# Conservation of Energy

| Teach 1 | Names of student(s) teaching: |
|---|---|
| Teach date:<br>Teach time:<br>Teach length: 45 minutes | Title of lesson: Egg Drop – Conservation of Energy<br>Source (Kit, Lesson, Page #): |

| Concept statement/Main idea: |
|---|
| Conservation of Energy: Energy is not created or destroyed.<br>Kinetic and Potential Energy: How kinetic and potential energy are transferred over time. |

| Standards for the lesson: |
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| National Science Teachers Association (NSTA) standards for this lesson. PS3.B Conservation of Energy and Energy Transfer and Engineering Design.<br><br>"Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced."<br><br>Students must define the problem, develop possible solutions and improve on the designs following testing/prototypes. |

| Objectives | Evaluation |
|---|---|
| Write objectives in SWBAT form | Write at least one question to match the objective you listed or describe what you will look at to be sure that students can do this. |
| SWBAT **identify** the difference between kinetic and potential energy. | What is kinetic energy? |
| SWBAT **determine** where the change between kinetic and potential energy takes place. | What is potential energy? |

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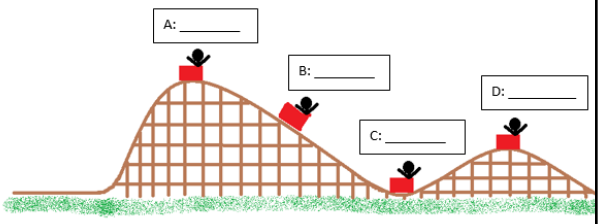
| SWBAT **explain** how energy is transferred in an impact situation. | Label where the kinetic and energy takes place.<br>  |

## Engagement

Estimated time: 5 minutes

Description of activity: Students will watch as the teacher drops an egg in a bucket.

| What the teacher does | What the student does | Possible questions to ask students — think like a student and consider possible student responses |
|---|---|---|
| The teacher will ask the students if they have ever heard of disaster relief supplies being dropped off by an airplane.<br><br>The teacher will elaborate and reiterate the necessity that the package drops must be coordinated correctly because these supplies must reach designated landing areas accurately and intact. When things do not go as planned, bags of food can burst from the impact, and sometimes supplies completely miss the target landing areas. | Students will be asked whether they have heard of air dropping supplies to people after disasters. Students will understand the importance of these supplies being properly packaged and the effects of not properly calculating how the force of impact will have on the supplies. | Have you ever heard of disaster relief supply package drop? [“Students will possibly say no. If they do explain briefly]<br>Explanation for students who do not understand: [Disaster relief groups and the armed forces must deliver life-sustaining and delicate supplies of food and equipment to people in places that are very hard to reach, often there are no nearby roads, trains and airports.]<br><br>Now that you see what happens when the egg is dropped, what do you think |

| | | |
|---|---|---|
| Lastly, the teacher will drop an egg into a paint bucket. This will display to the students what will happen when the calculations are wrong and the 'supplies' (in this case the egg) splatter or combust. | | we can use to prevent the egg from cracking? ["foam, air, pillow, ect…"] |

**Resources needed:**

- Raw egg in a Ziploc bag
- Clear Paint bucket
- Safety Goggles
- Computer
- Projector

**Safety considerations:**

The egg must remain in a Ziploc bag to prevent the egg from splattering everywhere. It is advised that the students stand far from the drop (still to where they can see).

## Exploration

Estimated time: 15 minutes

Description of activity: Students will be given some materials to see which one they feel will shield the egg from cracking. They will perform this activity in groups. They will form groups by each getting one of the number cards and going in the group together by the number. Then they will have some materials in front of them that they will then use to keep the egg from cracking. The students will each have an egg in a plastic bag and the teacher must reiterate to them that they are not to take it out of the bag. And they have only 10 minutes to put together the egg holder.

| What the teacher does | What the student does | Possible questions to ask students — think like a student and consider possible student responses |
|---|---|---|
| The teacher will explain to the students that today they will be coming up with a way | Students will form groups of about 4 students each. | Will the height of the drop affect how you protect your egg? |

| | | |
|---|---|---|
| to prevent an egg, which represents the supplies, from cracking upon impact.<br><br>The teacher will tell the students that they are to form groups by the number that is located on each of their desks. Once they are in groups they will begin to create their packaging for their egg.<br><br>The teacher must remind the students to not take the egg out of the zip lock bags.<br>The teacher will rotate around the groups providing feedback to help the students along as they determine how to best protect their egg. | The students will collaborate with one another to create a device to keep the egg from cracking. | Ask students questions based on what the students are creating throughout their exploration. |

