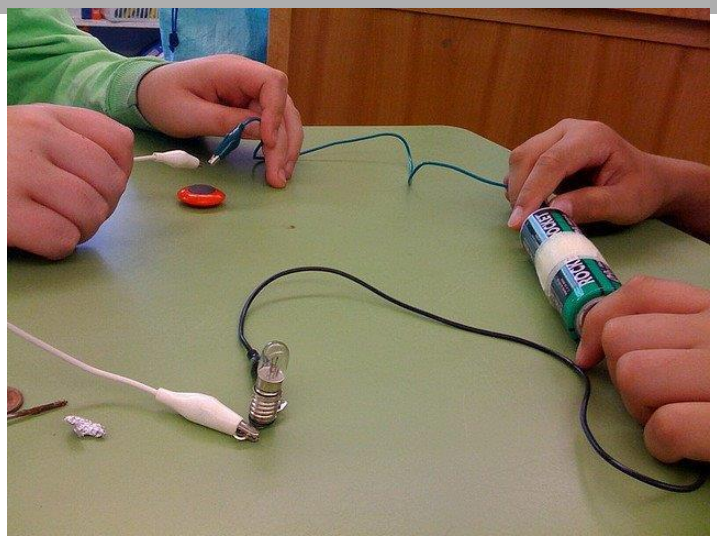
8/1/2012

Assessing with Learning Progressions in Science

FOSS MAGNETISM AND ELECTRICITY



Instructional Tools | **Contributors: Steve Hecimovich, Susan Kruckenberg, Elizabeth Zylstra**

Northwest Educational Service District 189
Together We Can

Funding information:
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Instructional Tools

In this packet you will find a set of instructional supports for science materials. These documents represent the work-in-progress of teachers in the Assessing with Learning Progressions in Science Project, a Math Science Partnership through the Northwest Educational Service District in Washington State. While we encourage others to use the materials, please know the power of these tools lies in the collaborative discussion and analysis that occurs during their creation. We strongly suggest that anyone utilizing these tools make them your own, adjusting them to fit your teaching context and district priorities. Professional development tools to aid you in this process are available on the ALPS project web page www.nwesd.org/nwalps. For access to editable versions of these documents please contact Nancy Menard nmenard@nwesd.org.

Overview of the Tools (not every unit tool-set will include all of these tools)

Unit Overview

The unit overview grid lays out learning targets or important scientific ideas from Washington State Standards for each investigation in the module and clarifies the success criteria for each learning target. It also details the formative assessments that have been designed to assess each target in the investigation.

Learning Progressions

A learning progression is a graphical representation of the path students take toward mastery of a science "big idea". The ALPS *Learning Progression* documents include a description of an important big idea from the *Washington State Science Learning Standards* and the progression of building-block learning targets that students master on their way toward an understanding of that big idea. For each building-block learning target the student success criteria is identified and one or more formative assessment tasks to elicit evidence of student understanding are suggested.

Formative Assessment Tasks

The suggested formative assessment tasks are examples of tools used by the teachers in the ALPS project to gather evidence of student understanding. The *Assessment Task Cover Sheet* details each assessment and gives administration tips and suggestions for instructional adjustments based on some of the common student struggles they encountered.

Student Work Samples

Selected student work samples from students in ALPS classrooms give a picture of the range of student responses gathered from sample formative assessments. The *Student Work Sample Cover Sheet* describes the student work samples and the teacher's interpretation of student understanding.

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Lesson		Learning Targets & Success Criteria	Assessment
Inv. 2, Part 1 Making Connections	Systems	One defective part can cause a subsystem to malfunction, which in turn will affect the system as a whole. 4-5 SYSD ✓ I can identify a faulty component that is keeping an electrical circuit from operating properly.	a) Teacher gives students a diagram of a complete circuit with a battery and a bulb and asks them what else could be wrong with the system. What is keeping the light bulb from lighting? (M&ESystems#3).
Inv. 2, Part 2 Making Connections	Systems	Systems contain subsystems. ✓ I can identify a switch, light bulb, or battery as a subsystem of a light circuit.	a) Draw a complete circuit including a switch and light bulb. Label the parts, including the component(s) that are subsystems. (M&ESystems #1) Discuss in small groups which components (from the diagram drawn) are subsystems and why.
Inv. 2, Part 3 Making Connections	Energy	No target or success criteria in the learning progression.	No assessment available.
Inv. 2, Part 3 Making Connections	Energy	No target or success criteria in the learning progression.	No assessment available.
Inv. 3, Part 1 Advanced Connections	Energy	No target or success criteria in the learning progression.	No assessment available.
Inv. 3, Part 2 Advanced Connections	Energy	No target or success criteria in the learning progression.	No assessment available.

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Magnetism and Electricity Unit Overview

Lesson	Learning Targets & Success Criteria	Assessment
Inv. 1, Part 1 The Force	**Energy** Magnets display forces of attraction and repulsion. 4-5 PS3E ✓ I can identify what materials are attracted to magnets and how the distance between two magnets affects force.	a) Give Foss worksheet #3 (Magnetic Observations) b) Teacher shows two pictures (M&EContent#1) and asks whether the attraction increases as the magnets move together or decreases. Students give thumbs up (increase) and thumbs down (decrease) to show their thinking.
Inv. 1, Part 2 The Force	**Energy** No target or success criteria in the learning progression.	No assessment available.
Inv. 1, Part 3 The Force	**Systems** Systems can have inputs and outputs. Changes in inputs may change the outputs of a system.4-5 SYSC ✓ I can show how adding spacers affects the force in a system.	a) Students use the data from the Investigation 1, Part 3 graph (Foss worksheet #5) and write a conclusion about the relationship between distance and force (M&E Systems #2).
Inv. 1, Part 4 The Force	**Energy** No target or success criteria in the learning progression.	No assessment available.
Inv. 2, Part 1 Making Connections	**Energy** A circuit is a closed pathway through which electric current flows and produces energy.4-5 PS3E ✓ I can determine whether or not a circuit will operate an energy receiver.	a) Teacher shows four possible circuits (M&E#2) and asks whether the circuit is open or closed. Students give thumbs up (closed) and thumbs down (open) to show their responses. Group discussions could follow. b) Give Foss worksheet #7 (The Flow of Electricity). This worksheet asks students to use arrows on a diagram to show how electricity flows and then to explain their thinking.

