# Energy transformation and transfer

By Doaa George, based on the Workshop investigation by Peta White.

## Introduction

Energy is observable in many forms and it can be transformed from one form to another. Energy is neither created nor destroyed: When energy changes in form the total amount of energy remains constant. In other words, even though energy degrades and dissipates, it is never destroyed.

Throughout this investigation you will explore energy transformations and transfers. Potential energy to kinetic energy is the most common transformation, such as ball rolling down a ramp. There are other forms of energy such as light, chemical, sound, heat, elastic, nuclear and electrical energies.

## Risk Analysis

Practices to consider potential hazards

- The hammer hitting the nail into the wood will be demonstrated as there are several risks with hammers and the potential miss hitting of the nail.
- Balls must be bouncy and only dropped. Please do not throw the balls around the classroom or at each other.
- A variety toys will be used which use a variety of energy transformations and transfers. Care should be taken if any toys fly, spin, propel quickly, or move around the classroom.
- Take time to consider the skills in the correct use of magnifying glasses.

## Questions

In this study you will learn about energy transformation and transfer through experimental work. You will also understand the meaning of conservation of energy.

Aim: To find different forms of energy in today's investigation:

## Plan

The investigation has been planned for you; however you should record your results and make full sense of what is happening. In doing so, you can carry out internet research and discuss the reasoning with the rest of class and with your teacher.

### Materials

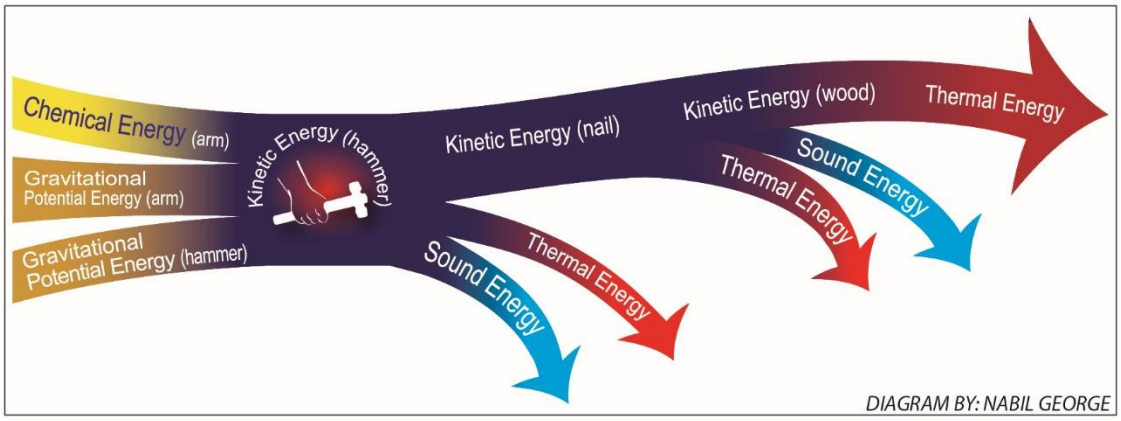
- Hammer and nail in wood (demonstration)
- Balls to bounce

- Toys
- Magnifying glasses
- Worksheet and pens/pencils

## Conduct

### Procedure

1. Watch a hammer hit a nail into wood and determine what this representation is communicating.




   Mark on the 'Sankey' diagram above the actions of the arm, hammer, nail, and the wood.

2. In your group, drop a ball from waist height onto the floor and allow it to bounce once (then catch it). Represent the energy transformations using a Sankey diagram.