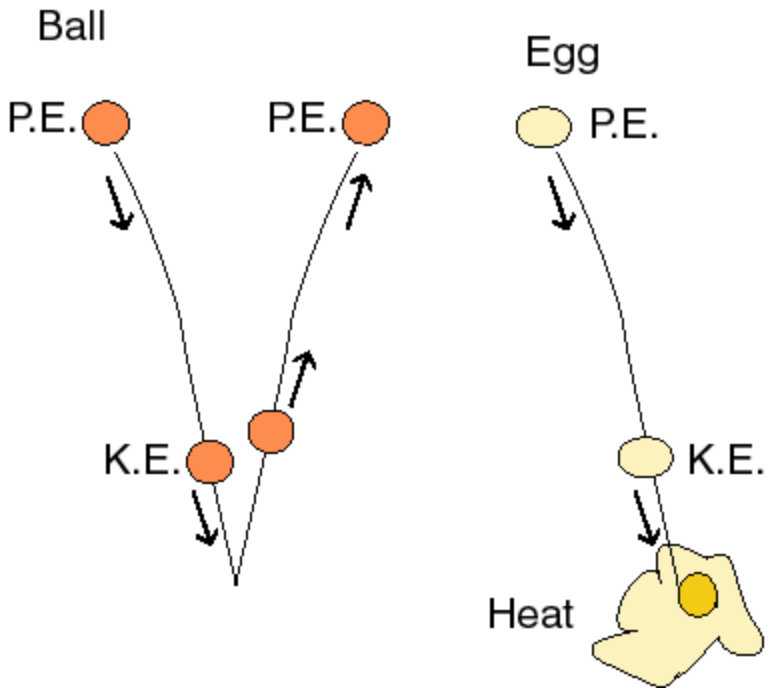
**Resources needed:**
Eggs, plastic bags, foam, Tupperware, paper towels, tape, scissors, paper, cotton balls, rubber bands, plastic grocery bags, yarn, foil, plastic wrap, egg carton, bubble wrap, ruler, and a target.

**Safety considerations:**
Scissors and supplies are the primary sources of danger. Be sure students use proper caution.

If dropping from a height such as a second story window, be sure to maintain proper supervision of students near the window. For greatest safety on higher drops, have only the teacher drop the eggs.

## Explanation

Estimated time: 10 minutes
Description of activity: The students will partake in a card sort to determine where they believe the kinetic and potential energy will be occurring. Here the teacher can show that the conservation of energy takes place more than one time by showing them a ball bouncing.




| What the teacher does | What the student does | Possible questions to ask students — think like a student and consider possible student responses |
|---|---|---|
| The teacher will direct the students to form groups.<br><br>The students will be introduced to the formal terms of kinetic and potential energy and then directed to conduct a card sort. The card sort is to apply the kinetic and potential energy they just established to another idea. | The students will complete the card sort.<br><br>Then the students will share their answers with the class. | Why does the Ball change from potential energy to kinetic energy and then back to potential energy?<br><br>Why does the egg have potential energy at the highest point? |

**Resources needed:**

KE & PE Card Sort

**Safety considerations:**

## Elaboration

Estimated time: 10 minutes

Description of activity: The students will partake in a card sort to determine where they believe the kinetic and potential energy will be occurring. Here the teacher can show that the conservation of energy takes place more than one time by showing them a ball bouncing. Can also relate this to a roller coaster as it changes from KE to PE, and that is how the roller coaster keeps running.

| What the teacher does | What the student does | Possible questions to ask students — think like a student and consider possible student responses |
|---|---|---|
| The teacher will pose a variety of questions to the students about the connection between kinetic and potential energy to other aspects. | Answer questions as a group. | Would the height of the egg drop affect the amount of kinetic and potential energy? What else is a good example of kinetic and potential energy? |

**Resources needed:**

**Safety considerations:**

## Evaluation

Estimated time: 5 minutes

Description of activity: Students will have a worksheet where they will answer the evaluation questions.

