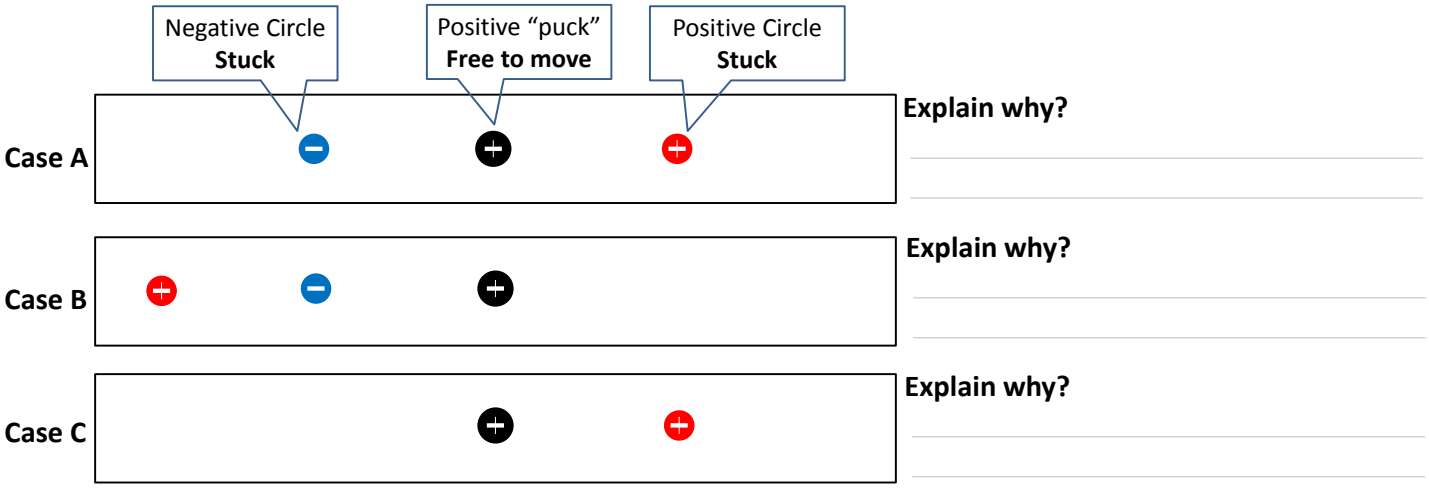
Pre-/Post-Test Static Simulations Block: __ Date: _____ ID #: _____

1. How is static electricity made/generated?

2. In the pictures below, the middle positive "pucks" are free to move, and have some positive and negative circles are stuck down on either side of them.

For each case (A, B, and C), **do you think the middle positive "puck" will move or not move?** If the puck will move, **draw an arrow** on the "puck" to show which way you think it will move. If the puck won't move, write that down.



3. An object has net charge of zero, i.e. neither positive nor negative. Describe the relative number of positive and negative charges on the object.

Post-Test ONLY – this portion will be used for informational purposes only and will not be graded.

1. How much time did you spend working on the assignment for the simulation?
   a. I didn't try or forgot to do the assignment.
   b. 1-20 minutes
   c. 21-40 minutes
   d. 41-60 minutes
   e. 61 or more minutes
2. Did you need/want the help with the simulation?
   a. No, I was able to understand and do everything by my self
   b. Yes, I needed help using the simulation
   c. Yes, I needed help understanding the concepts

John Travoltage Block: __ Date: _____ ID#: _____

Investigate the John Travoltage simulation and use the simulation to answer the following questions.

1. How could we measure the amount of charge in John's body?

   _____

   _____

2. Is there a limit to the amount of charge that John can have? What is it based on?

   _____

   _____

3. Rub John's foot just once, giving a small amount of charge. Watch the motion of the charges over a minute or two. Describe what the charges do and where they end up.

   _____

   _____

4. Draw where positive and negative would be in the following two situations.

   a. John standing - uncharged

   b. John fully charged

Balloons and Static Block: __ Date: _____ ID#: _____

Investigate the simulation and use the simulation to answer the following questions.

