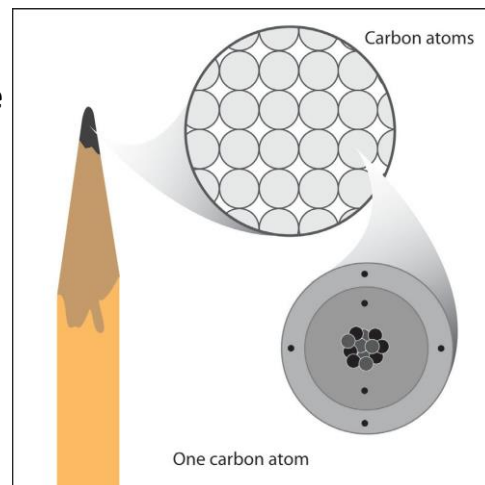


## INTRODUCTION

If you look closely at the tip of a sharpened pencil, you will see that it is made of graphite. Going deeper, graphite is made of carbon atoms. Deeper still, each carbon atom is made of protons, neutrons, and electrons. In this lesson, you will explore these subatomic particles and their charges.

1. Label the nucleus (protons, neutrons) and electrons in the drawing of the carbon atom.
2. Draw a line between the subatomic particle and its charge.

proton	no charge
electron	positive charge
neutron	negative charge



3. Would the following subatomic particles attract each other or repel one another?

Two protons \_\_\_\_\_

Two electrons \_\_\_\_\_

A proton and an electron \_\_\_\_\_

## ACTIVITY

### Question to investigate

What makes objects attract or repel each other?

### Materials for each group

- Plastic grocery bag
- Scissors

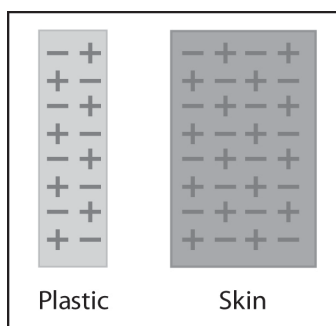
### Procedure, part 1

*Charged plastic and charged skin*

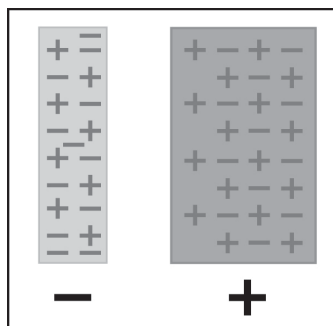
1. Cut 2 strips from a plastic grocery bag so that each is about 2–4 cm wide and about 20 cm long.



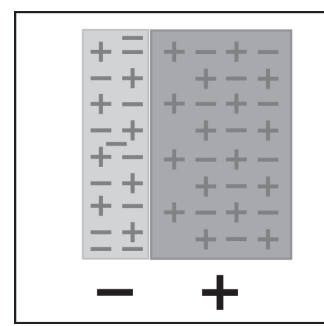
2. Hold the plastic strip firmly at one end. Then grasp the plastic strip between the thumb and fingers of your other hand as shown.
3. Quickly pull your top hand up so that the plastic strip runs through your fingers. Do this three or four times.
4. Allow the strip to hang down. Then bring your other hand near it.
5. Write “attract” or “repel” in the chart on the next page and explain why this happened.



Protons and electrons before rubbing



Protons and electrons after rubbing

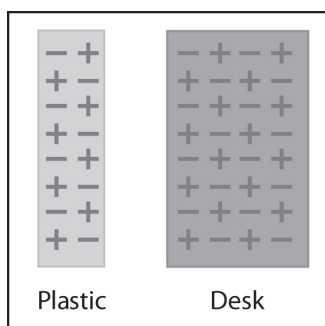


Opposites attract

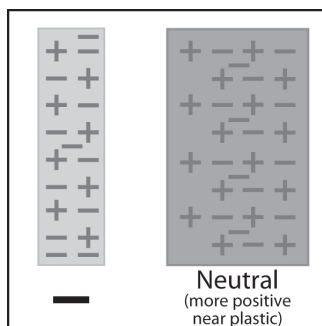
### Procedure, part 2

#### *Charged plastic and neutral desk*

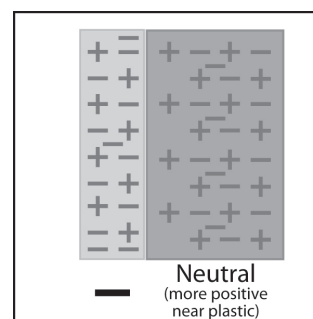
1. Charge one strip of plastic the same way you did previously.
2. This time, bring the plastic strip toward your desk or chair.
3. Write “attract” or “repel” in the chart on the next page and explain why this happened.



Protons and electrons before rubbing



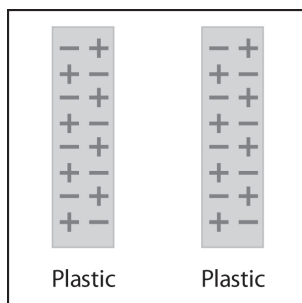
Protons and electrons after rubbing



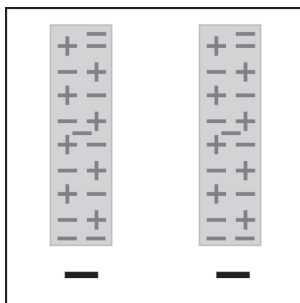
### Procedure, part 3

2 pieces of charged plastic

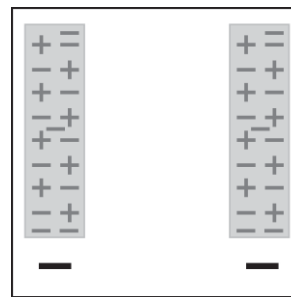
1. Charge two strips of plastic the way you did previously.
2. Slowly bring the two strips of plastic near each other.
3. Write “attract” or “repel” in the chart and explain why this happened.



Protons and electrons  
before rubbing



Protons and electrons  
after rubbing



### EXPLAIN IT WITH ATOMS & MOLECULES

4. Describe what happened with the electrons and charges to explain your observations in the last box in the chart.

What happened when you brought the following materials near each other?		
Materials	Attract or Repel	Use what you know about electrons, protons, and charges to explain your observations
charged plastic + charged skin		
charged plastic + neutral desk		
charged plastic + charged plastic		

## TAKE IT FURTHER

### Materials for each group

- Inflated balloon
- Small pieces of paper, confetti-size

### Procedure

- Rub a balloon on your hair or clothes.
- Bring the balloon slowly toward small pieces of paper.

5. Write captions beneath each picture explaining what happened between the balloon and your hair and the balloon and the paper in the activity.

