

## Activity 2.1 What Is Energy Conversion?

### Introduction

You have already learned that potential energy can be converted to kinetic energy and kinetic energy can be converted to potential energy. This is a common example of energy conversion.

Energy is converted from one form to another to meet a human need or want. We actually find energy in many forms, the most common of which is light energy. Solar energy is an example of light energy. Other energy forms include thermal, electrical, mechanical, chemical, and nuclear.

In this activity you will begin by reviewing potential and kinetic energy and then observe an energy storing device called a KinetiCan. Finally you will create a device that allows you to convert human chemical energy to mechanical energy.

### Equipment

- VEX IQ<sup>®</sup> equipment
- iPad<sup>®</sup> tablet
- Tablet applications
  - Popplet Lite app
  - Autodesk<sup>®</sup> Inventor<sup>®</sup> Publisher app
- Launch Log
- KinetiCan
  - Aluminum 12 oz. drink can (1 per student)
  - 16D nail
  - Hammer
  - Needle nose pliers
  - Rubber band #32, 1/8 inch wide and 3 inch diameter (1 per student)
  - 5/16 – 18 x 3/4" Machine bolt (1 per student)
  - 5/16 – 18 Nuts (3 per student)
  - Large paper clip (10)
  - Small paper clip (1 per student)
  - Cellophane tape (1 roll)

### Procedure

You will work with a group to examine and document types of energy. You will build a device that allows you to convert kinetic energy to potential energy and back. Finally, your group will create a machine using VEX IQ<sup>®</sup> components. The directions for building the machine are found on the Autodesk<sup>®</sup> Inventor<sup>®</sup> Publisher app on your tablet. Follow the procedures found below to complete this activity. Record your answers in your Launch Log.

## **Part 1 – Reviewing Potential and Kinetic Energy**

1. Open the Energy Review presentation for a quick review of potential and kinetic energy.
2. The amount of stored (potential) energy can vary, or change, from one object to another. Kinetic energy is also found in varying amounts. Search for examples of the following in your classroom:
  - High potential energy
  - Low potential energy
  - High kinetic energy
  - Low kinetic energy
3. As you search for examples, talk with your group about why you think the amounts of potential or kinetic energy vary.
4. Take photographs of each example using the camera app on a tablet.
5. Using the Popplet Lite app on a tablet, create a popplet that includes each of your images and an explanation for your choice. Label each example to show the type of energy you believe it represents and why you made that decision.
6. Share your results with the class as directed by your teacher.

## **Part 2 – Observing a KinetiCan**

1. If directed by your teacher, follow the construction guide to build your own KinetiCan.
2. Observe the actions of the KinetiCan when it is rolled across a flat surface. In your Launch Log, record the following:
  - Describe the actions of the KinetiCan.
  - How does this demonstrate potential and kinetic energy conversion?

## **Part 3 – Exploring Human Energy Sources and Conversion**

In this part you will engage in a discussion with your classmates and teacher and then record a summary of what you discussed and learned in your Launch Log.

1. To prepare for your discussion, create a list in your Launch Log of what you have eaten today.
2. Consider the following questions:
  - After you eat your breakfast, lunch, or snack, what benefit does your food provide to you?
  - What kind of energy conversion do you think this illustrates?

## **Part 4 – Converting Chemical to Mechanical Energy**

In this part of the activity, you will create a VEX IQ<sup>®</sup> device to model a common item you may already own and use—a bicycle. This device converts human chemical energy to mechanical energy.

1. Open the Autodesk<sup>®</sup> Inventor<sup>®</sup> Publisher app on your tablet.

2. Use the table of contents to select EC2\_Bike\_01. Follow the directions to build the box.
3. Remember that you can compress the table of contents to view the full screen by selecting the left arrows at the top of the screen.
4. Work through the building steps shown below to build the bicycle. As you complete each step, make a note in your Launch Log to track your progress.

<b>Building Step</b>	<b>Completed</b>
EC2_Bike_01_Frame	
EC2_Bike_02_FrontSupport	
EC2_Bike_03_FrontTire	
EC2_Bike_04_MiddleAxle	
EC2_Bike_05_Pedal	
EC2_Bike_06_RearSupport	
EC2_Bike_07_RearTire	
EC2_Bike_08_CompleteAssembly	

5. Take a section of chain out of your VEX IQ<sup>®</sup> equipment box. Obtain a rubber band from your teacher
  - Wrap it around both pulleys so that it is fairly tightly secured.
6. Respond to the following questions in your Launch Log:
  - How is this similar to a bicycle you have ridden?
  - How is it different?
  - How do the similarities and differences affect how this model will perform?
7. Remember to save your constructed bicycle for use later in Project 2.4.
8. Respond to the following question in your Launch Log:
  - What is the connection between the food you eat as described in part 3 and the reason why you can use your bike?

## **Conclusion Questions**

1. Describe the differences in potential and kinetic energy.
2. List examples in which energy is converted between potential and kinetic energy.
3. Explain how energy can be converted to meet a human need or want.