Assessing with Learning Progressions in Science
Math Science Partnership
File Name: ME_overview

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Lesson		Learning Targets & Success Criteria	Assessment
Inv. 3, Part 3 Advanced Connections	Energy	Different circuits can be designed to produce observable change and variations of energy. 4-5 PS3E ✓ I can explain how different pathways and the addition or subtraction of components can make changes to a circuit.	a) Use Making Connections worksheet (M&E#3) for students to complete. This worksheet includes the following sections: 1) I can draw a circuit that can light two bulbs with one battery. 2) I can draw a circuit that can light two bulbs as brightly as possible with one battery. 3) I can draw a circuit that can light two bulbs using two batteries. 4) I can draw a circuit that can light two bulbs as brightly as possible using two batteries.
Inv. 4, Part 1 Current Attractions	Energy	No target or success criteria in the learning progression.	No assessment available.
Inv. 4, Part 2 Current Attractions	Systems	A system can do things that none of its subsystems can do by themselves. 4-5 SYSB. ✓ I can show how an electromagnet is made of subsystems, which work together to form a system.	a)Teacher shows a "defective" electromagnetic circuit and students describe how to repair it. Use the illustration in the teacher's guide (page 10 of Investigation 4) or use the M&ESystems #4 document.
Inv. 4, Part 3 Current Attractions	Energy	The flow of electrical current and magnetism are closely related. 4-5 PS3E ✓ I can show how the electric current in an electromagnet can be changed to create stronger magnetism.	a) Student worksheet (M&E#4) with the following information: You have a long length of thin wire, a long length of thicker (conducting) wire, a piece of shorter wire, an aluminum nail, a steel nail, and four D-cells. Describe what you would do with these materials to make the strongest electromagnet possible. Draw a diagram and explain your thinking.
Inv. 5, Part 1 Click It		No target or success criteria in the learning progression.	No assessment available.
Inv. 5, Part 2 Click It		No target or success criteria in the learning progression.	No assessment available.
Inv. 5, Part 3 Click It		No target or success criteria in the learning progression.	No assessment available.

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Learning Progression

FOSS Magnetism and Electricity - Content - Inv. 1, 2, 3, 4

Prerequisite skills:
Heat, light, motion, electricity, and sounds are all forms of energy.

There is always a force involved when something starts moving or changes its speed or direction of motion.

Grades 2-3 PS1B, PS3B

Learning Target 1:
Magnets display forces of attraction and repulsion.
4-5 PS3E
Inv. 1, Part 1

Success Criteria:
I can identify what materials are attracted to magnets and how the distance between two magnets affects force.

Formative Assessment:
a) Give Foss worksheet #3 (Magnetic Observations)
b) Teacher shows two pictures (M&EContent#1) and asks whether the attraction increases as the magnets move together or decreases. Students give thumbs up (increase) and thumbs down (decrease) to show their thinking.

Give assessment DURING Investigation 1, Part 1.

Learning Target 2:

A circuit is a closed pathway through which electric current flows and produces energy.

4-5 PS3E
Inv. 2, Part 1

Success Criteria:
I can determine whether or not a circuit will operate an energy receiver.

Formative Assessment:
a) Teacher shows four possible circuits (M&E#2) and asks whether the circuit is open or closed. Students give thumbs up (closed) and thumbs down (open) to show their responses. Group discussions could follow.
b) Give Foss worksheet #7 (The Flow of Electricity). This worksheet asks students to use arrows on a diagram to show how electricity flows and then to explain their thinking.

Give assessment AFTER Investigation 2, Part 1.

Learning Target 3:

Different circuits can be designed to produce observable change and variations of energy.

4-5 PS3E
Inv. 3, Part 3

Success Criteria:
I can explain how different pathways and the addition or subtraction of components can make changes to a circuit.

Formative Assessment:
a) Use Making Connections worksheet (M&E#3) for students to complete. This worksheet includes the following sections: 1) I can draw a circuit that can light two bulbs with one battery. 2) I can draw a circuit that can light two bulbs as brightly as possible with one battery. 3) I can draw a circuit that can light two bulbs using two batteries. 4) I can draw a circuit that can light two bulbs as brightly as possible using two batteries.

Give assessment AFTER Investigation 3, Part 3 (Replace Foss

Learning Target 4:

The flow of electrical current and magnetism are closely related.

4-5 PS3E
Inv. 4, Part 3

Success Criteria:
I can show how the electric current in an electromagnet can be changed to create stronger magnetism.

Formative Assessment:
a) Student worksheet (M&E#4) with the following information: You have a long length of thin wire, a long length of thicker (conducting) wire, a piece of shorter wire, an aluminum nail, a steel nail, and four D-cells. Describe what you would do with these materials to make the strongest electromagnet possible. Draw a diagram and explain your thinking.

Give assessment AFTER Investigation 4, Part 3.

Big Idea:

Magnetic and electrical energy can be changed to other forms of energy, including light, heat, sound, and motion.
4-5 PS3E

Later big ideas that build on this big idea include:

- Energy from a variety of sources can be transformed into electrical energy, and then to almost any other form of energy.
- Electricity can also be distributed quickly to distant locations.

Grades 6-8 PS3E

Assessing with Learning Progressions in Science
Math Science Partnership
File Name: ME_energy

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Magnetism and Electricity

Big Idea: **Energy**

Magnetic and electrical energy can be changed to other forms of energy, including light, heat, sound, and motion. 4-5 PS3E

Formative Assessment Task Cover Sheet

Learning Target 1a	
Assessment Task Details	**Teacher Background**
Brief Description of the Assessment Task: Foss worksheet #3 (Magnetic Observations)	**Administration Tips:** Give assessment DURING Investigation 1, Part 1.
Learning Target 1: Magnets display forces of attraction and repulsion. 4-5 PS3E	**Suggestions for Instructional Adjustments:**
Success Criteria: I can identify what materials are attracted to magnets and how the distance between two magnets affects force.	**Key:** Worksheet #3: Students know that magnets are attracted to anything with iron.
Student Task Sheet Included: No Student Work Samples Included: No	

