

Name _____
Honors Physics
Period _____

Date _____
Electrostatics WS #1H
Mrs. Nadworny

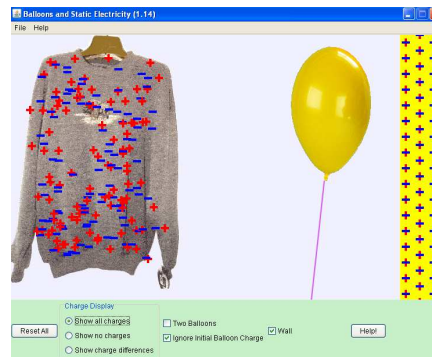
Shocking Simulations

Purpose

- To explore properties of static electricity.

Part One: Balloons and Static Electricity

- Go to <http://phet.colorado.edu>. Click on **Play with Sims** or **How to Run Simulations/On Line** to get to the list of simulations. From the menu choose **Physics** and then click on the simulation entitled **Balloons and Static Electricity**. Click on **Run Now!** and you should see the screen at right. Uncheck *Ignore Initial Balloon Charge* and uncheck *Wall*. Click on *Show no charges*.



- Move balloon near the sweatshirt but not touching it. Does the balloon move when you let it go or does it stay put? (1 pt)

The balloon stays put.

- Does this indicate that the balloon and sweatshirt are charged or neutral?

They both are neutral

- Now grab the balloon and rub it all over the sweatshirt. Can you tell by looking at the balloon whether it is positive, negative or neutral?

You can't tell the charge of the balloon.

- Pull the balloon far away from the sweatshirt and let it go. What does it do?

The balloon attracts to the sweatshirt.

- Does this indicate that the balloon and sweatshirt are charged or neutral?

They are charged.

- Do you think the balloon and sweatshirt have the same type of charge or the opposite type of charge?

The balloon and sweatshirt have the opposite charge.

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8. Click on *Reset All* to restart the simulation but this time click on *Show all charges*. Look at the number of positive and negative charges on the balloon and the sweatshirt. Do they look like they are positively charged, negatively charged or (approximately) neutral?

They look neutral.

9. Rub the balloon on the sweatshirt just a little. What happens to the negative charges?

The negative charges transfer to the balloon.

10. What happens to the positive charges?

The positive charges stay put.

11. What is the overall (net) charge on the balloon now – positive or negative?

The balloon is negative.

12. What is the overall (net) charge on the sweatshirt now – positive or negative?

The sweatshirt is positive.

13. Rub the balloon much more on the sweatshirt now. How does this affect the number of charges that are transferred?

More charges are transferred when it is rubbed for longer.

14. Which are the only types of charges to be transferred – positive or negative?

Negative charges are transferred.

15. Think of your answer to the above question – are the charges that are transferred protons or electrons?

Electrons are transferred.

16. Pull the balloon far away and let it go. Explain what happens to the balloon and why.

It attracts to the sweatshirt because opposite charges attract.

17. Click on *Reset All*. Check *Show all charges* and *Two Balloons*. Rub both balloons on the sweatshirt. What is the net overall charge on each balloon after the rubbing?

Both balloons are negative.

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18. Bring one balloon near the other balloon. What happens to them and why?

The balloons repel each other because they have the same charge.

19. Click on *Reset All*. Uncheck *Two Balloons* but check *Wall*. What is the net charge on the wall?

The wall is neutral.

20. Bring the balloon nearby but not touching the wall and let it go. Explain what it does and why.

The balloon does nothing because they are both neutral.

21. Now rub the balloon on the sweatshirt then bring it VERY near to the wall but not touching it. Explain what it does and why.

The balloon attracts to the wall because charged objects attract neutral objects.

22. Look back on your answers to the above questions to answer the following questions. Will a balloon that is negatively charged attract, repel or neither to an object that is:

a) positively charged? attracts

b) negatively charged? repels

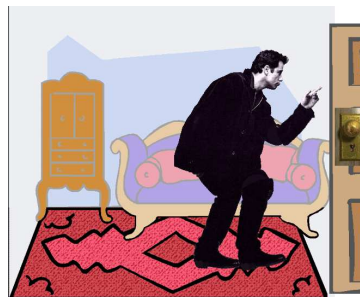
c) neutral? attracts

Part Two: John Travoltage

23. Go back to the menu for physics click on the **John Travoltage** simulation. Click on **Run Now!** to open the simulation. You should see the screen at right.

24. Rub his foot on the carpet to build up charge on his body.

Be sure his finger is not near the door knob. Are these charges positive or negative? (HINT: Use what you learned in the first simulation to answer this question.)



The charges are negative.

25. Now bring his finger near the door knob. Describe what happens to the charges.

The charges go to the knob.

26. Based on your observations, what is happening when you see a spark go between a person's finger and a metal object such as a door knob?

A spark is charges moving.

27. Now, keep his finger near the door knob and rub his foot again on the carpet. What happens to the charges as you do this – do they build up on his body or do they immediately go into the door knob?

The charges go immediately to the knob.