[Download all Associated Files for this lesson from our Website](http://peer.tamu.edu/DLC/NSF_Resources.asp?ID=1480&type=browse&num=10&terms=&content=allcontent&subject=allsubjects&grade=allgrades&query=query&hl=no&count=537&number=6&view=yes)

**Summary:** This lesson reviews basic definitions for force, motion, and energy, and introduces the concepts of potential and kinetic energy. This lesson has six, fun and interactive online activities for students to learn how changes in mass or gravity can affect kinetic or potential energy and will require a computer lab. The purpose of this lesson is to teach students about the two different forms of energy, how objects contain potential or kinetic energy, and that energy can be transferred between potential and kinetic energy. Similarities and differences of potential and kinetic energy will also be explored.

**Keywords:** Force, Motion, Energy, Potential Energy, Kinetic Energy

**Subject TEKS:**

Science TEKS: 6.8A: compare and contrast potential and kinetic energy.

**Grade Level:** 6th

**Learning Objectives:**

* Students will be able to define all terms in the vocabulary list.
* Students will be able to classify when objects have potential or kinetic energy.
* Students will know the similarities and differences in potential and kinetic energy.
* Students will understand that energy transfers between potential and kinetic energy.
* Students will be able to identify which objects have the lowest/highest potential or kinetic energy.

**Time Required:** 1 hr

**Materials:**

* Paper and pencil
* Computer with projector
* Marble Experiment
	+ 3 marbles (of different masses) /per group
	+ 1 Incline plane or ramp /per group
	+ 1 Metric ruler /per group
	+ 1 Empty, cleaned milk Carton /per group

**Background and Concepts for Teachers:**

Browse and review these listed websites:

* Potential and Kinetic Energy

<http://www.fmschools.org/webpages/kquattrocci/index.cfm?subpage=14137>

* Compare potential and kinetic energy

<http://www.internet4classrooms.com/grade_level_help/physical_science_potential_and_kinetic_sixth_6th_grade_science.htm>

* Work, Energy, and Power – Potential Energy

<http://www.physicsclassroom.com/class/energy/U5L1b.cfm>

* Work, Energy, and Power – Kinetic Energy

<http://www.physicsclassroom.com/class/energy/U5L1c.cfm>

**Vocabulary/Definitions:**

* **Force** - A push or a pull that causes an object to move, change direction, change speed, or stop
* **Motion** - A change in the position of the object
* **Energy** - The ability to do work by applying force
* **Potential Energy** - Stored energy
* **Kinetic Energy** - The energy of motion

**Lesson Introduction/Motivation:**

Students can view a short graphical explanation of kinetic and potential energy before the lesson is started.

“The story of kinetic and potential energy” <https://www.youtube.com/watch?v=7K4V0NvUxRg>

**Requires:** Computer and projector

**Presentations:**

1. Potential and Kinetic Energy PowerPoint

After activity:

2. Potential Kinetic Review PowerPoint - interactive PowerPoint and for students to complete by themselves.

**Marble Experiment:**

See attached Force Motion Energy Lesson. Print out one copy for each student to fill out, have each group’s experiment materials divided up per the activity plan’s instructions (3 marbles, ruler, ramp, etc.) depending on the number of groups you have. Students should all have a standard ramp or include surface, e.g., stacking two textbooks on top of each other and having a third act as the ramp.

**Activity/Application:**

1. **Kinetic vs. Potential Energy** – This is a short online quiz that asks students to choose the right answer and fill in the blanks to solidify basic concepts in potential and kinetic energy. There are 3 exercises to earn three coins, once students finish the first they must click on the bottom, right button “Next exercise >>” to advance.

**Requires:** Computer lab

<http://www.quia.com/cz/8072.html?AP_rand=1568493411>

1. **Energy in a Roller Coaster Ride** – This is a short visual in which a roller coaster is used to present the concepts of potential and kinetic energy to students. This visual allows students to step through each stage of the roller coaster ride and view the buildup of potential energy and release of kinetic energy at various stages of the ride.

**Requires:** Computer and projector

<http://www.pbslearningmedia.org/resource/hew06.sci.phys.maf.rollercoaster/energy-in-a-roller-coaster-ride/>

1. **Whoahler Coaster!** – This is a fun online game where students can design roller coaster tracks and then test whether or not the designed roller coaster will make it to the end of the ride. The game provides a great challenge to students, since they will need to learn how to handle the buildup of potential energy and release of kinetic energy so that the riders reach the end of the track unharmed. The change in potential and kinetic energy can be viewed in a bar graph once students click on “Test It!”.

**Requires:** Computer lab

<http://pbskids.org/fetch/games/coaster/game.html>

1. **Energy Skate Park** – This is another fun online game where students can design tracks for a skateboarder and then observe how the potential and kinetic energy of the skater changes throughout the tracks. Similar to the Whoahler Coaster! activity above. Students can view multiple ways how potential and kinetic energy change by clicking on the graphs on the right side of the window. Students can change options such as mass of the skater and gravity to observe effects on potential and kinetic energy.

**Requires**:Computer lab

<http://phet.colorado.edu/en/simulation/energy-skate-park>

1. **Dropping Paint** – This is a short online simulation where students can observe the impact of changing mass on potential and kinetic energy.

**Requires**:Compute lab

<http://www.classzone.com/books/ml_science_share/vis_sim/mem05_pg69_potential/mem05_pg69_potential.html>

1. **Pendulum** – This is another online simulation where students can observe the energy change of a pendulum. The height that the pendulum is dropped can be varied, and its effects on potential and kinetic energy can be observed by a plot and bar graph.

**Requires**:Computer lab

<http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS05/PS05.html>

**Lesson Closure:**

At the end of the course, ask students to reflect on what they learned about potential and kinetic energy. Things such as definitions, similarities, differences, or examples of kinetic and potential energy could be topics to be discussed. This could either be done in an interactive manner with the whole class or individually on paper.

**Assessment/Evaluation:**

* PowerPoint titled “Potential Kinetic Review” can be done at the end of the lesson.
	+ Modified from [http://stemteachersnowpdproject.wikispaces.com](http://stemteachersnowpdproject.wikispaces.com/)
* Activities #3 and #4 can be done at home, if time is an issue.

**Resources:**

* Investigating Kinetic and Potential Energy

<http://www.teachersdomain.org/resource/hew06.sci.phys.maf.lpenergy/>

* Energy

<http://www.infoplease.com/encyclopedia/science/energy-potential-kinetic-energy.html>

* Difference between Kinetic Energy and Potential Energy

<http://www.differencebetween.info/difference-between-kinetic-energy-and-potential-energy>

**References:**

All images found on Google.

**Author:**

Graduate Fellow: Bagrat Grigoryan and Jennifer Graham