

Goal • Apply your knowledge of electric charge from the chemistry unit by designing an experiment.

Question

How can you make an empty pop can roll the greatest distance without touching it?
(Brainstorm)

- Use static electricity
- We could rub a balloon against our hair and then hold the balloon close to the can without touching it.

Group Members

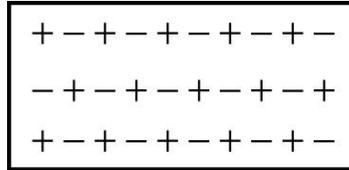
1. Ainsley
2. Brooke
3. Jocelyn

Group Name

Goal • Review your understanding of charge transfer.

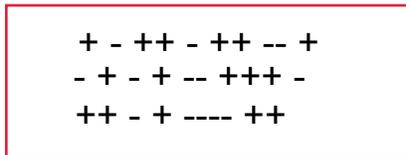
What to Do

Use the following diagram to answer question 1–3. Use (–) to represent negative charges and (+) to represent positive charges.



1. The diagram shows represents a neutral solid object. What is the relationship between the number of positive and negative charges in a neutral object?
It has a equal amount of negative and positive charges.

2. When the above neutral object is rubbed with a material, it becomes positively charged.
(a) Draw a new diagram that represents the object with a positive charge.



(b) How do the number of positive charges compare to the original diagram?
The number of positive charges is bigger by one.

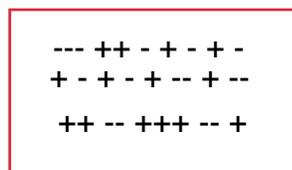
(c) How do the number of negative charges compare to the original diagram?
The number of negative charges is smaller by one.

3. When the neutral object is rubbed with a different material, it becomes negatively charged.
(a) Draw a new diagram that represents the object with a negative charge.

(b) How do the number of positive charges compare to the original diagram?
The number of positive charges is smaller by one

(c) How do the number of negative charges compare to the original diagram?
The number of positive charges is bigger by one

(a)



Goal • Review your understanding of the laws of static charge.

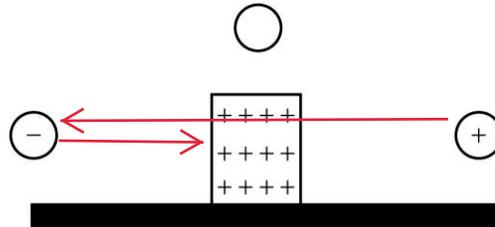
What to Do

Complete the following sentences using the following terms. Each term may be used more than once.

attracts, repels, positive, neutral, negative

1. A negative charge is repelled by a negative charge.
2. A positive charge attracts a negative charge.
3. A charged object attracts a neutral object.
4. A negative object attracts an unknown object. The unknown object could be positive or neutral.
5. A positive object repels a positive object.

Use the diagram below to answer question 6.

