"Balloons and Energy"

Tehani Finch, Howard University GK12 Program

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I. DCPS Standards:

8.5.1 Explain how energy is the ability to do work and is measured in Joules (J).

8.5.2 Describe kinetic energy as the energy of motion (i.e. a deflating balloon) and potential energy as the energy of position or configuration (e.g. an inflated untied balloon held at the throat)

8.5.3 Investigate and explain how kinetic energy can be transformed into potential energy and vice versa.

II. Goals:

Students will understand that an inflated balloon has potential elastic energy stored in its stretched frame. Students will recognize the process of letting an inflated balloon deflate (and fly around) is an example of potential energy being transformed into kinetic energy.

III. Objectives:

Students will analyze describe the potential energy of a balloon in its inflated state, and its kinetic energy as it deflates.

IV. Prerequisite Knowledge: **Elastic Potential Energy** is the potential energy due to stretching. A balloon is one example, in addition to a stretched spring.

Kinetic Energy is the energy an object has by virtue of its motion. For an object of mass m and speed v it is equal to $(1/2)mv^2$.

Conservation of Energy: The total amount of energy in an [isolated] system doesn't change; the energy merely

converts from one form to another during a dynamical process.

V. Essential Questions:

How does an inflated balloon have potential energy? What happens to the potential energy of the inflated balloon when the balloon is released? What is different if it is inflated more or less than before?

VI. Materials: One or several balloons.

VII. Differentiating Instruction: This activity should pose no problem to speakers of English.

VIII. Rationale: This activity demonstrates the transformation of potential into kinetic energy.

IX. Activity Procedure The instructor begins with an example such as a rubber band, to help explain the following concept: Stretching of an elastic material gives it potential energy. The instructor then reviews the concept of kinetic energy and explains that the following demonstration shows the conversion of potential to kinetic energy. Student volunteers (one at a time) are used to inflate and release the balloons; the first slightly and the last almost fully. The balloons fly a short distance and are then retrieved and discarded.

X. Evaluation and Assessment: The students are asked to compare the responses of the various amounts of inflation. What happens to the potential energy of the inflated balloon? [It becomes kinetic energy.] How does the amount of inflation correspond to the amount of kinetic energy the balloon receives? [More inflation leads to more kinetic energy.] Where do

they thing think the energy goes after the balloon stops moving? [It goes into slightly increased motion of the air molecules of the room; this provides an opportunity to briefly discuss energy conservation.] Students write their own statement in their lab notebooks saying what this demonstration has shown them about energy.