

Name: Sample

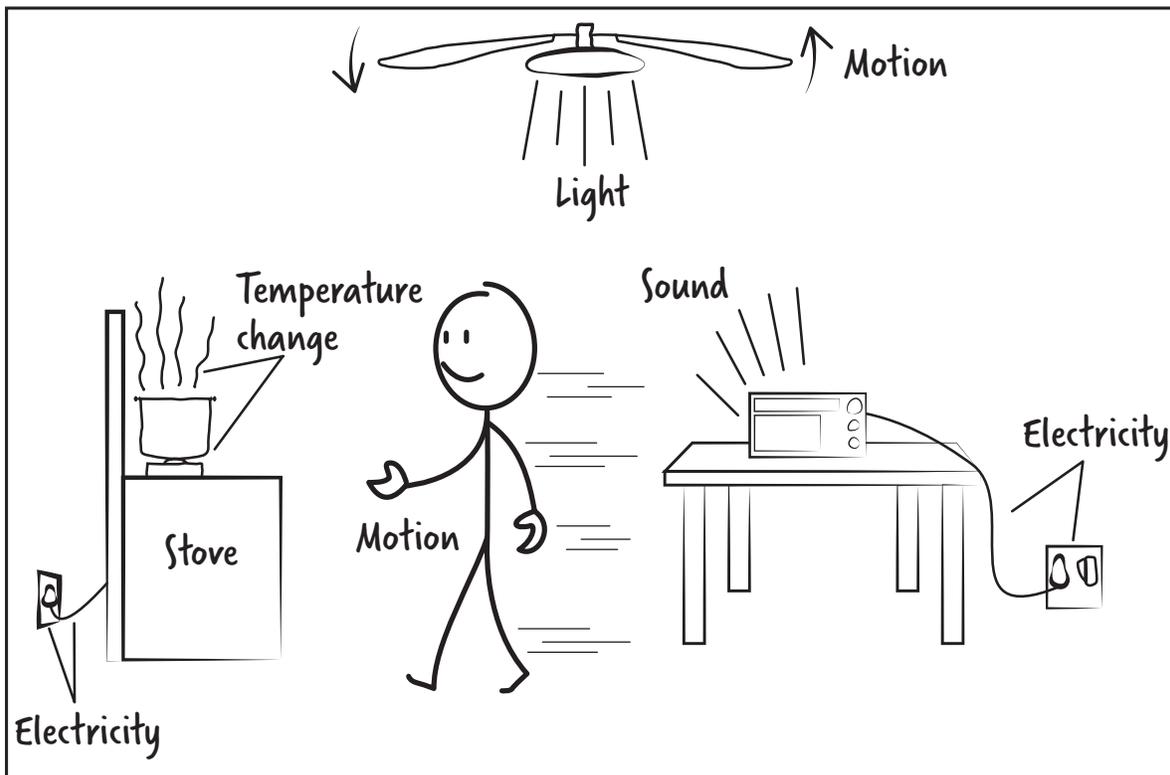
Date: _____

LEVEL 4 ENERGY

End-of-Module Assessment

- Imagine that you are in the kitchen helping to cook dinner and listening to music.

Draw a model to show the indicators of energy that you would observe. Be sure to label your model, including the indicators of energy.



2. Use a pencil or a highlighter to analyze the data set below. Use the data set to answer the questions that follow.

Student A and Student B are curious about who can kick a soccer ball into a goal with more energy. They know that a slower ball will take more time to reach the goal. The students take turns kicking the ball from the same location and timing how long it takes for the ball to reach the goal. Their data set is displayed in the table below.

Trial	Time for Student A	Time for Student B
1	4 seconds	6 seconds
2	4.5 seconds	5 seconds
3	4 seconds	5.5 seconds
4	4.5 seconds	4 seconds
5	5 seconds	5 seconds
6	4 seconds	5.5 seconds
7	4.5 seconds	5 seconds
8	4.5 seconds	5 seconds
9	5.5 seconds	5.5 seconds
10	4.5 seconds	5 seconds

- a. What pattern(s) do you notice in the data set? Use evidence from the data to support your response.