Learning Target 1b	
Assessment Task Details	**Teacher Background**
Brief Description of the Assessment Task: Teacher shows two pictures (M&EContent#1) and asks whether the attraction increases as the magnets move together or decreases. Students give thumbs up (increase) and thumbs down (decrease) to show their thinking.	**Administration Tips:** Give assessment DURING Investigation 1, Part 1.
Learning Target 1: Magnets display forces of attraction and repulsion. 4-5 PS3E	**Suggestions for Instructional Adjustments:**
Success Criteria: I can identify what materials are attracted to magnets and how the distance between two magnets affects force.	**Key:** Students are able to identify that the two magnets closer together have a stronger force.
Student Task Sheet Included: Yes Student Work Samples Included: No	

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Magnetism and Electricity

Big Idea: **Energy**

Magnetic and electrical energy can be changed to other forms of energy, including light, heat, sound, and motion. 4-5 PS3E

Learning Target 2a	
Assessment Task Details	**Teacher Background**
Brief Description of the Assessment Task: Teacher shows four possible circuits (M&E#2) and asks whether the circuit is open or closed. Students give thumbs up (closed) and thumbs down (open) to show their responses. Group discussions could follow.	**Administration Tips:** Give assessment AFTER Investigation 2, Part 1. **Suggestions for Instructional Adjustments:** **Key:** The third illustration is the only diagram that shows a complete circuit.
Learning Target 2: A circuit is a closed pathway through which electric current flows and produces energy. 4-5 PS3E	
Success Criteria: I can determine whether or not a circuit will operate an energy receiver.	
Student Task Sheet Included: Yes Student Work Samples Included: No	

Learning Target 2b	
Assessment Task Details	**Teacher Background**
Brief Description of the Assessment Task: Give Foss worksheet #7 (The Flow of Electricity). This worksheet asks students to use arrows on a diagram to show how electricity flows and then to explain their thinking.	**Administration Tips:** Give assessment AFTER Investigation 2, Part 1. **Suggestions for Instructional Adjustments:** **Key:** Worksheet #7: Students are able to make a complete circuit (one wire from battery to the metal bulb/tip of the bulb and another wire from the battery to the metal threaded base of the bulb…see page 11 in Investigation 2 of teacher's guide) and correctly show the direction (with same-size arrows) of the flow (from the bottom of the battery, which is negative, to the top of the battery, which is positive.) In the reflection piece, students are able to describe in words what their diagram shows.
Learning Target A circuit is a closed pathway through which electric current flows and produces energy. 4-5 PS3E	
Success Criteria: I can determine whether or not a circuit will operate an energy receiver.	
Student Task Sheet Included: No Student Work Samples Included: Yes	

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Magnetism and Electricity

Big Idea: **Energy**

Magnetic and electrical energy can be changed to other forms of energy, including light, heat, sound, and motion. 4-5 PS3E

Learning Target 3a	
Assessment Task Details	**Teacher Background**
Brief Description of the Assessment Task: a) Use Making Connections worksheet (M&E#3) for students to complete. This worksheet includes the following sections: 1) I can draw a circuit that can light two bulbs with one battery. 2) I can draw a circuit that can light two bulbs as brightly as possible with one battery. 3) I can draw a circuit that can light two bulbs using two batteries. 4) I can draw a circuit that can light two bulbs as brightly as possible using two batteries.	**Administration Tips:** Give assessment AFTER Investigation 3, Part 3 (Replace Foss worksheet #15 from the kit with this assessment .) **Suggestions for Instructional Adjustments:** **Key:** Illustration #1: Students should change the circuit so the bulbs are in parallel (two complete paths.) They will need to include one more wire (see page 5 in Investigation 3 in teacher's guide.) Illustration #2: Students change the circuit so the batteries are in series (negative side of one battery touches or is connected with a wire to the positive side of the other battery.) The light bulbs could be either in parallel or series.
Learning Target: Different circuits can be designed to produce observable change and variations of energy. 4-5 PS3E	
Success Criteria: I can explain how different pathways and the addition or subtraction of components can make changes to a circuit.	
Student Task Sheet Included: No Student Work Samples Included: No	

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Magnetism and Electricity

Big Idea: **Energy**

Magnetic and electrical energy can be changed to other forms of energy, including light, heat, sound, and motion. 4-5 PS3E

Learning Target 4a	
Assessment Task Details	**Teacher Background**
Brief Description of the Assessment Task: Student worksheet (M&E#4) with the following information: You have a long length of thin wire, a long length of thicker (conducting) wire, a piece of shorter wire, an aluminum nail, a steel nail, and four D-cells. Describe what you would do with these materials to make the strongest electromagnet possible. Draw a diagram and explain your thinking.	**Administration Tips:** Give assessment AFTER Investigation 4, Part 3. **Suggestions for Instructional Adjustments:** **Key:** To show the strongest electromagnet possible students will need the thicker wire, the steel nail/rivet and both D-cells. For the strongest magnet, students should show coils of wire that are tightly and closely placed together.
Learning Target 4 The flow of electrical current and magnetism are closely related. 4-5 PS3E	
Success Criteria: I can show how the electric current in an electromagnet can be changed to create stronger magnetism.	
Student Task Sheet Included: Yes Student Work Samples Included: No	

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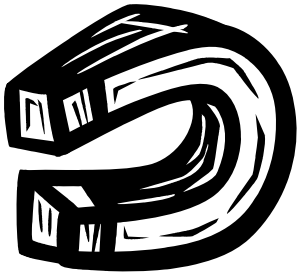

Clipart source: Microsoft

Success Criteria:
I can identify what materials are attracted to magnets and how the distance between two magnets affects force.

Formative Assessment:
Give worksheet #3 (Magnetic Observations) from the kit PLUS teacher shows the two pictures above and asks whether the attraction increases as the magnets move together or decreases? Students give thumbs up (increase) and thumbs down (decrease) to show their thinking.

Give this assessment DURING Investigation 1, Part 1.

