

OH WOW!

Apple Wrecking Ball

Standards :

4.PS3.4: Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

PS 5.1.1: The amount of change in movement of an object is based on the mass of the object and the amount of force exerted.

6.PS.3: There are two categories of energy: kinetic and potential.

Objectives :

The student will be able to design a wrecking ball structure using given materials.
The student will be able to define potential and kinetic energy.

Academic Language :

Energy: The ability to do work or cause change

Kinetic energy: Energy in motion

Potential energy: Energy that is stored and ready to be used

Conversion: The transformation of one form of energy into another form of energy

Momentum: The force that causes an object to continue moving

Force: A push or pull on an object

Motion: A change in position

Materials :

- Apple
- Masking tape
- Unsharpened pencils
- Toilet paper rolls
- Strings, yarn, pipe cleaners
- Popsicle sticks
- Markers (set of 10)
- Cardboard scraps

Procedure :

1. Lay items on a table top



2. Inform students that they will must design a wrecking ball structure that will hold an apple
 - a. Provide example photos to give inspiration or ideas
 - b. The apple must be able to swing back and forth.
 - c. The apple must be able to knock down a set of markers
3. Allow building time for 30-45 minutes
4. Stack and place markers as bowling pins
5. Place the structure 2 inches from the front marker
6. Test apple wrecking ball

Extension Activities :

1. Have students build a house or building structure out of household materials. Then, see if the apple wrecking ball can knock it down.

Talking Points :

- Kinetic energy is energy in motion
- Potential energy is energy that is stored, or has to potential to be used
- Force is a push or pull on an object.
- Motion is a change in an object's position.
- The apple utilized both kinetic and potential energy throughout this activity. The apple had potential energy as it sat in the wrecking ball structure. After swinging and releasing the apple, this energy converted into kinetic energy because it began to move.
- The force and momentum of the apple caused the markers to fall.
- If the apple was held back further and released, it would move faster. The faster motion of the apple would result in more markers falling down.

Discussion Questions :

1. How heavy is the apple? Does this affect its ability to knock down structures?
2. How long will the apple swing once released? What cause it to keep moving?
3. When did the apple have the most potential energy?
4. When did potential energy convert to kinetic energy?
5. What caused the markers to fall down?
6. How can we increase or decrease the force of the apple?
7. What other variables affected the force and motion of the apple?

Additional Resources :

<https://www.stemchallenge.com/2019/08/22/apple-annihilator-fall-stem-challenge/>
<https://www.stemchallenge.com/2019/09/12/4th-grade-ngss-stem-challenges/>

https://www.teacherspayteachers.com/Product/Fall-STEM-Challenge-Activity-Apple-Annihilator-2660480?utm_source=STEMSite&utm_campaign=4thNGSS_Annihilator