The pattern I see is that Student A almost always kicked the ball into the goal faster. I notice that Student A kicked the soccer ball into the goal faster 7 times, and Student B kicked it faster only once. The typical time for Student A was 4.5 seconds, and the typical time for Student B was 5.5 seconds.

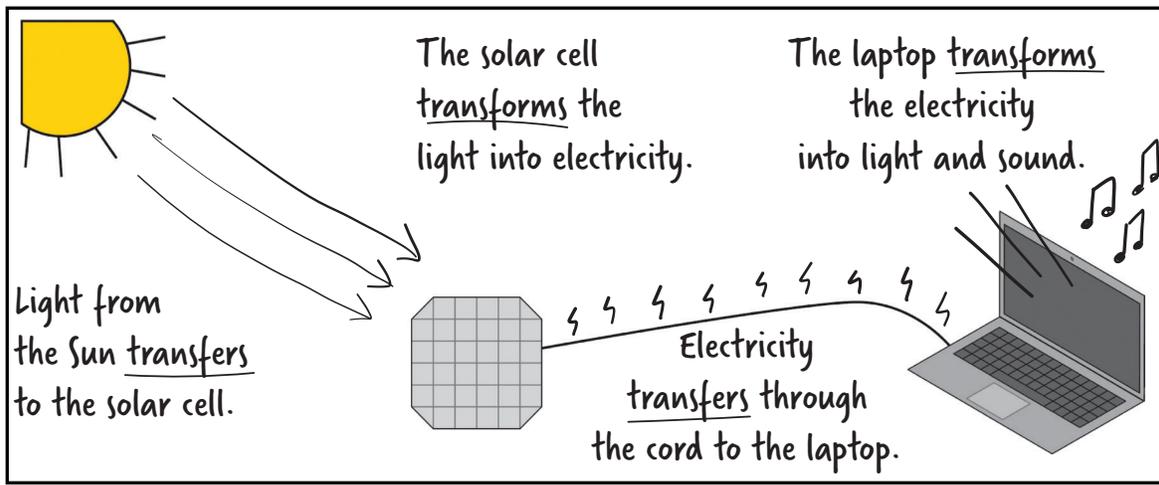
- b. Neither student has ever worked with this type of information before. What three questions might the students have about this data as they try to figure out who kicked the soccer ball with more energy?

Why did Student B's ball get to the goal faster in Trial 4? Did Student B use more energy than Student A in Trial 4? How does the time it takes the ball to get to the goal relate to the energy used to kick it?

- c. Student A says that she used more energy during the investigation than Student B. Is there evidence in the data to support her claim?

Yes. Since Student A got the soccer ball to the goal faster almost every time, her ball was usually moving faster and had more energy. I know this because I remember from the ball bearing investigation that an object with greater speed has more energy. Student A transferred energy to the ball each time she kicked it, so she used more energy during the investigation.

3. The model below shows a solar cell powering a laptop computer that is playing music. Add detailed information to the model to explain the energy transfers and energy transformations taking place.



4. A blue marble is sitting on a flat surface when a white marble collides with it. Describe what happens to the energy of each marble before, during, and after the collision. If needed, create a drawing in the box to help organize your thoughts.

Before the collision:

The blue marble doesn't have any energy of motion because it is sitting still.

The white marble has energy because it is moving. It is also making a sound as it rolls.

During the collision:

The white marble hits the blue marble. We know some of the white marble's motion energy is transformed because we hear a sound and both marbles get a little warm. Some of the white marble's motion energy is transferred to the blue marble, causing it to move.

After the collision:

The blue marble starts moving because the force from the collision transferred motion energy to it. The white marble's motion changes, too, and eventually it stops.