Magnetism and Electricity Content Learning Progression
M&EContent#1

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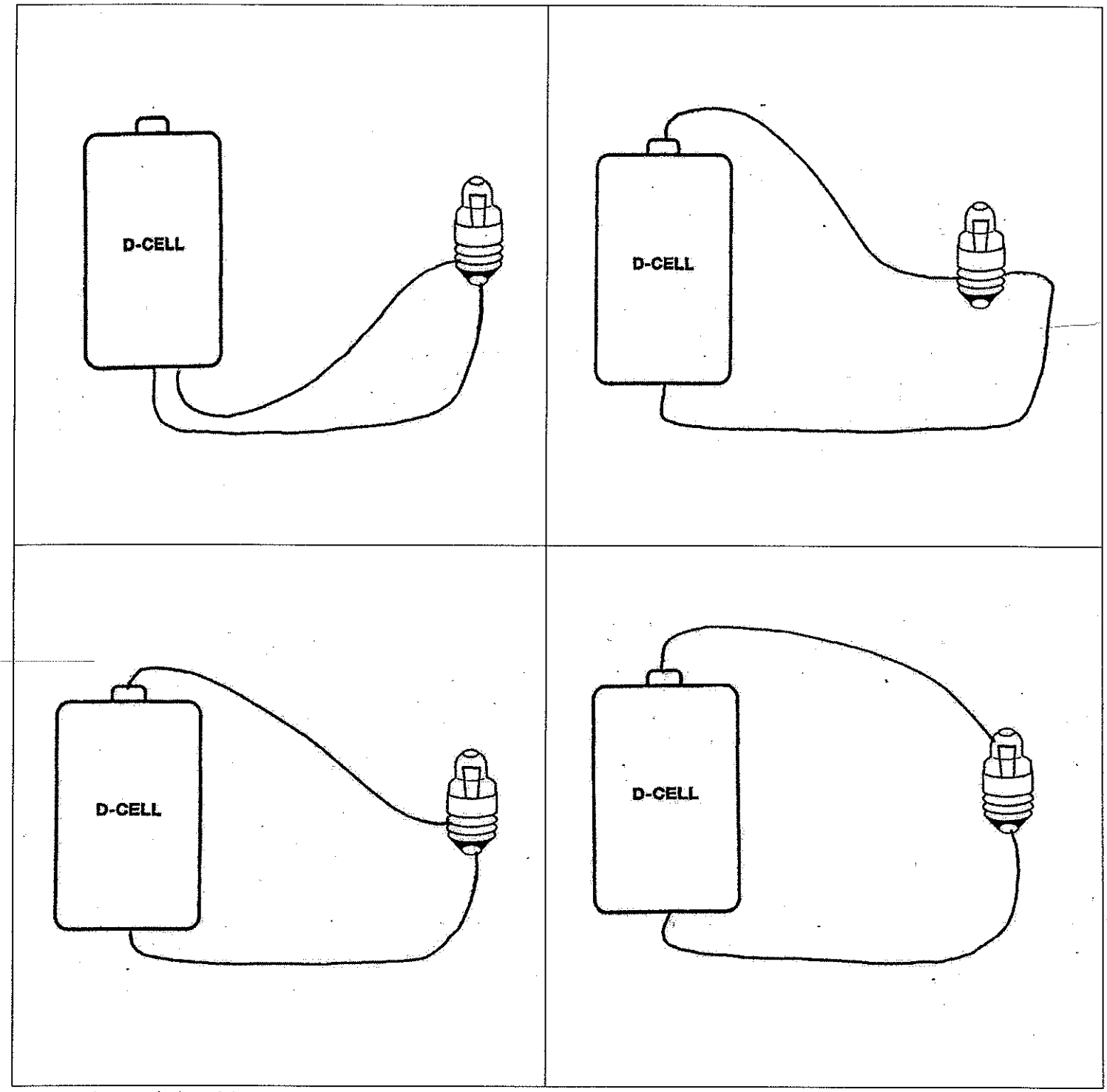
Complete or Incomplete Circuits?



Magnetism and Electricity Learning Progression
M&E#2
Give assessment AFTER Investigation 2, Part 1 (Students give Thumbs Up/Thumbs Down on whether or not these are complete circuits.)

MAGNETISM AND ELECTRICITY

Big Idea: **Magnetic and electrical energy can be changed to other forms of energy, including light, heat, sound, and motion. (4-5 PS3E)**

Target 2, Assessment: *2b The Flow of Electricity*

Formative Assessment Student Work Cover Sheet

Student Work Description

Sample 1: (Student #8) Student understands that the electricity flows through the wires and arrows indicate a negative to positive flow. There seems to be some confusion about the process of the energy source (i.e "gas in the D-cell".)

Sample 2: (Student #4) Student understands that the electricity flows through the wires and arrows indicate a negative to positive flow. Student elaborates thoughts using appropriate scientific vocabulary and is more detailed in his/her reflection.

Sample 3: (Student #1) Student understands that the electricity flows through the wires and arrows indicate a negative to positive flow.

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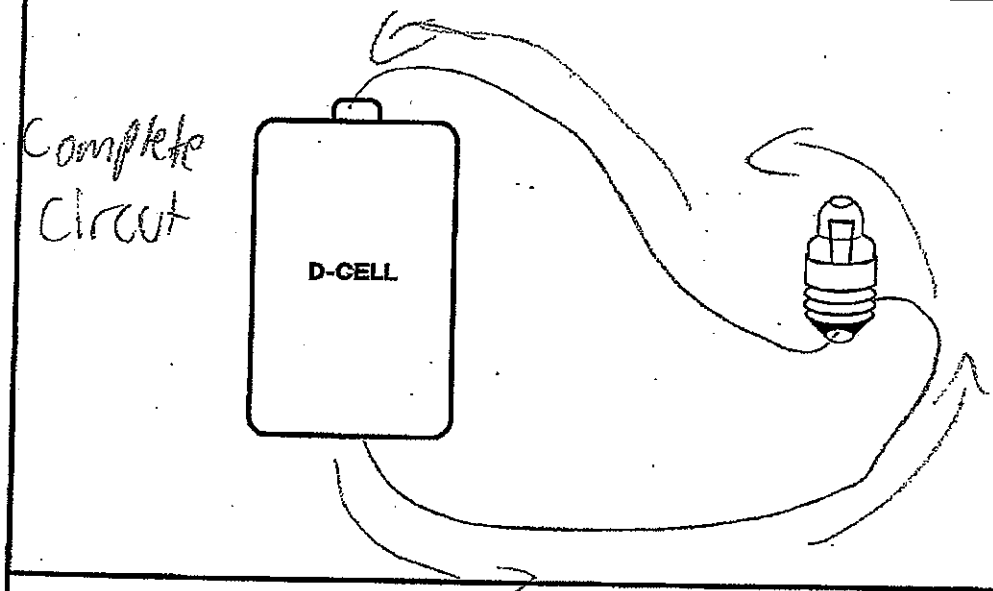
Name _____

Date _____

THE FLOW OF ELECTRICITY



CONNECT THE D-CELL TO THE BULB ABOVE.