1. How do you charge the balloon?

   _____

   _____

2. Draw the charges (both positives and negatives) on a balloon before it is rubbed on the sweater in Figure A. Draw the charges on the balloon after it has been rubbed on the sweater in Figure B.

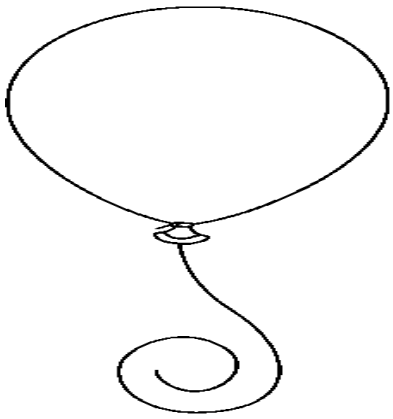


Figure A

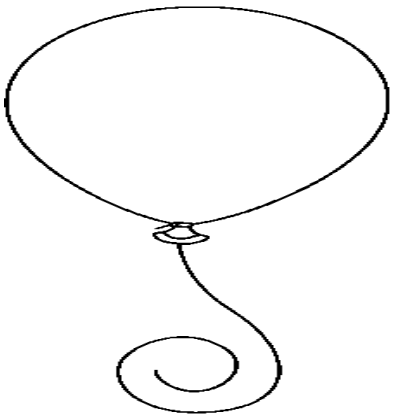


Figure B

3. Are there any positive charges on the balloon in Figure B? If there are, where did they come from? If there are no positives, where did they go?

   _____

4. How do you charge an object so that it is positively charged?

   _____

5. Why does the balloon stick to the wall?

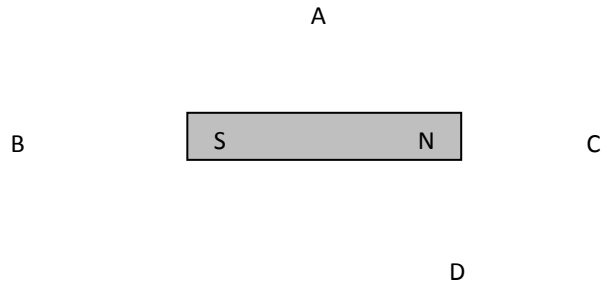
   _____

6. Can you get the two balloons to be attracted to each other? Explain how to make this happen or why it cannot happen.

   _____

Pre-/Post-Test Faraday's Simulation Block: __ Date: _____ ID #: _____

1. A bar magnet is shown below. At points A, B, C and D label the direction a compass would point.



2. Compare and contrast a bar magnet to an electromagnet.

3. What do you have to do to make a light bulb light using a magnet? Use words and pictures in your explanation.

Post-Test ONLY – this portion will be used for informational purposes only and will not be graded.

1. How much time did you spend working on the assignment for the simulation?
    a. I didn't try or forgot to do the assignment.
    b. 1-20 minutes
    c. 21-40 minutes
    d. 41-60 minutes
    e. 61 or more minutes
2. Did you need/want help with the simulation?
    a. No, I was able to understand and do everything by my self
    b. Yes, I needed help using the simulation
    c. Yes, I needed help understanding the concepts

Faraday's Electromagnetic Lab Block: __ Date: ____ ID #: _____

Open the PhET (phet.colorado.edu) simulation ***Faraday's Electromagnetic Lab***. Investigate the simulation and use the simulation to answer the following questions.

