

Lesson Outline**LESSON 1*****Electric Charges and Electric Forces*****A. Electric Charges**

1. Each atom contains a core called the _____.
 - a. The nucleus is made up of smaller particles called protons and _____.
 - b. Atoms also contain _____, which move around the nucleus.
 - c. Protons and _____ have electric charge.
2. Electric charges are either positive or _____.
 - a. Protons have _____ charge; electrons have _____ charge.
 - b. Atoms are _____ because they have equal amounts of positive and negative charges.
 - c. Electrically neutral objects become _____ when they gain or lose electrons.
 - d. An object that loses electrons becomes _____ charged.
 - e. An object that gains electrons becomes _____ charged.
3. _____ is the loss of unbalanced electric charge by an object.
 - a. Some electric discharge occurs _____, for example, maybe you have noticed that static cling lasts longer on dry days.
 - b. A lightning strike is an example of an electric discharge that occurs _____.
4. _____ move at different rates through different materials.
 - a. Materials through which electric charge moves easily are called _____.
 - b. Materials through which electric charge cannot move easily are called _____.
 - c. Examples of insulators include plastic, wood, and _____.
 - d. Some of the best conductors of electric charge are _____.

Lesson Outline continued

B. Electric Fields and Electric Forces

1. An electric charge is surrounded by a(n) _____.
 - a. Charged objects do not have to _____ to exert a force on each other.
 - b. Scientists know that there is a(n) _____ region around charged objects that apply an electric force.
2. _____ is the force an electric field applies to another charged object.
3. The electric force between two charged objects depends on the _____ of charge on the objects.
 - a. Two negative objects _____ each other away.
 - b. Two positive objects _____ each other away.
 - c. A positive object and a negative object _____ each other together.

Content Vocabulary

LESSON 1

Electric Charges and Electric Forces

Directions: Explain the relationship for each set of terms on the lines provided. Use complete sentences.

1. electric field; electric force

2. electrically neutral; electrically charged

3. nucleus; electron; charge

4. electrically charged; electric discharge

Content Practice B

LESSON 1

Electric Charges and Electric Forces

Directions: *Distinguish between the terms in each of the following pairs.*

1. atom, nucleus

2. proton, electron

3. positively charged, negatively charged

4. electric insulator, electric conductor

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Key Concept Builder 

LESSON 1

Electric Charges and Electric Forces

Key Concept How do electrically charged objects interact?

Directions: Answer each question in the space provided.

Question	Answer
1. What is an electric force?	
2. What is an electric field?	
3. How will two positively charged objects interact?	
4. How will two negatively charged objects interact?	
5. How will a negatively charged object and a positively charged object interact?	
6. What can you infer about the electric charges of two objects that attract each other?	
7. What can you infer about the electric charges of two objects that repel each other?	

Challenge**LESSON 1*****Investigate the Behavior of Charged Objects***

You may have tried picking up tiny bits of newspaper or tissue with a comb that you ran through your hair. Your challenge in this activity is to use electric charges to explain the behavior of the comb and paper.

Materials: hard plastic or rubber comb, newspaper or bathroom tissue (optional: wool cloth)

Procedure

1. Tear the paper into tiny bits between 0.5 cm and 1 cm in size. Place the paper on a nonconducting surface, such as a wooden tabletop or the cover of a book.
2. Hold the comb by one end and run it through your hair several times. If it is humid or if your hair is coated with a grooming product, you might want to rub the comb with a wool cloth instead.
3. Quickly bring the end of the comb near the paper bits without touching them. Observe what happens over the next 10–15 seconds, but do not touch the paper or the comb other than holding the end. When all action has stopped, record your observations.

4. Draw a series of diagrams of the comb and paper, using electric charges to explain what happened to cause each of the actions of the newspaper.
 - a. Draw what happens to the charges when you run the comb through your hair.
 - b. Draw what happens when you bring the comb near the paper.
 - c. Draw what happens when the paper is touching the comb.