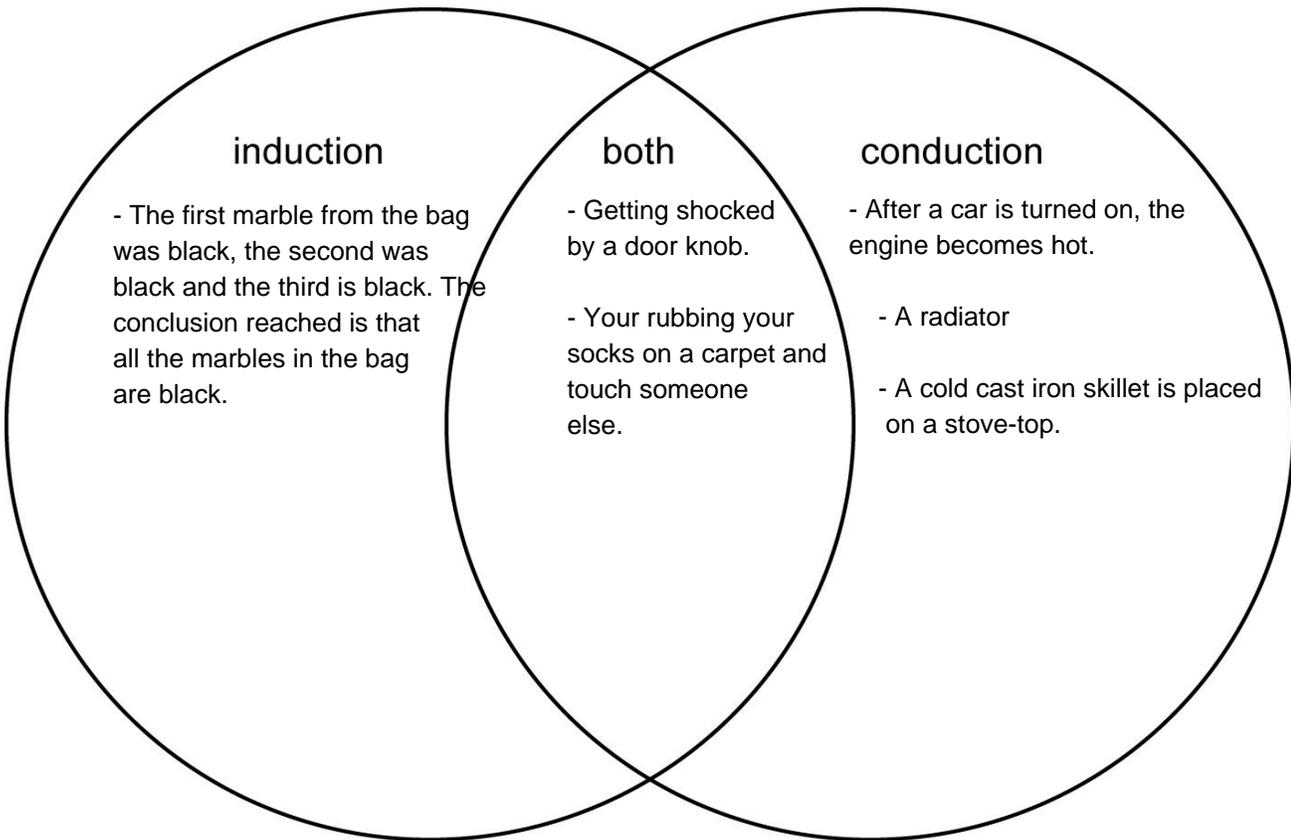


6. A positively charged object is attached to a table as shown. Use an arrow to indicate the direction of the force on the negative (-), positive (+), and neutral (no sign) charges placed near the object on the table.
7. Use the words "increased" or "decreased" to complete each of the following statements.
 - (a) To increase the electric force between two charged objects, the distance separating the two charges should be decreased.
 - (b) To increase the electric force between two charged objects, the amount of charge on one or both objects should be increased.
 - (c) To decrease the electric force between two charged objects, the distance separating the two charges should be increased.
 - (d) To decrease the electric force between two charged objects, the amount of charge on one or both objects should be decreased.

Goal • Compare and contrast conduction and induction.

What to Do

Complete the following Venn diagram. List points that are true of induction on the left side. List points that are true of conduction on the right side. List points that are true of both induction and conduction in the middle.



Goal • Review your knowledge of electric charge and its interaction with conductors, insulators, and electroscopes.

What to Do

Answer the questions that follow.

1. Classify the following items using an X.

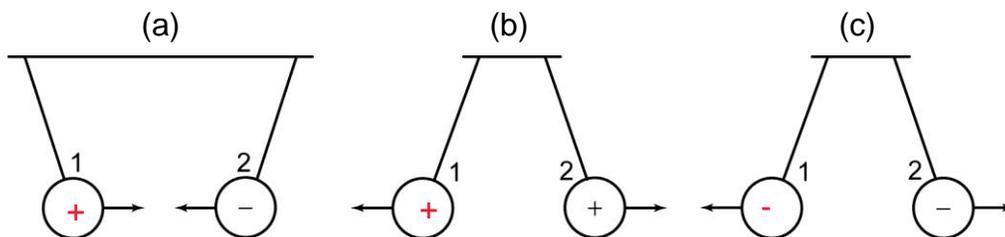
	Conductor	Insulator
Human body	X	
Air		X
Wood		X
Rubber		X
Plastic		X
Aluminum		X
Silver	X	
Wool	X	
Copper	X	
Iron	X	
Fur	X	

2. Using the list of words below, complete the following sentences. Each word may be used more than once.

negative, negatively, positive, positively, opposite

- Opposite _____ charges are unlike charges.
- Two like charges are either both _____ or both _____.
- If two _____ opposite charges are brought together, they will be attracted.
- If a _____ positively charged object is brought near a positively charged electroscope, the leaves will separate.
- If a _____ negatively charged balloon is brought near a positively charged rod, the balloon is attracted to the rod.