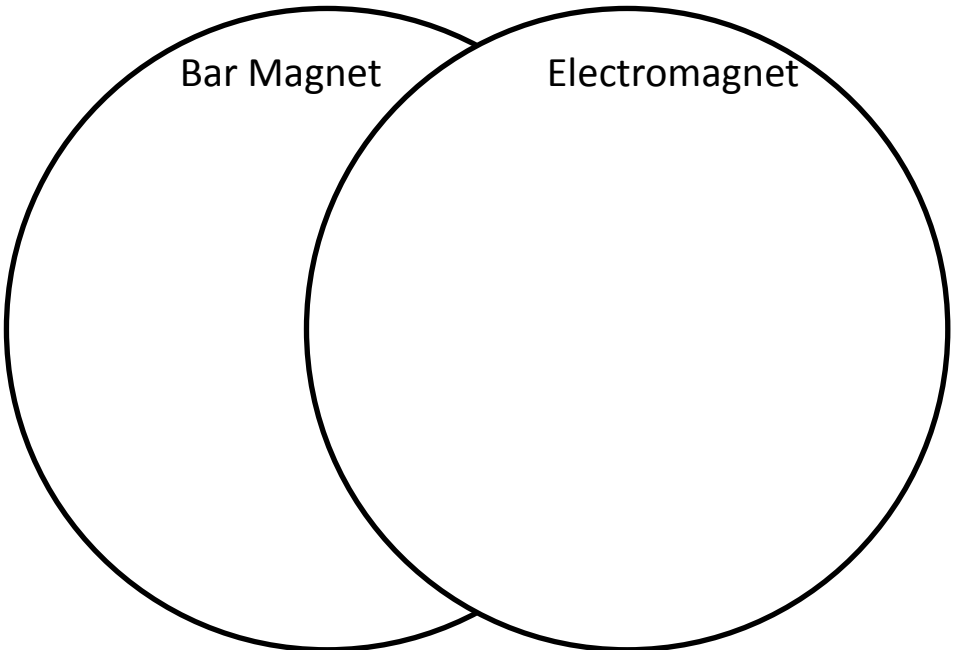
1. Draw the shape of the magnetic field around a bar magnet.

2. Why does/What makes a compass needle point North?

3. Make a list of ways to make a light bulb light.

4. How can you make the light bulb brighter?

5. Investigate tabs 3 and 4 (electromagnet and transformer). Make a Venn diagram to show the similarities and differences between a bar magnet and an electromagnet.



6. How does using AC current in an electromagnet affect a compass?

7. The phenomenon that you have seen (lighting a light bulb with a magnet) is called **induction**. Describe, in your own words, what **induction** means, include step by step instructions of how to accomplish it.

8. Design an experiment to investigate how a variable, of your choosing, will affect the amount of induction.
    a. The variable that I will investigate is…

    b. How will you measure the amount of induction?

    c. Write a hypothesis about your investigation.

    d. Write a short procedure.

    e. Make a data table to record your information

    f. Conclusion

Pre-/Post-Test for States of Matter Block: __ Date: _____ ID #: _____

1. What are the differences and similarities between solid, liquid and gas particle motion? Include an illustration of a solid, liquid and a gas.

2. How does temperature relate to the kinetic energy of molecules?

3. Can all substances change into solid, liquid and gas form? Explain.

4. When you rub your hands together, why do they get hot? Describe the transfer of energy.

Post-Test ONLY – this portion will be used for informational purposes only and will not be graded.

3. How much time did you spend working on the assignment for the simulation?
    a. I didn't try or forgot to do the assignment.
    b. 1-20 minutes
    c. 21-40 minutes
    d. 41-60 minutes
    e. 61 or more minutes
4. Did you need/want help with the simulation?
    a. No, I was able to understand and do everything by my self
    b. Yes, I needed help using the simulation
    c. Yes, I needed help understanding the concepts

States of Matter/Friction Block: __ Date: _____ ID #: _____

Open the PhET simulation ***States of Matter***. Investigate the simulation and use the simulation to answer the following questions.

1. How does solid Neon or Argon look compared to liquid Neon or Argon?

2. How does liquid Neon or Argon look compared to gas Neon or Argon?

3. How do the Oxygen and Water molecules compare to Neon and Argon? Draw each. Why do you think they look the way that they do?

4. What is the red part of each water molecule, and what are the white parts of each water molecule? Include a picture.

5. Have you heard that solid water, ice, takes up more space than liquid water? If your pipes freeze they split!!! Can you see why that is the case? Draw and label a picture to explain.

