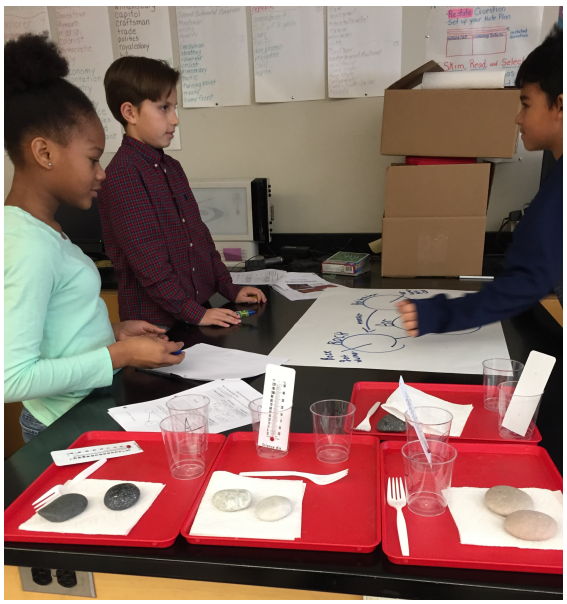
What's the energy story of the rock in the water?

Plan Investigation 2A



We are surrounded by examples of thermal energy transfer, although we don't typically think of our experiences in those terms. When your hand warms up as you wrap your fingers around a cup of hot cocoa, or when you feel your hand cooling as you hold a can of cold soda, you are experiencing the transfer of thermal energy. The cocoa transfers some of its thermal energy into your hand, warming your hand and (although this is not so obvious) cooling the cocoa. In the other example, your hand transfers some of its thermal energy to the can of soda, thereby cooling your hand and warming the soda.

In the previous investigation, students collected data that highlighted the transfer of thermal energy from the hot water to the rock. Today they "dig deeper" into that investigation, first by using energy cubes to tell the energy story of the rock in the hot water, and later by creating posters that tell that same energy story, being careful to address every question of the Energy Tracking Lens on their posters.

Sharing the posters and providing additional time for making meaning happens in the next investigation, Thermal Energy Investigation 2B.

By the end of this investigation students will have expanded their understanding of energy transfer to include the transfer of thermal energy, and will continue to strengthen their representation skills and their ability to "tell the energy story."

Learning Targets Introduced in this Investigation

- Thermal energy can be transferred between objects through contact.
- Drawings and representations help students reason about energy flow in a scenario.

Sequence of Experiences		
1. Introduction	All Class	15 Minutes
2. Reason about the Energy Story (Cubes)	Groups of 4	15 Minutes
3. Communicate the Energy Story (Posters)	Groups of 4	30 Minutes

Materials

For each group of four:

- 6 student-size energy cubes with the thermal energy symbol (Th) added to a side
- Large sheet of paper and markers or whiteboard and erasable markers (for cubing)
- Large sheet of paper or poster board (for poster)
- (optional) Additional sheets of colored paper for poster

Preparation

- Add a Th for Thermal Energy to one face of each energy cube.
- Review the Energy Cube Rules, available on the Focus on Energy website in the Resources for Teachers section as well as at the end of Motion Energy Investigation 3B.

1. Introduction

All class – 15 Minutes

In today's class, students use two different representations to tell the energy story of the system they started to investigate in the prior lesson: the rock in the cup of water.

Today's Investigation question is:

> *"What's the energy story of the rock in the water?"*

Tell students that they will first use energy cubes to figure out the energy story. Next, they will make a poster that communicates their story to others.

> *Scientists frequently make posters to share their ideas with other scientists, so being able to communicate your work with others is a very important part of science. Posters also allow other scientists to ask questions and share their ideas about each other's work. And finally, making an effective poster can sometimes help you better understand the science yourself.*

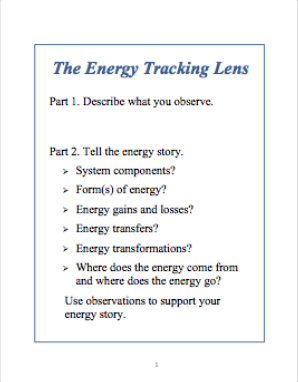
There will be time in the next science class to share posters.

Since students will not be using the actual materials today, have them open their Thermal Energy notebooks to page 2 and ask them to briefly describe the previous thermal energy investigation. What did they observe? And, what were the results?

Show students that you have added a Th symbol to one face of each cube to represent thermal energy. After using cubes to represent the energy story, students will create posters to communicate their energy stories. Provide large sheets of paper, so they have plenty of room to make drawings and write notes.

Ask if there are any questions about using the cubes or using circles to represent the components of a system. They will work in groups of four, and can decide in their groups what circles (system components) they will need.

Finally, have students focus their attention on page 1 of their Student Notebooks, *The Energy Tracking Lens*, and review each of the questions they need to consider when they are telling the energy story of a system.


The Energy Tracking Lens

Part 1. Describe what you observe.

Part 2. Tell the energy story.

- System components?
- Form(s) of energy?
- Energy gains and losses?
- Energy transfers?
- Energy transformations?
- Where does the energy come from and where does the energy go?

Use observations to support your energy story.