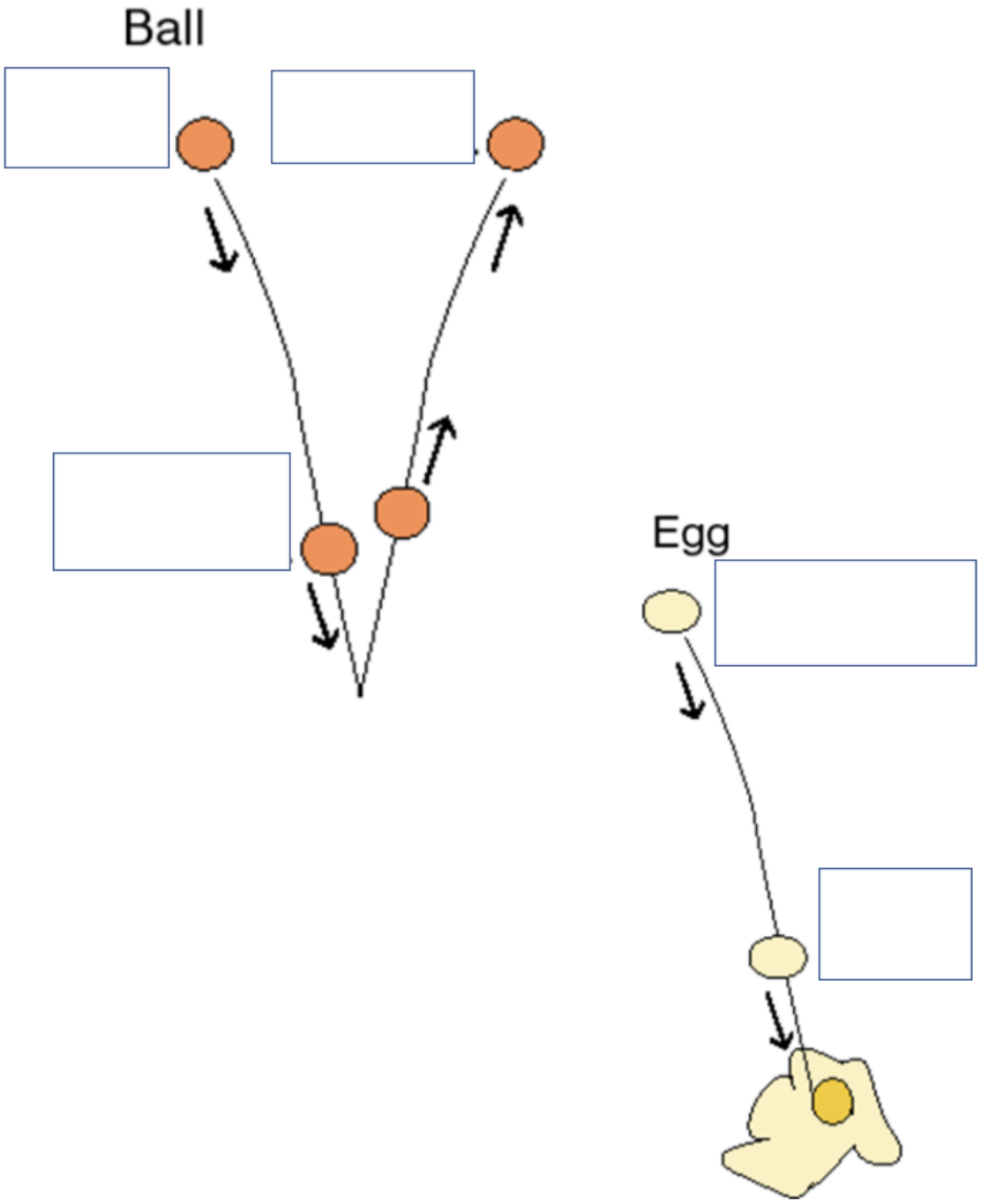
| What the teacher does | What the student does | Possible questions to ask students — think like a student and consider possible student responses |
|---|---|---|
| Administers an evaluation quiz that students will complete on their own. | Complete the evaluation quiz on their own. | |

**Resources needed:**

Evaluation Quiz

**Safety considerations:**

| | | |
|---|---|---|
| Kinetic Energy | | Is energy that is in motion. |
| Potential Energy | | Is stored energy. |
| K.E | K.E | K.E |
| P.E | P.E | |


Ball
Egg

Name: Date:

Kinetic and Potential Energy Quiz

1. Define what kinetic and potential energy is:
   a. Kinetic Energy:

   b. Potential Energy:

2. Label where kinetic and potential energy is located on the diagram below.