

Name _____ Pd. _____ Date _____

ACTIVITY #2: Knock'em Down

MAIN IDEAS: The important concepts and skills covered in this activity are ...

- A moving object has energy because of its motion. This energy, called **kinetic energy**, gives us an indication of how much a moving object can change the motion of other objects.
- The kinetic energy of an object is determined by its speed and mass. Increasing the size of the speed and/or the mass increases the object's kinetic energy.
- **Energy Transfer** takes place whenever energy is 'passed' from one object to another object.

Question #1: This is a review question from Activity 1. As the release height of the golf ball is increased, how does the speed of the ball at the bottom of the ramp change?

Question #2: Based on your graph, what effect does the speed of the golf ball have on the number of cards it knocks down?

Question #3: By replacing a solid golf ball with a hollow golf ball and repeating the experiment of Part A, what variables will be changed, and what variables will be kept the same?

Question #4: What effect did changing the mass of the ball (substituting the hollow ball for the solid ball) have on the resulting number of cards knocked down?

Question #5: Look at the results of your experiments and identify in which case the golf ball had the greatest kinetic energy.

Question #6: Considering the entire motion of the golf ball, from its release at the top of the ramp to the point where it comes to rest. At what point in its motion does the ball have its greatest kinetic energy?

Question #7: In the question above, you identified the solid golf ball as having the greatest kinetic energy. Describe how you could give the hollow golf ball this same amount of kinetic energy.

MAKING SENSE OF ENERGY ...

Energy is the most central concept in all of science. It is the thread that ties the physical, life, and earth sciences together. Matter and energy make up the universe. While matter is tangible and something that we can hold in our hands, energy is far more abstract. We commonly say that objects have energy, but we can't really see this energy. We recognize energy mainly through the effects it has on objects. We see things happen and changes occur when an object or substance has energy and shares that energy with other objects.

Energy is not easily defined, so historically, scientists studied energy by looking at the effects it had on matter. A loose definition that is sometimes used for

Energy is the ability to bring about some sort of change...

energy is "the ability to bring about some sort of change." In other words, if something has energy, then it can cause a change in itself or its surroundings. By designing experiments to study these changes, scientists learn more about energy.

Scientists long ago noticed patterns emerging through their experiments. One story suggests that Galileo watched a pendulum in a clock rock back-and-forth during a church sermon. He wondered why the pendulum kept swinging without slowing down much and how the pendulum could stop at the ends of the swing, yet speed up while approaching the center of the swing. He questioned if there something being saved up during each swing. These types of observations were repeated by other scientists that followed Galileo. Sir Isaac Newton used the conclusions of Galileo to formulate his famous three laws of motion, but ironically, Newton's work included nothing about energy. It appears that the famous Isaac Newton was not aware of energy. The concept of energy was not developed and used to explain physical changes until the 1800's, more than a hundred years after Newton's death. Today, the concept of energy is a key idea in all the sciences.