LEVEL 4 ENERGY

End-of-Module Assessment Rubric

Item and Standards Addressed		1 Incorrect or unreasonable response with no detail or evidence provided	2 Correct or reasonable response with no detail or evidence provided OR Incorrect or unreasonable response with some detail or evidence provided	3 Correct or reasonable response with some detail or evidence provided OR Incorrect or unreasonable response with sufficient detail or evidence provided	4 Correct or reasonable response with sufficient detail or evidence provided
1	4.3B 4.6A	The student model includes one or two of the five energy indicators (electricity, temperature change, light, motion, sound) but does not represent them accurately. OR The student model does not include any energy indicators.	The student model includes and accurately represents one or two of the five energy indicators (electricity, temperature change, light, motion, sound). OR The student model includes three or four of the five energy indicators but does not represent them accurately.	The student model includes and accurately represents three or four of the five energy indicators (electricity, temperature change, light, motion, sound). OR The student model includes all five energy indicators but does not represent them accurately.	The student model includes and accurately represents all five energy indicators (electricity, temperature change, light, motion, sound).
2a	4.2D	The student does not correctly identify any patterns in the data set related to time, distance, speed, or energy and provides no detail or supporting evidence to justify the response.	The student correctly identifies a pattern in the data set related to time, distance, speed, or energy but provides no detail or supporting evidence to justify the response. OR The student does not correctly identify any patterns in the data set but provides some detail or supporting evidence to justify the response.	The student correctly identifies a pattern in the data set related to time, distance, speed, or energy and provides some detail or supporting evidence to justify the response.	The student correctly identifies a pattern in the data set related to time, distance, speed, or energy and provides clear supporting evidence to justify the response.

Item and Standards Addressed		1 Incorrect or unreasonable response with no detail or evidence provided	2 Correct or reasonable response with no detail or evidence provided OR Incorrect or unreasonable response with some detail or evidence provided	3 Correct or reasonable response with some detail or evidence provided OR Incorrect or unreasonable response with sufficient detail or evidence provided	4 Correct or reasonable response with sufficient detail or evidence provided
2b	4.2A	The student does not provide any questions. OR The student provides one or more questions that do not reveal the relationship between time, distance, speed, and energy.	The student provides one question that reveals the relationship between time, distance, speed, and energy.	The student provides two questions that reveal the relationship between time, distance, speed, and energy.	The student provides three questions that reveal the relationship between time, distance, speed, and energy.
2c	4.2D	The student's response is incorrect and provides no supporting evidence of the relationship between time, distance, speed, and energy.	The student's response is correct but provides no supporting evidence of the relationship between time, distance, speed, and energy. OR The student's response is correct despite obvious errors in data analysis. Some evidence of reasoning must be provided.	The student's response is correct but provides little supporting evidence of the relationship between time, distance, speed, and energy. OR The student's response is incorrect due to obvious errors in data analysis but provides some evidence of reasoning.	The student's response is correct and provides clear supporting evidence of the relationship between time, distance, speed, and energy.

Item and Standards Addressed		1 Incorrect or unreasonable response with no detail or evidence provided	2 Correct or reasonable response with no detail or evidence provided OR Incorrect or unreasonable response with some detail or evidence provided	3 Correct or reasonable response with some detail or evidence provided OR Incorrect or unreasonable response with sufficient detail or evidence provided	4 Correct or reasonable response with sufficient detail or evidence provided
3	4.3D 4.6A	The improved model shows only one of the four key components correctly (transfer of energy from the Sun to the solar cell, transformation of light into electrical energy, transfer of electrical energy through the cord, transformation of electrical energy into light and sound). OR The improved model does not show any key components.	The improved model shows only two of the four key components correctly (transfer of energy from the Sun to the solar cell, transformation of light into electrical energy, transfer of electrical energy through the cord, transformation of electrical energy into light and sound).	The improved model shows only three of the four key components correctly (transfer of energy from the Sun to the solar cell, transformation of light into electrical energy, transfer of electrical energy through the cord, transformation of electrical energy into light and sound).	The improved model shows all four key components correctly (transfer of energy from the Sun to the solar cell, transformation of light into electrical energy, transfer of electrical energy through the cord, transformation of electrical energy into light and sound).
4	4.2A	The student's response does not provide any detail about the energy of each marble before, during, or after the collision.	The student's response provides some detail about the energy of each marble before, during, or after the collision.	The student's response provides at least some detail about the energy of each marble before, during, and after the collision.	The student's response accurately describes what happens to the energy of each marble before, during, and after the collision.