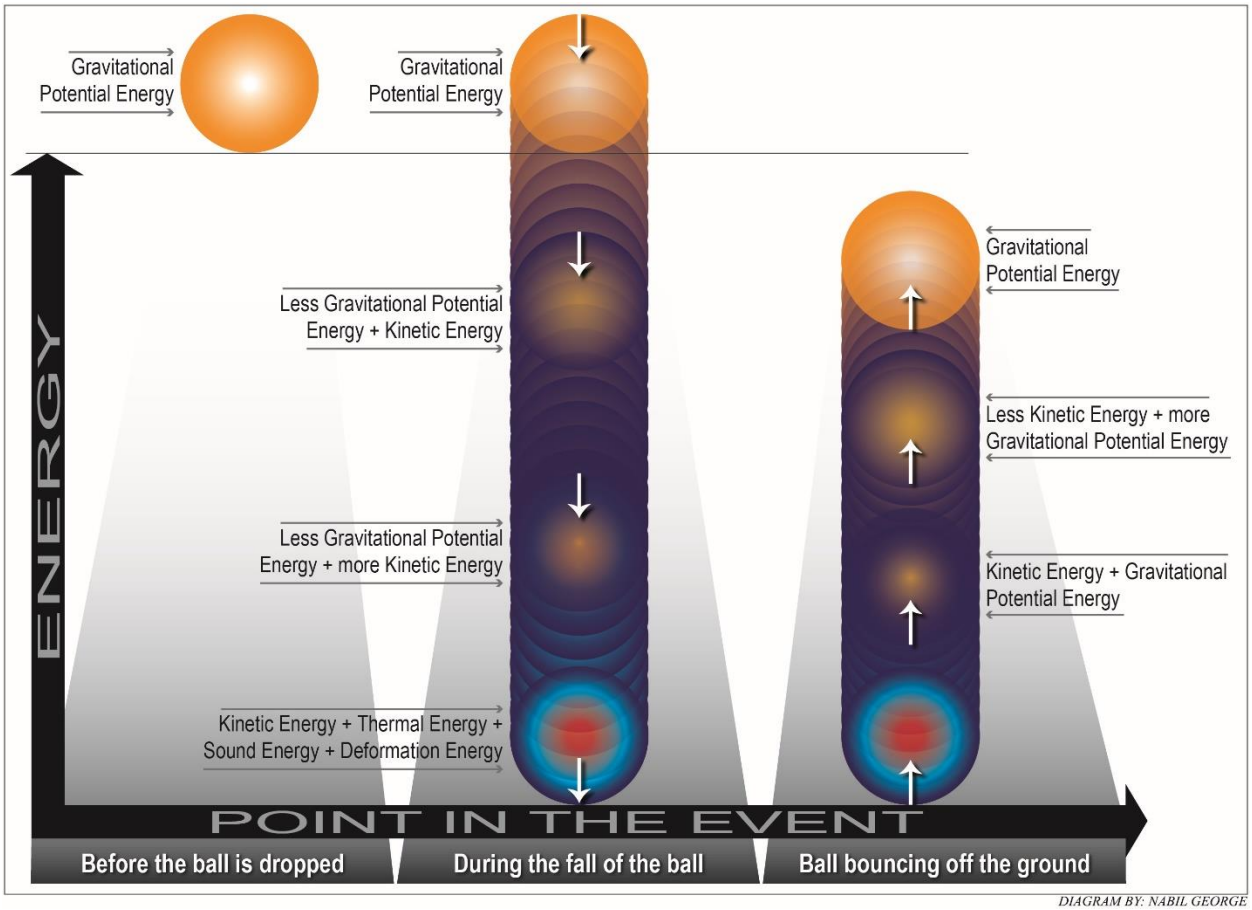
3. A challenge task: Explore the toy given to you in terms of the energy transformations and transfer used by it.

## Analysis

Write down what each Sankey diagram is showing.
What does the Sankey diagram allow you to illustrate and explain?
What happens to the energy as it transforms or transfers?
What happens to the total amount of energy?
What do you understand about energy transformation from the Sankey diagram?
Can you provide definitions for kinetic and potential energy, energy transformation, and energy transfer?

## Discussion-Problem solving and reasoning

There are many alternative ways of representing the energy transformations of the dropping ball. The following diagram is a different representation.




Can you design one other representation on the energy transformations involved in dropping the ball and it bouncing once?

Discuss your thoughts about the energy transformations and transfers used by the given toy. Do not include you (and your energy) in the representations (start from when the toy is wound or pulled etc.). Design a Sankey diagram or any alternative representation that will allow you to communicate your thoughts to others.

Can you and your team represent the mechanisms and principles by which your toy works? What are the mechanisms that propel the toy? These are not necessarily energy related. Discuss your thoughts with your team and then design a representation that will allow you to communicate your thoughts to others.

**Conclusion**

Can you answer the question in the aim?