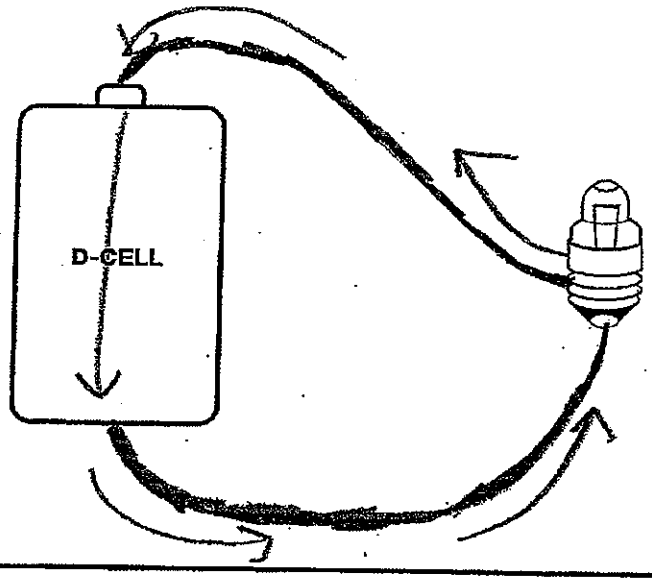
Use arrows to show how the electricity flows. Use large and small arrows if you need to show different amounts of electricity. Describe below how electricity flows in your drawing above.

It starts with the negative side and it flows through the wire to the bulb (making it light), back to the D-cell through the positive side, and once again to the negative side making a complete circuit.

Name #4

Date

THE FLOW OF ELECTRICITY



CONNECT THE D-CELL TO THE BULB ABOVE.

Use arrows to show how the electricity flows. Use large and small arrows if you need to show different amounts of electricity. Describe below how electricity flows in your drawing above.

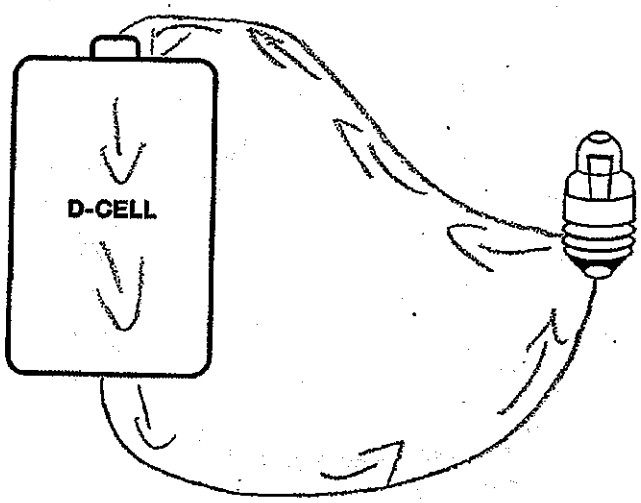
If you set up the system above, this is how it will work. The D-Cell provides the electricity. The negitive end of the D-Cell gives power to the wire, which lights the bulb (a.ka. an electricity source), then gives power to the other wire, that connects to the possitive side of the D-Cell, which goes through the D-Cell, then goes to the negative side of the D-Cell again.

FOSS Magnetism and Electricity Module, Student sheet no.7, The Flow of Electricity,2005. Developed at the Lawrence Hall of Science and published and distributed by Delta Education.

Name #8

Date

THE FLOW OF ELECTRICITY



CONNECT THE D-CELL TO THE BULB ABOVE.

Use arrows to show how the electricity flows. Use large and small arrows if you need to show different amounts of electricity. Describe below how electricity flows in your drawing above.

The electricity flows by the wires and the wires in the light also the gas in the D cell helps it too.

Electromagnets Name _____

Pretend you have the following materials available:

- a long length of thin wire
- a long length of thicker wire
- a piece of shorter wire
- an aluminum nail/rivet
- a steel nail/rivet
- two D-cells

Which materials would you choose from the list? Describe what you would do with these materials to make the strongest electromagnet possible. Draw a diagram and explain your thinking.

_____

_____

_____

_____

_____

_____

_____

_____

Magnetism and Electricity Learning Progression
M&E #4
Give assessment AFTER Investigation 4, Part 3.

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Learning Progression

FOSS Magnetism and Electricity – Systems - Inv. 1, 2, 4

Prerequisite skills:
A system is a group of interacting parts that form a whole.

A whole object may not continue to function the same way if some of its parts are missing.

Learning Target 1:
Systems contain subsystems.
4-5 SYSA
Inv. 2, Part 2

Success Criteria:
I can identify a switch, light bulb, or battery as a subsystem of a light circuit.

Formative Assessment:
a) Draw a complete circuit including a switch and light bulb. Label the parts, including the component(s) that are subsystems. (E-Systems #1) Discuss in small groups which components (from the diagram drawn) are subsystems and why.

Give assessment DURING Investigation 2, Part 2.

Learning Target 2:

A system can do things that none of its subsystems can do by themselves.
4-5 SYSB
Inv. 4, Part 2

Success Criteria:
I can show how an electromagnet is made of subsystems, which work together to form a system.

Formative Assessment:
a)Teacher shows a "defective" electromagnetic circuit and students describe how to repair it. Use the illustration in the teacher's guide (page 10 of Investigation 4) or use the E-Systems #4 document.

Give assessment AFTER Investigation 4, Part 2.

Learning Target 3:

Systems can have inputs and outputs. Changes in inputs may change the outputs of a system.
4-5 SYSC
Inv. 1, Part 3

Success Criteria:
I can show how adding spacers affects the force in a system.

Formative Assessment:
a) Students use the data from the Investigation 1, Part 3 graph (Foss worksheet #5) and write a conclusion about the relationship between distance and force (M&E Systems #2).

Teacher note: Remind students to use the word "system" in their explanation.

Give assessment AFTER Investigation 1, Part 3

Learning Target 4:

One defective part can cause a subsystem to malfunction, which in turn will affect the system as a whole.
4-5 SYSD
Inv. 2, Part 1

Success Criteria:
I can identify a faulty component that is keeping an electrical circuit from operating properly.

Formative Assessment:
a) Teacher gives students a diagram of a complete circuit with a battery and a bulb and asks them what else could be wrong with the system. What is keeping the light bulb from lighting? (M&ESystems#3).

(Teacher looks for answers like: D-cell might be bad or light bulb might be bad.)

Give assessment AFTER Investigation 2, Part 1.