6. Do other molecules take up more space as a solid as compared to a liquid? Use words and pictures to explain.

7. How do the temperatures of a solid, liquid and a gas compare? Is it the same for all 4 atoms/molecules? Explain.

8. When you add heat to a container of molecule, what happens to the molecules?

9. Can you get the molecules to stop wiggling? If so, how?

10. A person notices that when she pumps up her bike tire the pump gets warm. What would you say to this person to explain that phenomenon?

11. Water is usually a solid below 273 K, a liquid between 273 K and 373 K, and a gas above 373 K. Can you make water a gas at a temperature below 100 K? Explain how or why not.

Open the PhET simulation ***Friction.*** Investigate the simulation and use the simulation to answer the following questions.

12. Describe what you observe. What is this simulation supposed to demonstrate and how does it demonstrate it?

13. What happens to the energy you put into rubbing the books together?

RUBRICS

Static Simulation			
1. How is static electricity made/generated?			
3- Must say both friction/rubbing and separation of charge	2- say friction/rubbing but not separation of charge 2- gain/lose electrons 2- make ions	1- rub charged object together 1- can't be made only transferred	0- electricity
2.Which way do you think the puck will move? Explain			
3- Correct direction for all and reasonable explanation All three move left. -like repel -opposite attract -proximity is important	2- Correct directions but no explanations 2- one mistake in direction or explanation	1- two mistakes	0- More than two mistakes
3. Describe the number of positive and negative charges on an object with a net charge of zero.			
3-same 3- equal	2- correct answer but have extra incorrect info as well	1- No charges 1- zero	0- Incorrect

Faraday's Simulation			
1. Draw the direction of the magnetic field.			
3- All correct A- left B- Right C- Right D- Down (may be slightly to the left or right)	2 – B and C correct and either A or D correct 2- All opposite/ backwards	2- two correct 2- B and C to the left, others incorrect	0- All point to "N" 0- 1 or less correct 0- compass directions with no key (rose)
2. Compare and contrast a bar magnet to an electromagnet.			
Excluded due to ambiguity of how to adequately answer the question and the complexity and variety of the answers given.			
3. Explain and draw how to make a light bulb light using a magnet.			
3- Movement of magnet near loop of wire, with picture 3- Changing magnetic field, with picture	2- Magnet moves but magnet gives …, with picture 2- Correct picture with partial explanation	1- Magnet close to light bulb (no movement), with picture 1- Draw pictures from simulation but no explanation 1- Friction between magnet and wire, with picture	0- Magnet touches light bulb 0- electrons from magnet 0- magnet as part of the circuit

Matter Simulation			
1. Difference and similarities between solids, liquids and gases particle motion? Include pictures.			
3- Correct pictures Solid- molecules close together, <u>some</u> movement. Liquid- flow or movement, bottom of container Gas – free moving, fill container	2-two of the three pictures and explanations correct 2- No picture but all three explanations correct 2- Movement not described all else correct	1- One of three correct	0- Zero of three correct
2. How does temperature relate to the kinetic energy of molecules?			
3- Temp is <u>proportional</u> to KE 3-Temp measures average KE	2- Temp <u>related</u> to KE, no movement stated 2- The hotter the faster 2- Temp is related to movement but connect to KE 2- direct relationship	1- Temp is how much molecules move 1- Temp causes movement 1- Temp changes pressure causing movement	0- Temp changes the energy 0- Do not mention temp
3. Can all substance change in to a solid, liquid and gas form? Explain.			
3- Yes, need material specific temp.	2- Yes, <u>most</u> can. 2- solid to liquid, liquid to gas 2- <u>depends</u>, with explanation 2- Yes, but don't explain 2- No, temps are too extreme	1- No, not the correct properties 1- Temp based on water	0- No, solids can't become gases 0- Yes, mix them together 0- No, incorrect explanation
4. When you rub your hands together, why do they get hot? Describe the transfer of energy.			
3- Friction turns KE into heat/thermal	2- Friction creates heat/thermal 2- KE causes heat	1-Friction and heat are same thing 1- <u>Kinetic Friction</u> 1- Fast movement causes heat 1- Transfer of KE 1- No Transfer of Energy 1- Body heat trapped	0- No conservation of energy 0- Make energy 0- Hands transfer heat