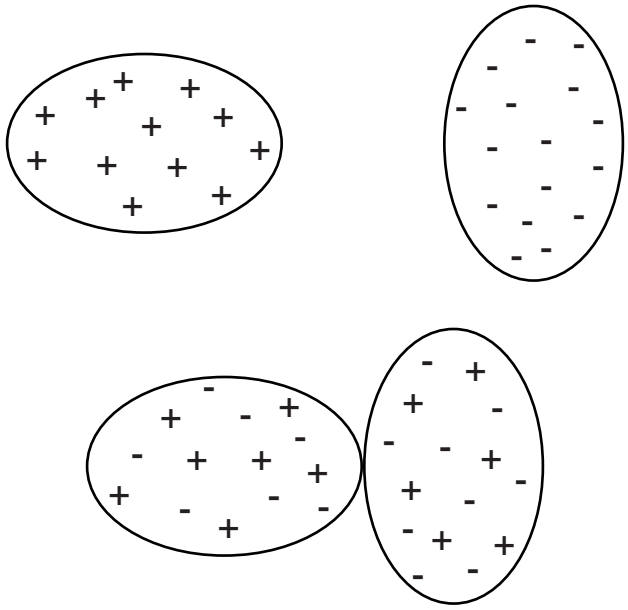
4. When objects exchange charge, why do we believe that the negative charge moves rather than the positive charge?

The molecular structure of solid conductors is like a lattice: the nuclei (and therefore the protons) are bound in place, while the electrons are free to move from one atom to another.

5. Imagine that the charged conductors below come in contact. Draw how the charges will spread out once the conductors are touching.



Since the objects are conductors, the positive and negative charges will spread out evenly across their combined surfaces.

6. Name the four fundamental forces and rank them from strongest to weakest.

strong force (binds atomic nuclei together)

electromagnetism (causes attraction and repulsion among objects with charge)

weak force (causes radioactive decay)

gravity (causes attraction among objects with mass)

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7. **You are handed two mystery materials and told to determine which one accepts negative charges more easily. Using a positively charged, helium-filled balloon that is tied to a tabletop with a 1 m long string, describe a simple experiment that will help you identify the more attractive material.**

Rub the two materials together and bring one of the materials close to the balloon without touching it. Repeat this process with the second material. Whichever material pulls the balloon in farthest is the most negatively charged and therefore accepts electrons more easily. If both materials affect the balloon equally, they have similar electronegativity and may be made of the same substance.