

Good morning 6K Science Students!

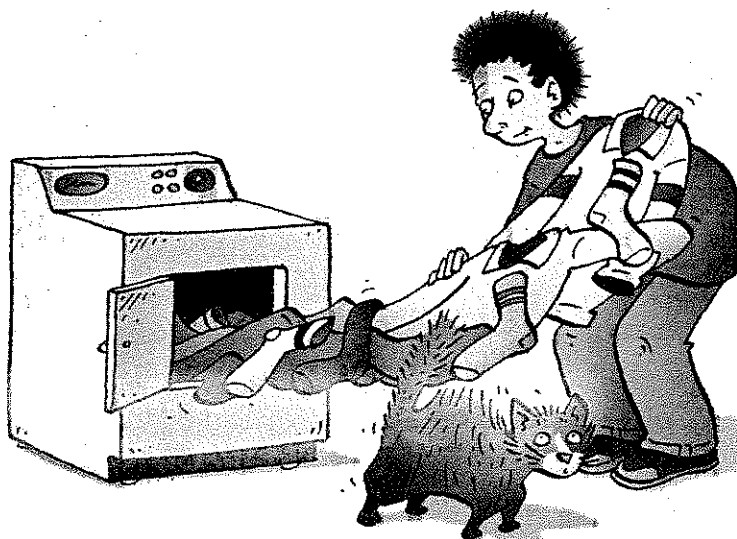
- 1) Please read the 4 pages about static electricity.
- 2) On the first page of the reading in the left corner there is a box with key terms. After you have read the 4 pages, please write definitions for these words (static electricity, attract, repel, negative, positive, neutral, like charges, unlike charges).
- 3) Draw a picture of a balloon attracting an object. Draw a picture of a balloon repelling an object.

## Section 1.1

## Static Electricity

## Key Terms

static electricity  
 attract  
 repel  
 negative  
 positive  
 neutral  
 like charges  
 unlike charges

**Figure 1.2**

What causes some objects to stick together when they come out of a clothes dryer? What other objects are affected by this sticking effect?

It is a cold, dry winter day. You have just come home after playing your favourite winter sport, and you're feeling chilled. You jump onto the couch and wrap yourself in a cozy blanket. You stare absently at the carpet on the floor as you try to get warm under the blanket. Maybe a snack would warm you up faster. You step into your slippers, walk across the carpet, and reach for the doorknob. Ouch! The shock is so strong that you can see a spark in the dimly lit room.

The shocks you get from walking across a carpet and touching a metal doorknob look like tiny lightning bolts. In fact, that is exactly what they are! What could possibly be the same about a thunderstorm and walking across a carpet? How does rubbing create the condition that results in sparks?

### Charging Materials with Static Electricity

In your Starting Point Activity, you rubbed a balloon against wool. Then you made it interact with your head, hand, and another balloon. When you rub different objects against each other, you change their properties and the way they behave. Sometimes the rubbed objects attract other objects. For instance, the rubbed balloon attracted your hair as you walked by it. Figure 1.2 shows ways that objects can attract each other after rubbing.

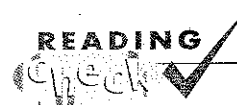
Scientists use the word “charged” to talk about objects that attract or repel other objects. Some objects become charged when they are rubbed with other objects. The charges on a rubbed object are electrical. The build-up of charges is referred to as **static electricity** because the charges are on the surface of an object. (*Static* means “not moving.”)

## Describing How Charged Objects Behave

Think again about what you observed in your Starting Point Activity. When you rubbed the balloon with wool cloth, you charged it with static electricity. After you charged the balloon, you saw that it behaved in certain ways.

- When you moved toward the balloon, the balloon moved toward you. Charged objects can **attract** (pull on) other objects. Figure 1.3 shows an example of attracting.
- When you put the charged balloon near a second charged balloon, the two charged balloons moved away from each other. Charged objects also can **repel** (push away) other objects. Figure 1.4 shows an example of repelling.

Is there a pattern to the way that objects behave when they are charged? When can you see objects repel? When can you see objects attract? You will explore more about how charged objects behave in Investigation 1-B on the next page.



What are two ways that charged objects can behave?



**Figure 1.3** The charged comb is attracting bits of paper. Where have you seen an effect like this before? What do you think might cause it to happen?



**Figure 1.4** This machine creates a strong static electric charge on its dome. Each strand of hair on this student’s head repels each of the other strands when she touches the charged dome.

