

WHAT IS ENERGY?

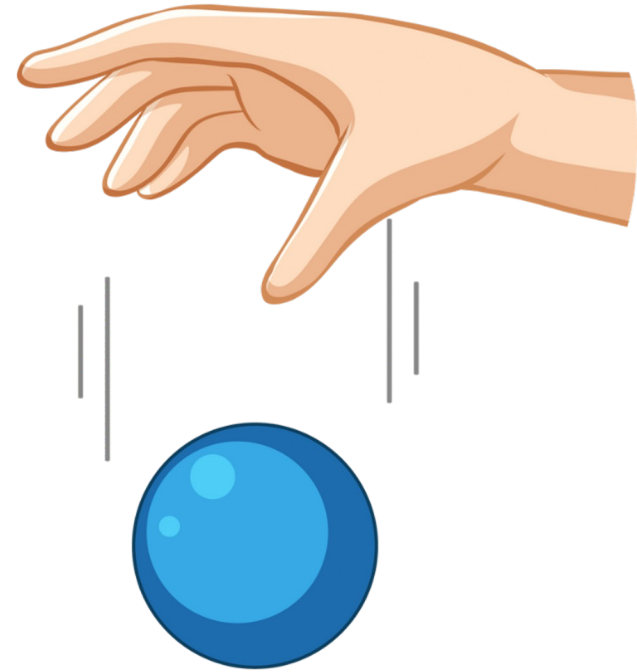
“In speaking of the Energy of the field, however, I wish to be understood literally. All energy is the same as mechanical energy, whether it exists in the form of motion or in that of elasticity, or in any other form.

The energy in electromagnetic phenomena is mechanical energy. The only question is, ‘Where does it reside?’”

James C. Maxwell

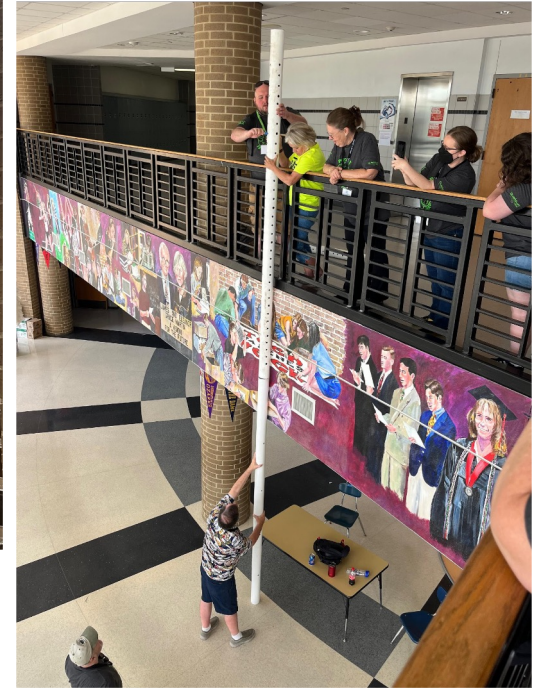
Simple Situation

Ball Drop: Identify system



OBJECTIVES:

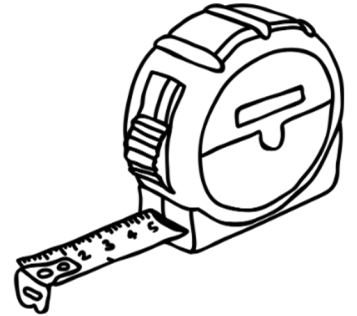
- Derive the relationship between PE and mgh .
- Understand the relationships between energy, work, and momentum.
- Identify the system and environment.



INVESTIGATION TIME:

- **Materials:**

- Irrigation Pipe
- Dowel
- Smart Water Bottle/PVC Bottle
- Tape Measure
- Cans



INVESTIGATION TIME:

Option A:
Vary the mass of the
water bottle

Option B:
Vary the drop
height of the water
bottle

GRAPHING

Use your data collected to create a graph of:

Can Crush vs. Drop Height

or

Can Crush vs. Mass

TEACHER NOTES

Based on the class data and graphs students should be able to predict:

How much a can would be crushed when dropped from a height that was not tested

or

How much a can would be crushed when dropped from a given height with a mass that was not tested

EVALUATE

- Qualitatively describe the relationship between potential (mgh), work done on the cans by the falling mass, and the amount of can crushed.
- Describe the changes in momentum.
- Identify the system and environment



WRAPUP

- Have students identify the system.
- How is the energy stored?
- Identify the work-energy transformations from initial release to crushing of can.
- How does changing the variable change momentum?
- How does the change in momentum relate to the amount of crush?



Photo: Duane Merrell, AAPT President 2023

EXTEND

Have students create a device using paper and tape to protect a Pringle chip from crushing. The device must be no taller than 15 cm and must fit inside the irrigation pipe.