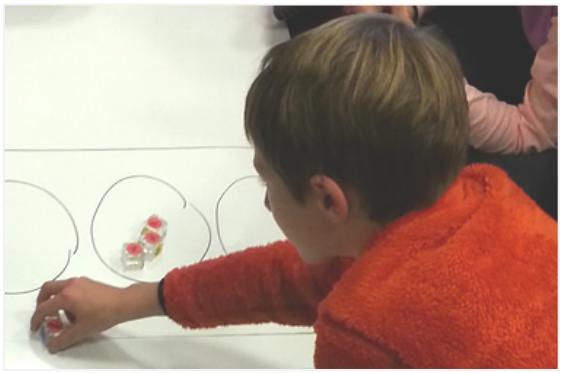
2. Reason about the Energy Story (Cubes)

Groups of 4 – 15 Minutes

Ask students to use the cubes to work out their explanation of the energy story. Let them know they have only 10 minutes to use energy cubes. Then they will work on their posters. They should ignore the rock that remained dry, and focus on the cup filled with hot water and the rock that was placed in it.

Distribute paper or whiteboards, markers, and six energy cubes to each group of 4 students.

After 10 minutes, transition to making posters to communicate the energy story of the rock and hot water. (Section 3)



3. Communicate the Energy Story (Posters)

Groups of 4 – 30 Mins

Before students start to work on their posters, briefly discuss the following:

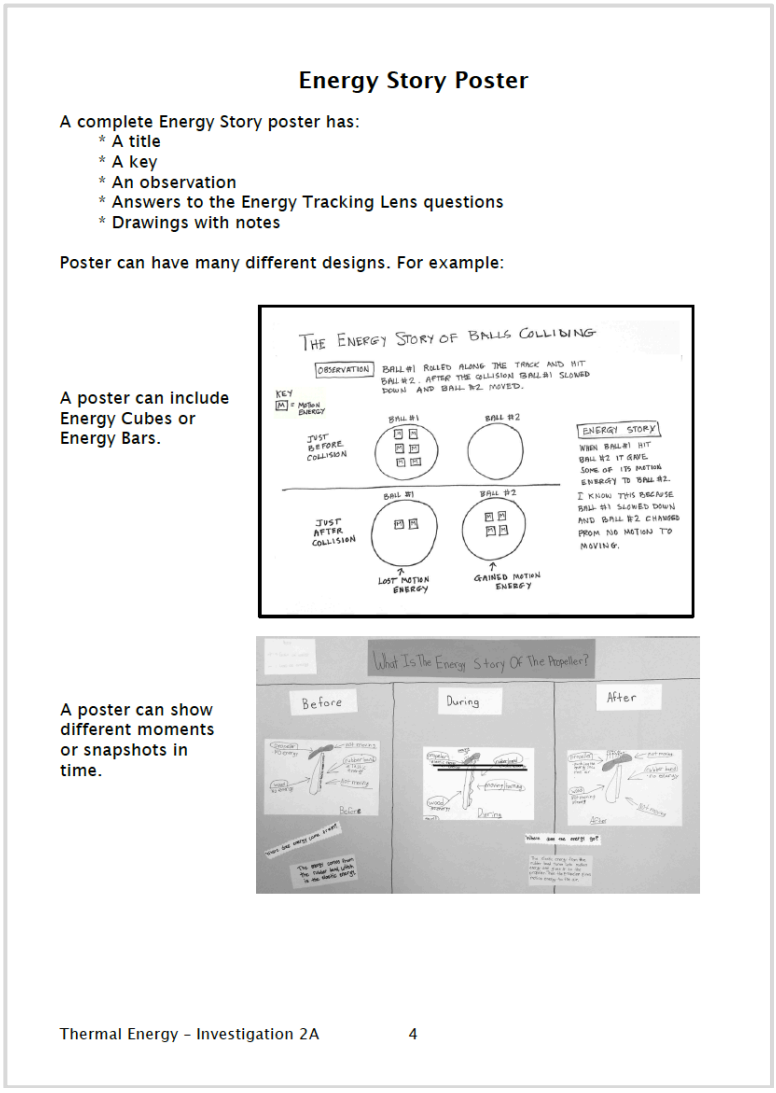
- Posters serve a different purpose than the cubes or sketches. The poster should tell the energy story in a way that is clear to someone who never saw the actual investigation. You can find a sample student poster in Resource Quick Links. Have students turn to page 4 of their notebooks, *Energy Story Poster*. At the top, there is a list of the components or parts that every poster should include: a Title, a Key, an Observation (what did we see), and the energy story, which should include both drawings and notes. Together, these components should answer the Energy Tracking Lens questions. There are also examples of some of the different ways a poster could be designed, but students are free to create their own poster design.

- There's a challenge: the flow of energy through a system changes from moment to moment. They showed this with energy cubes by moving them. They need to figure out how to show this in a drawing where nothing moves.

- Remind them that their posters should answer each of the Energy Tracking Lens questions that are on page 1 of their Student Notebooks.

- Let students know that they have the rest of the class to create their posters. They will have a chance to share their posters and energy stories in the next class.

Give each group of 4 students an additional large sheet of paper that they can use for their posters.



Energy Story Poster

A complete Energy Story poster has:
* A title
* A key
* An observation
* Answers to the Energy Tracking Lens questions
* Drawings with notes

Poster can have many different designs. For example:

A poster can include Energy Cubes or Energy Bars.

A poster can show different moments or snapshots in time.

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