Big Idea:

Systems
Systems contain smaller sub-systems and are also part of larger systems.

4-5 SYS

Later big ideas that build on this big idea include:

- The output of one system can become the input of another system.
- If the input of matter or energy is the same as the output, then the amount of matter or energy in the system won't change.

Grades 6-8 SYSC, SYSE

Assessing with Learning Progressions in Science
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File Name: ME_systems

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MAGNETISM AND ELECTRICITY

Big Idea: **Systems contain smaller sub-systems and are also part of larger systems.**

Formative Assessment Task Cover Sheet

Learning Target 1, 1a	
Assessment Task Details	**Teacher Background**
Brief Description of the Assessment Task: Draw a complete circuit including a switch and light bulb. Label the parts, including the component(s) that are subsystems. (M&ESystems #1)	**Administration Tips:** Give assessment DURING Investigation 2, Part 2. **Suggestions for Instructional Adjustments:** Have a small group discussion about what components were subsystems in the diagram, and why students identified these as subsystems.
Learning Target 1: Systems contain subsystems.	**Key:** Students draw an accurate working circuit (complete) with a battery, switch, and light bulb. These three (battery, switch, and light bulb) components are labeled. One of these three subsystems in the diagram is circled.
Success Criteria: I can identify a switch, light bulb, or battery as a subsystem of a light circuit.	
Student Task Sheet Included: Yes Student Work Samples Included: No	

Learning Target 2, 2a	
Assessment Task Details	**Teacher Background**
Brief Description of the Assessment Task: Teacher shows a "defective" electromagnetic circuit and students describe how to repair it. Use the illustration in the teacher's guide (page 10 of Investigation 4) or use the M&ESystems #4 document.	**Administration Tips:** Give assessment AFTER Investigation 4, Part 2. **Key:** Students conclude there is a battery/batteries/energy source missing from the circuit and that you need some sort of energy source to make the electromagnet work (draw up the washers.)
Learning Target 2: A system can do things that none of its subsystems can do by themselves.	
Success Criteria: I can show how an electromagnet is made of subsystems, which work together to form a system.	
Student Task Sheet Included: Yes Student Work Samples Included: No	

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MAGNETISM AND ELECTRICITY

Big Idea: **Systems contain smaller sub-systems and are also part of larger systems.**

Learning Target 3, 3a	
Assessment Task Details	**Teacher Background**
Brief Description of the Assessment Task: Students use the data from the Investigation 1, Part 3 graph (Foss worksheet #5) and write a conclusion about the relationship between distance and force (M&E Systems #2).	**Administration Tips:** Give assessment AFTER Investigation 1, Part 3. **Suggestions for Instructional Adjustments:** Remind students to use the word "system" in their explanation. **Key:** Students use the word system (balance, cups, magnets, and washers) to describe that the force between magnets is stronger when you have fewer spacers (plastic chips) between the magnets.
Learning Target 3: Systems can have inputs and outputs. Changes in inputs may change the outputs of a system.	
Success Criteria: I can show how adding spacers affects the force in a system.	
Student Task Sheet Included: Yes Student Work Samples Included: Yes	

Learning Target 4, 4a	
Assessment Task Details	**Teacher Background**
Brief Description of the Assessment Task: Teacher gives students a diagram of a complete circuit with a battery and a bulb and asks them what else could be wrong with the system. What is keeping the light bulb from lighting? (M&ESystems#3).	**Administration Tips:** Give assessment AFTER Investigation 2, Part 1. **Key:** Students conclude that the battery is dead/not working/too weak to light the bulb, the light bulb is dead/not working/burned out, or there is a break in the wire.
Learning Target 4: One defective part can cause a subsystem to malfunction, which in turn will affect the system as a whole.	
Success Criteria: I can identify a faulty component that is keeping an electrical circuit from operating properly.	
Student Task Sheet Included: Yes Student Work Samples Included: No	

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Circuits Name _____

Draw a working circuit (system) which includes at least one switch and one light bulb. Label the parts, including the component(s) that are subsystems. Circle one of the subsystems within your system.

Magnetism and Electricity Systems Learning Progression
M&E Systems #1
Give assessment DURING Investigation 2, Part 2.

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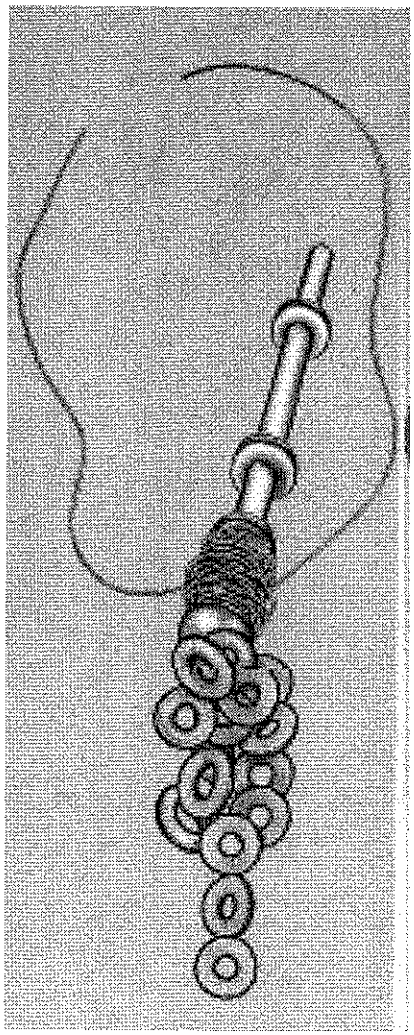
Electromagnet Name _____

Take a close look at the following diagram of a defective electromagnetic circuit. Explain what you would do to repair this circuit.



Magnetism and Electricity Systems Learning Progression
M&E Systems #4
Give assessment AFTER Investigation 4, Part 2.

Magnets and Force Name _____

Based on the data from your completed graph (Foss Magnetism and Electricity worksheet #5), what conclusion can you make about how the distance between two magnets affects the force required to pull them apart? Use the word "system" in your explanation.

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Magnetism and Electricity Systems Learning Progression
M&E Systems #2
Give assessment AFTER Investigation 1, Part 3.

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MAGNETISM AND ELECTRICITY

Big Idea: **Systems contain smaller sub-systems and are also part of larger systems. (4-5 SYS)**

Target 3, Assessment: 3a Magnets and Force

Formative Assessment Student Work Cover Sheet

Student Work Description

Sample 1: Student understands that the more spacers between magnets, the less strength the magnets have. The word system was used, but student understanding of how systems work is unclear.

