# Science in a Bag – Student Instructions

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## Do You Know the Difference?

**Grade 5:** Physical Science

**Content Standard** 10 – Energy

**Grade Level Expectations**: GLE 0507.10.1 Design an experiment to illustrate the difference between potential and kinetic energy.

**Checks for Understanding:** 0507.10.1 Design and conduct an investigation to demonstrate the difference between potential and kinetic energy.

**State Performance Indicators**: SPI 0507.10.1 Differentiate between potential and kinetic energy.

**Task Objective**: Determine the difference between kinetic and potential energy.

**Materials Contained In Bag**:

* Ruler
* Pencil
* Chart Worksheet
* Box of Dominoes
* Tape Measure
* Facts sheet
* Stop watch

**Instructions: \*Record results in chart\***

1. Take all materials out of the bag and lay on the desk.
2. Read your fact sheet to understand more about potential and kinetic energy to help you understand.
3. Make a chart like the one that was provided, using the ruler provided, to put in your learning logs.
4. Line up 10-20 dominoes in a straight line, using 0.5 cm. lengths with your tape measure.
5. After you have the dominoes lined up, push one of the dominoes over to start the dominoes falling while at the same time timing how long it takes for the dominoes to fall with the provided stopwatch.
6. Write your results on your chart provided.
7. Then do 5 more experiments like before, beginning with step 2, with the dominoes using different measuring lengths. Such as, after you do the 0.5 cm, then do 1.0 cm, 1.5 cm, 2.0 cm, 2.5 cm, and 3 cm.
8. Record all of your results in the chart you drew earlier.

**Assessment: \*Record in your learning logs\***

1. List 5 examples in your classroom of kinetic energy.
2. List 5 examples in your classroom of potential energy.
3. Can potential energy be changed into kinetic energy?
4. Can Kinetic energy be changed into potential energy?
5. An apple hanging from a branch is what kind of energy?
6. An apple falling from a branch is what kind of energy?
7. What is Potential energy?
8. What is Kinetic energy?
9. Explain how speed and measurement affects the time for the dominoes to fall.
10. When an object is not moving, does it have energy?
11. Is the only time an object is moving in motion an object have energy?

**Clean-up:**

* Make sure to put your charts with your results in your learning logs.
* Put your answers to the questions in your learning logs.
* Pick up all dominoes and put them back in their box.
* Put ruler, pencil, chart worksheet, box of dominoes, tape measure, facts sheet, and stopwatch back in the Ziploc bag neatly.
* Close the Ziploc bag back up.



# Science in a Bag – Teacher Instructions

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**Background Information for Teachers**: Have you ever set up a line of dominoes and watched them fall? If you wanted to make your line of dominoes fall faster, do you think you should set the dominoes up with more or less space between them? My goal is that the students understand the difference between potential and kinetic energy at the end of the assignment. The Law of Conservation of Energy states that energy cannot be created or destroyed. It may be transformed from one form into another, but the total amount of energy never changes. Potential energy is stored energy. Mechanical potential energy is related to the position of an object. Kinetic energy is the energy an object has due to its motion. Examples of Potential Energy: Water behind a dam, stretched rubber band, and a book resting on shelf (position). Examples of Kinetic Energy: water flowing over a dam, released rubber band, and a book falling from shelf.

**Common Misconceptions**:

* People can make energy
* When an object is not moving, it has no energy
* An object only has energy when it is moving.
* Students incorrectly believe that energy can be made, used, and lost.
* Students incorrectly use the terms “energy” and “force” interchangeably

**Real World Connections:** A real world example of how science behind potential and kinetic energy can be used or observed is water above and behind a dam, an object being still or moving, and time it takes for something to fall due to potential and kinetic energy.

**Across the Curriculum**:

**Math**: After a lesson is taught on Geometry and Measurement, allow students to measure each domino to determine the size, length, area, and volume of each domino with different measurement instruments. For example, use rulers, tape measures, pencils, pens, and/or piece of paper. This will also help them understand about measurements.

**0506.4.7** Understand, select and use units of appropriate size and type to measure angles, lengths/distances, area, surface area and volume.

**0506.4.8** Identify characteristics of the set of points that define vertical and horizontal line segments.

**0506.4.10** Recognize that measurements are never exact

**0506.4.12** Develop strategies for choosing correct tools of measurement.

**References:**

<http://library.thinkquest.org/2745/data/ke.htm>

<http://www.rpdp.net/sciencetips_v2/P12C2.htm>

<http://www.state.tn.us/education/ci/math/doc/MA_Grade_5.pdf>

<http://www.state.tn.us/education/ci/sci/doc/SCI_Grade_5.pdf>

<http://www.sciencebuddies.org/science-fair-projects/project_ideas/ApMech_p034.shtml>

[Energy Review Guide sheet (had to create a hyperlink, because I got this on a webpage and couldn’t find it, but this is the whole word document I used.)](file://localhost/Users/student/Desktop/Energy%20review%20guide.doc)

**Pictures:**

<http://www.google.com/imgres?imgurl=&imgrefurl=http%3A%2F%2Fmagic.about.com%2Fod%2Flibraryofsimpletricks%2Fig%2FMind-Reading---Predictions%2FThe-Deciding-Domino.--7i.htm&h=0&w=0&sz=1&tbnid=2Fkhi1h3ra0NCM&tbnh=120&tbnw=120&zoom=1&docid=8ZMwjinw_OAVDM&ei=5n02UqizO4aS9QSP7oG4Dw&ved=0CAMQsCU>

The rest came from clip art.