3. The diagram below shows two charged pith balls hanging on thin threads. One ball in each diagram is shown with either a positive (+) or a negative (-) charge. The arrows indicate whether the two balls are attracted or repelled. On the diagram, indicate the charge on the blank balls.



Question

How can you make an empty pop can roll the greatest distance without touching it?

Hypothesize

Write a hypothesis for your experiment.

I predict that the balloon will have enough static charge and make the can roll without anyone touching it.

Materials

- fur or wool
- rubber rod
- plastic or glass rod
- plastic golf tube
- balloon
- empty pop can
- plastic wrap and/or plastic bags

Procedure

1. With your group of 3. Include any or all of the above materials in the design of your experiment. Write your procedure below.

We are using a balloon, empty pop can & our hair. We will be rubbing the balloon against our hair to create static charge to give the pop can momentom. This then should make the pop can roll.

2. Test the procedure and revise it as necessary. If you touch the can during the race, the can will be disqualified.
3. Write the revised procedure below. Have your procedure approved by the teacher. You will use this procedure in a race against your classmates.

We didn't change our procedure because we thought ours was good and would work. And in the end our procedure did work.

Observations

As your group tests each part of its procedure, write down your observations below. You will need to refer to these observations when you decide which method of racing your can will give you the best chance of winning.

You need more electricity and energy to make it go farther.

Results

Record the results of the race. Describe briefly how each group (including your own group) moved its race can and how well each method worked.

Everyone but Jack used the method that all of us used which was rub a balloon against fur and your hair. Jack's method was putting a can on a piece of plastic and lifting it up and letting it roll but it failed and didn't roll and landed weird.

Conclusion

Draw specific conclusions about your group's method of moving the pop can. If your group's method worked, explain why. If your group's method did not work or did not work well, explain why.

Our groups hypothesis was right. Our method worked because the balloon was positively charged and the can was negatively charged. Since opposites attract each other, they both attracted each other.

Analyze

1. Was your original hypothesis correct? Explain.

Yes our original hypothesis was right. We predicted that the balloon would have enough static charge to make the can roll without any of us touching it.

2. Evaluate your group's approach to this activity. What aspects of your group's procedure and interaction would you change in future investigations?

In my opinion I wouldn't change anything.

Group Reflection – Collaboration Fluency

“Establish”

1. Did your group stick to the original agreed upon non-negotiables? Explain

Yes, we stuck with our original plan.

“Envision”

2. Did your group stick to the original plan? Explain

Yes, we stuck to our original plan, which was rubbing a balloon against a piece of fur and someones hair, and then putting it near the pop can

“Execute”

3. Did your group execute the plan? Explain

Yes, we executed the plan but we didn't have enough energy and electricity to keep going near the end. We should've had someone hold a piece of fur and rub a balloon on it , so when we lost energy on the other balloon we could've given the new charged balloon to them.

“Examine”

4. How did the collaboration go? Explain

The collaboration went well. Every worked well together and finished their parts on time.

Self-Reflection – Collaboration Fluency

“Establish”

5. Did you stick to the original agreed upon non-negotiables? Explain

Yes I did stick to the original agreed upon non-negotiables. Our group and I never touched the pop can because if we did then we would have got disqualified.

“Envision”

6. Did you stick to the original plan? Explain

Yes, I followed the original plan and our hypothesis. When we did the race, our plan worked out and our hypothesis was correct.

“Execute”

7. Did you execute the plan? Explain

Yes we executed the plan. We used the balloon and static electricity to move the pop can. We did two groups of races because there wasn't enough room for everyone's cans. We won the first race but then in the second race someone else's pop can went farther than ours. We didn't win the race but our pop can went farther than I expected it to go.

“Examine”

8. How did the collaboration go? Explain

The collaboration went really well. We all thought of ideas on how to make the can roll without anyone touching it, we all worked on the worksheets and helped each other out and we all did equal amount of work.