Sample 2: Student understands that the more spacers between magnets, the less strength the magnets have. The word system was used, but student understanding of how systems work is unclear. Even though input/output was not used in the reflection, student seems to understand that change in input changes the output.

Sample 3: Student made an accurate observation about the data, but did not draw a conclusion about how the spacers affected the strength of the magnets. The student used the word "system" accurately, but did not clarify that he/she knew what a system was.

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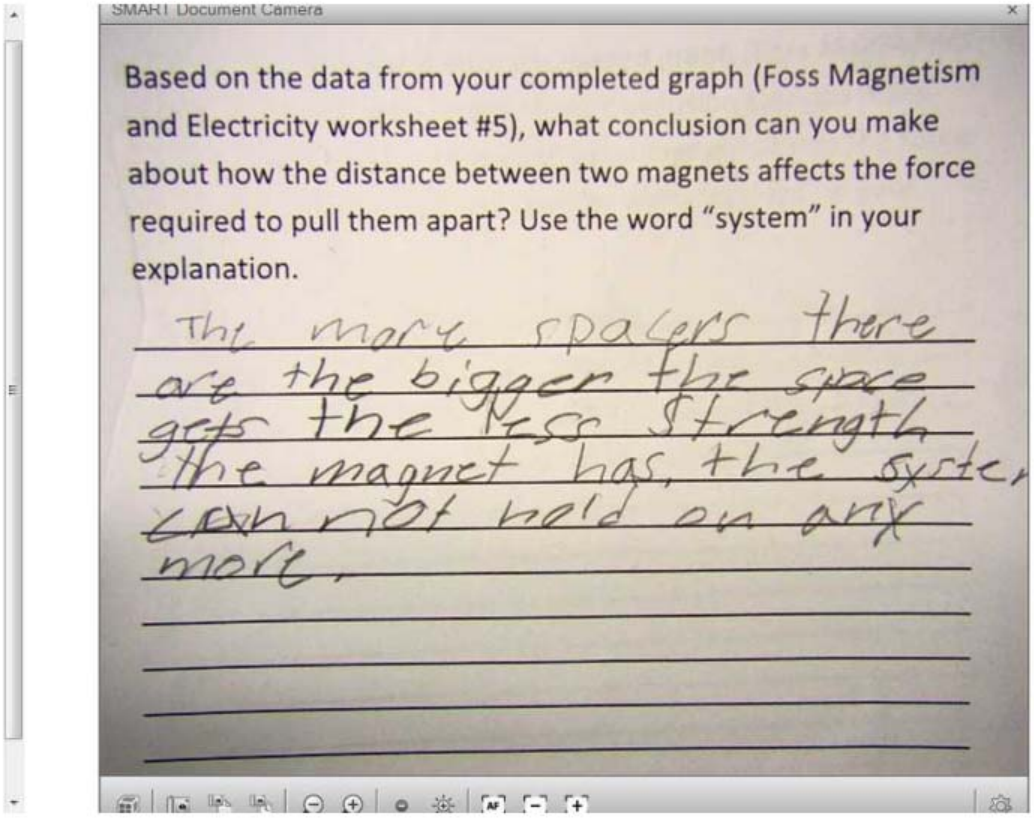

Student Work
Sample #1

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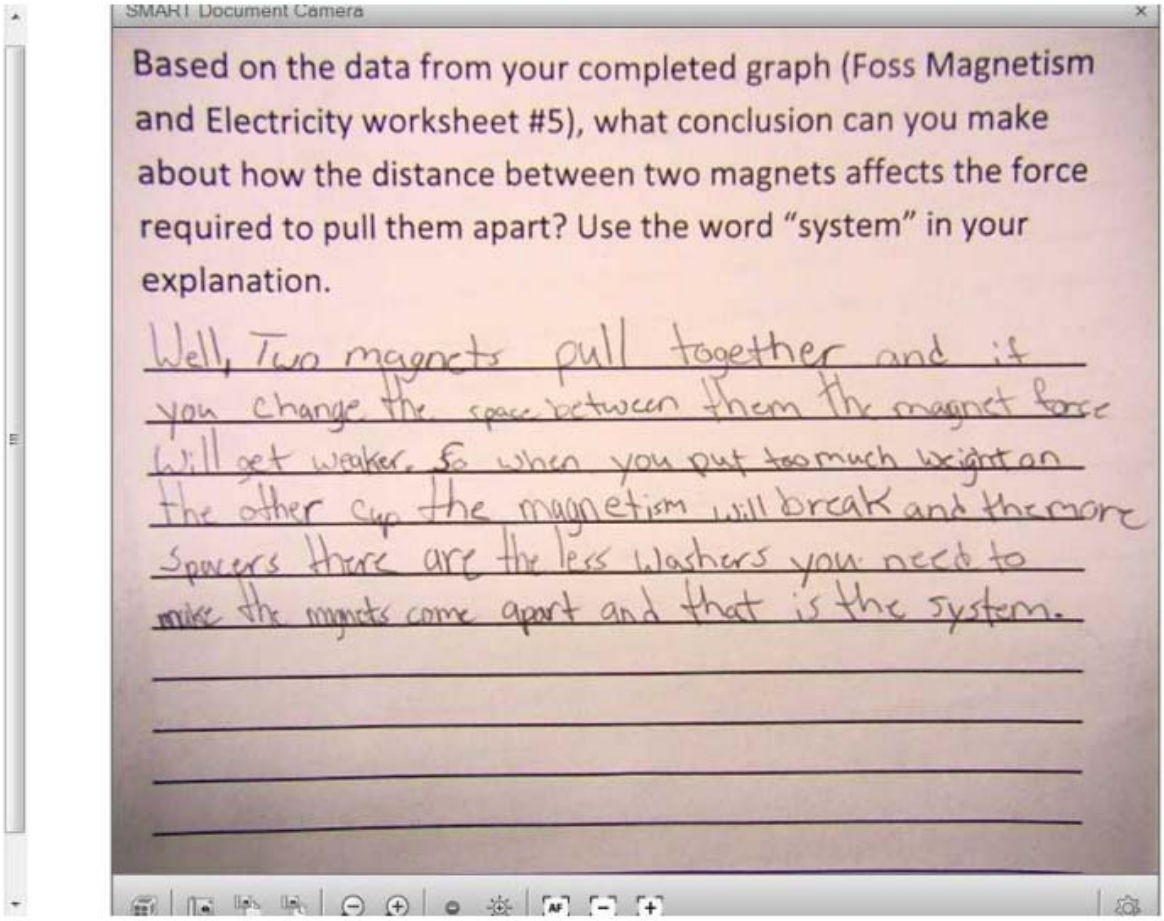

