Activity 2.2 Energy Conversion in Action

Introduction

Energy, and the conversion of energy to different forms, is all around you. The cars on the road, the refrigerator that keeps your food fresh, even the device you may be reading this on all need energy.

Your body also uses energy. The food you eat contains energy that your body stores and uses later when you run, play, and even when you rest. Your body needs energy throughout the day and night for growth and repair.

Energy is needed for many things we use every day. We heat and cool our homes, ride in cars and buses, and watch television. All of these require the use of some form of energy. How do we get the energy we need for our daily tasks?

In this activity you will observe several types of energy conversion and learn about forms of energy including light, thermal, electrical, mechanical, chemical, and nuclear.

Equipment

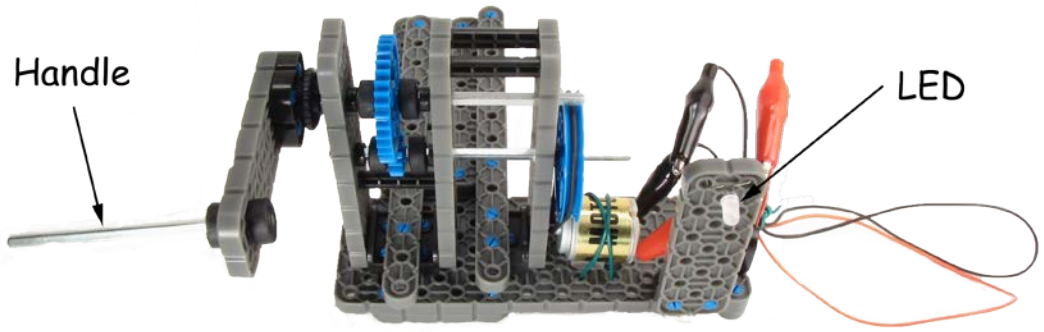
- Generator materials, enough for 2 class generators
- VEX IQ® Construction Kit (2)
- Motor (2)
- Light Emitting Diodes (LEDs), 5 mm, red/green MV5491A (2)
- Jumper leads (4)
- 8 Inch solid core wire (2)
- 4 Inch solid core wire (2)
- Tape ¾ inch wide from dispenser, 1 inch length (2)
- Launch Log
- Hand warmers (6)
- Glow sticks, 1 per student
- iPad® tablet
- Tablet application
    - Instructure by Canvas App
    - Autodesk® Inventor® Publisher

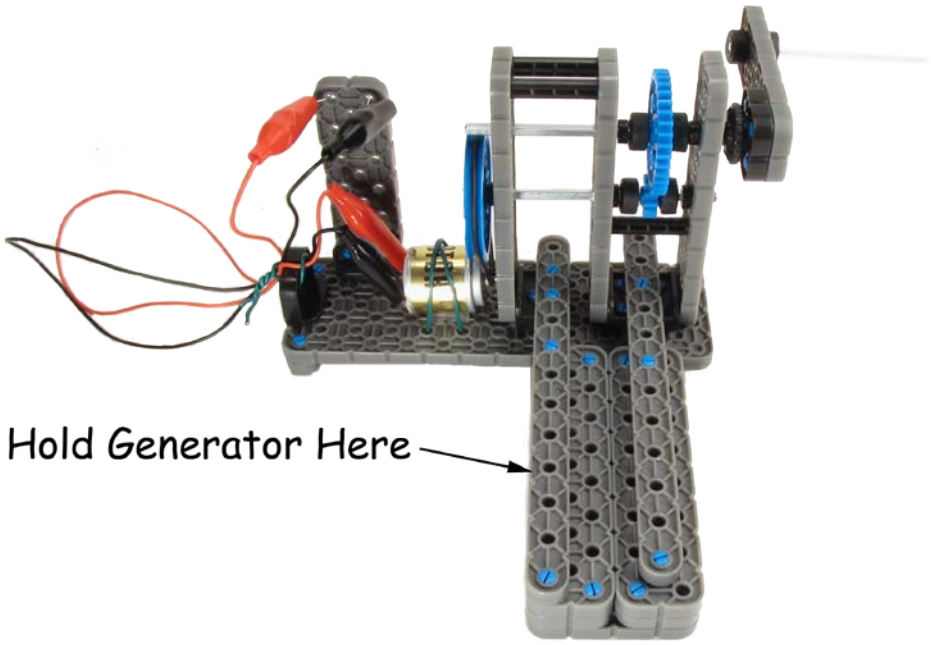
Procedure

Part 1 – Energy Conversion Observations

1. Follow your teacher's directions to rotate through three stations. The order in which you experience the stations is not important. At each station you will record information in your Launch Log.
2. These stations include hand warmers, glow sticks, and an electrical generator. Specific instructions are below:

- Hand Warmers
  - Use a tablet or other device to take a photograph of the hand warmer in the package.
  - Tear open the hand warmer package. Be careful not to damage the warmer inside.
  - Take another photograph of the hand warmer outside of the package.
  - In your Launch Log, write down your observations of how the hand warmer looks and feels. You may want to draw a sketch of the hand warmer as well.
  - Shake the hand warmer for at least 30 seconds.
  - After 5 minutes write down your observations of how the hand warmer looks and feels. Note any changes you observed.
- Glow sticks
  - Use a tablet or other device to take a photograph of the glow stick.
  - In your Launch Log, write down your observations of how the glow stick looks and feels. You may want to draw a sketch of the glow stick as well.
  - Bend the glow stick until you hear a “pop” sound.
  - Write down your observations of how the glow stick looks and feels and what the glow stick felt like when you bent it until it popped. Note any changes you observed.
  - Take another photograph of the glow stick.
- Generator
  - The generator has a handle and LED as shown:





- An LED is a light emitting diode. You will learn more about LEDs in Activity 2.3.
- Use a tablet or other device to take a photograph of the generator.
- Use one hand to hold the generator firmly to the table top and the other hand to turn the crank. Start slowly, and then gradually increase the speed.
- Take turns in your group turning the crank.
- In your Launch Log, describe the generator and how it changed once you turned the crank.
- Experiment with turning the crank at different speeds and in different directions. Document your observations in your Launch Log.
- Take another photograph or record a video of the generator while a student is turning the hand crank.

3. After you have experienced all three stations, reflect on the following questions. You may write your answers in your Launch Log or discuss with a partner as directed by your teacher.
    - What were some similarities between the stations?
    - What were some differences between the stations?
    - What do you think caused the changes you observed?

Part 2 – Forms of Energy

4. View the presentation called Energy and take notes in your Launch Log.
5. Review the notes, sketches, and photographs from Part 1 and label the forms of energy you observed.

Part 3 – Digital Presentation

6. Follow your teacher's directions to work with a partner or in a small group to create a digital presentation on one of the energy conversions you observed in Part 1.
7. The presentation will focus on one of the following stations:
    - Hand warmer
    - Glow stick
    - Generator
8. The presentation must include the following:
    - An image of the station
    - A description of the change observed
    - The forms of energy observed (mechanical, electrical, thermal, light, or chemical)
    - How this energy conversion meets a human need or want
9. Share and discuss your presentations as directed by your teacher.

Conclusion Questions

1. What form of energy do you use the most? Explain.

2. A traditional car uses gasoline for energy. Is the gasoline a type of potential or kinetic energy? Why?

3. Think about the lights in your classroom. Describe some energy conversions that might have happened in order for these lights to work.