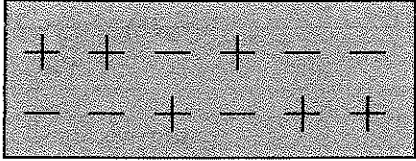
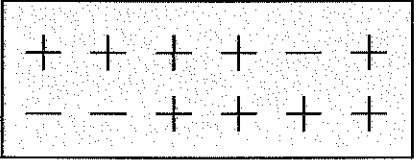
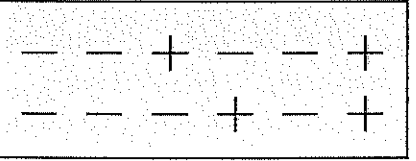
## Types of Charges

You have been collecting a lot of information about charged objects and static electricity. Think about what you have seen. For instance:

- You have seen that two different charged objects can attract each other.
- You have seen that two charged objects of the same kind can repel each other.
- You have seen that a charged object can attract an object that is not charged (an uncharged object).

Hundreds of years ago, scientists observed the same things about charged objects that you did. They concluded that there are two types of charge. They called one type of charge **negative**, and they used a minus sign (–) to refer to it. They called the other type of charge **positive**, and they used a plus sign (+) to refer to it. Objects that do not have a charge are called **neutral**. Figure 1.5 shows how you can use plus signs and minus signs to describe charged and uncharged objects.

**Figure 1.5** The charge that an object has depends on the balance between positive charges (plus signs) and negative charges (minus signs) in the object.

|   |  |
|---|--|
| <p><b>A</b></p>  | <p><b>A neutral object</b></p> <ul style="list-style-type: none"> <li>• six positive charges</li> <li>• six negative charges</li> <li>• number of positive charges equals number of negative charges</li> <li>• no overall charge</li> </ul>                                 |
| <p><b>B</b></p>  | <p><b>An object with positive charge</b></p> <ul style="list-style-type: none"> <li>• nine positive charges</li> <li>• three negative charges</li> <li>• number of positive charges is greater than number of negative charges</li> <li>• overall positive charge</li> </ul> |
| <p><b>C</b></p>  | <p><b>An object with negative charge</b></p> <ul style="list-style-type: none"> <li>• four positive charges</li> <li>• eight negative charges</li> <li>• number of positive charges is less than number of negative charges</li> <li>• overall negative charge</li> </ul>    |

## How Charges Interact

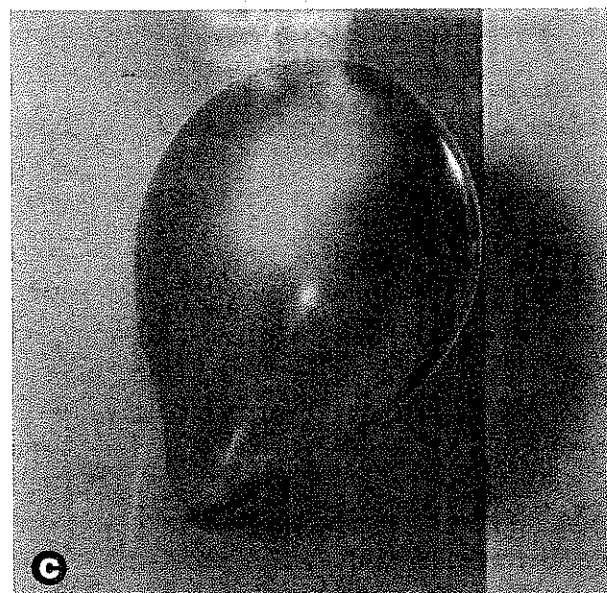
Two charges of the same type (both positive or both negative) are alike. They are called **like charges**. Two charges that are different (one type positive and one type negative) are not alike. They are called **unlike charges**. When charged objects and uncharged objects interact, there are three ways they can behave. These three ways are listed below and shown in Figure 1.6.

1. Unlike charges attract.
2. Like charges repel.
3. Charged objects attract uncharged (neutral) objects.

### INTERNET CONNECT

[www.mcgrawhill.ca/links/ns+science6](http://www.mcgrawhill.ca/links/ns+science6)

The charge that an object has depends on the tiny particles that make up all matter. You might know that these tiny particles are called atoms. If you want to know more about atoms and how they affect static charge, go to the above web site and click on **Web Links** to find out where to go next.



**Figure 1.6** Which of these photos shows like charges repelling? Which shows unlike charges attracting? Which shows a charged object attracting a neutral object?