Student Work
Sample #2

Funding information:
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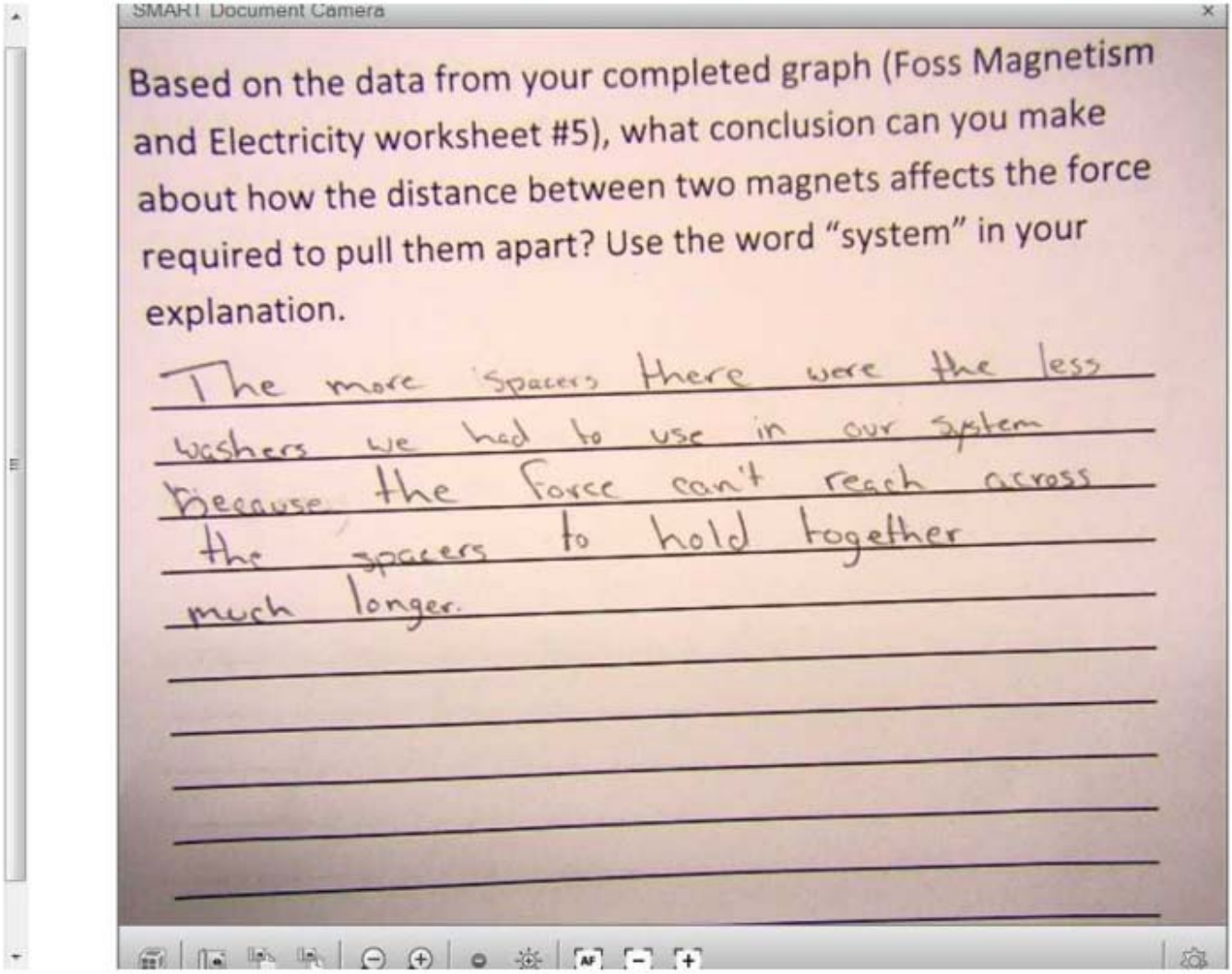

Student Work
Sample #3

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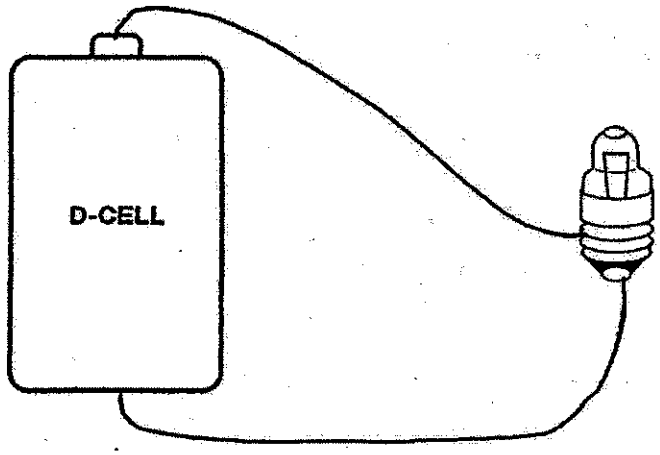
Defective Systems Name _____

Look at the following diagram of a complete circuit that SHOULD light the bulb. Pretend the bulb does NOT light. What could be wrong with this system? What might be keeping the light bulb from lighting? Explain your thinking.



Magnetism and Electricity Systems Learning Progression
M&E Systems #3 (Teacher can use this document with an overhead projector and have students work in pairs to brainstorm answers OR give this worksheet for students to complete independently.)
Give assessment AFTER Investigation 2, Part 1.

MAGNETISM AND ELECTRICITY

Bibliography

Dylan, Wiliam. *Embedded Formative Assessment.* Bloomington, IN: Solution Tree, 2011. Print.

Keeley, Page. *Science Formative Assessment: 75 Practical Strategies for Linking Assessment, Instruction, and Learning*. Thousand Oaks, CA: Corwin, 2008. Print.

Popham, W. James. *Transformative Assessment*. Alexandria, VA: Association for Supervision and Curriculum Development, 2008. Print.

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