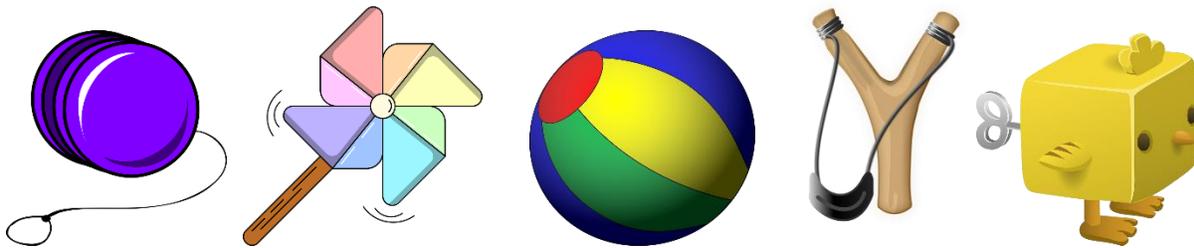


Energy Conservation Lab Activity - Teacher Edition

Energy Toys

Background Information and Extended Teacher Notes:

Although we cannot see it, energy can make things work. Many, everyday objects take energy in as one form and then transform it into one or more other forms allowing it to perform a task. Many simple toys that you can find at home, are based on this principle, and are considered converters of energy.



This lab allows students to engage their prior knowledge of how energy toys operate. It provides a useful real-world context for the abstract concepts of energy transformation and transfer. The lab can be carried out at home by distance learning or in a laboratory setting and caters to a wide variety of learning abilities.

The activity is best carried out in pairs to allow students to observe and discuss the energy transformations they are seeing, while developing their scientific writing/explanations. Building a class set of toys pre-arranged into a container with the six different toys makes for easy set up and collection.

Group Size: Pairs

Time allowance: 30-40 mins

Learning Objectives:

- Identify energy transformations and give examples.
- State the law of energy conservation and apply it to different scenarios.

Name: _____ Period: _____ Date: _____

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Pre-Lab Questions:

1. State the law of energy conservation

Energy is not created or destroyed but transforms from one form into another.

2. What is the difference between an energy transformation and energy transfer?

Energy transformations involve energy changing forms

Energy transfers involve the same type of energy moving from object to object.

3. Identify the type of energy often generated as waste energy.

Heat due to friction

Equipment Needed:

Selection of energy toys such as a:

- Yoyo
- Wind-up toy
- Pull back car
- Mini catapult/slingshot
- Bouncy (rubber) ball
- Pinwheel

Method:

1. Use each toy and observe the energy changes occurring.
2. Record all observations in the table below.

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Observations: Answers will vary depending on the type of toys used.

Name of Toy	Description of how the toy it works	Types of energy involved
Yoyo	Drop the yoyo from a height and allow the string to uncoil. Once the string is completed uncoiled, the yoyo bounces back up recoiling the string.	Gravitational potential energy Kinetic energy
Windup toy	The key is wound up and then released causing the gear inside the toy to move the toy.	Kinetic energy Elastic energy Sound energy
Pull-back car	The car is pulled backwards which coils a spring. When released the car moves forwards.	Kinetic energy Elastic energy Sound energy
Catapult	The rubber basket is stretched backwards and then released. The contents of the basket flies forwards.	Elastic energy Gravitational potential energy Kinetic energy
Bouncy ball	The ball is released from a height and dropped, it bounces and returns to the person's hand.	Gravitational potential energy Kinetic energy Elastic energy
Pinwheel	Air is moved over the wheel (by blowing on it) which causes it to spin.	Kinetic energy only

Post-Lab Questions:

- Write energy chains for each of the toys

Yoyo – gravitational potential energy → kinetic → gravitational potential energy

Wind-up toy – Elastic energy → kinetic energy → sound energy

Pull back car - kinetic energy → elastic energy → kinetic energy → sound energy

Catapult – Elastic energy → gravitational energy → kinetic energy

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Bouncy ball - gravitational potential energy → kinetic → elastic energy → kinetic energy →

gravitational potential energy

Pinwheel – kinetic energy only.

2. Another toy that acts as an energy converter is a tyre swing.

Describe the energy involved in the motion of the tyre swing.

There are two types of energy as the tyre swings. At its highest point all the energy possessed by the tyre swing is gravitational potential energy. This is converted into kinetic energy as it swings downwards, reaching maximum kinetic and minimal gravitational potential energy when the swing is at its lowest point. As it moves back up it gains gravitational potential energy again as the kinetic energy is converted.



3. Some toys such as cars and robots require a battery to initiate their energy transformations.

- a) Name this initial type of energy.

Chemical potential energy

- b) For a battery-operated toy car write an energy chain to show the energy transformations involved.

Chemical potential energy → electrical energy → kinetic energy → sound energy

4. Is the pinwheel an example of an energy transformation, why or why not?

No as the movement of air (kinetic energy) causes the blades of the pinwheel to spin (also kinetic energy) so it is energy transfer.