



## Lesson Overview

The following activity guide is for use by high school students and educators looking to explore and expand on the concept of inertia both in the classroom and at home. The guide presents an overarching challenge for students to respond to and some supporting activities to integrate cross-curricular priorities and help structure their understanding by providing depth and richness within the learning. There is an extension task to encourage students to apply their understanding to new situations and encourage further thinking.

**Inertia** is the property associated with moving objects and links to Newton's First Law of Motion: Moving objects will tend to keep moving unless an outside force acts upon them.

Students will explore this concept with egg experiments to demonstrate Newton's First Law and then investigate the variables affecting the property of inertia.

## Lesson Intentions

- Use investigative skills to design experiments
- Investigate the laws of physics through designed experiments
- Discuss the energy and motion of objects using scientific language

## Teachers Notes

### Year 8 Outcomes:

#### Science Understanding

- Energy appears in different forms, including movement (kinetic energy), heat and potential energy, and energy transformations and transfers cause change within systems (ACSSU155)

#### Science Inquiry Skills

- Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge (ACSI139)
- Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (ACSI140)
- Measure and control variables, select equipment appropriate to the task and collect data with accuracy (ACSI141)

### Year 10 Outcomes:

#### Science Understanding

- Energy conservation in a system can be explained by describing energy transfers and transformations (ACSSU190)
- The motion of objects can be described and predicted using the laws of physics (ACSSU229)

#### Science Inquiry Skills

- Formulate questions or hypotheses that can be investigated scientifically (ACSI198)
- Plan, select and use appropriate investigation types, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods (ACSI199)
- Select and use appropriate equipment, including digital technologies, to collect and record data systematically and accurately (ACSI200)

## Main Challenge

### We like to Move It, Move It:

Design an experiment using eggs that investigates Newton's idea that a force is not required to keep an object moving.

#### Tips:

- Consider how to prove that objects tend to keep doing what they're doing unless acted on by an outside force.
- Consider the relationship between an object's mass and its inertia.
- Consider how an object's movement and ability to resist change corroborates to its mass.
- Consider what forces act on objects that move in different ways.
- Consider what forces can act on different objects.
- Consider ways to remove or lessen different forces that act on moving objects.
- Take photos and record accurate measurements during your investigation.
- Present your investigation and findings using a digital medium.

#### Check your understanding with these questions:

1. Imagine you are cooking eggs in space in a weightless environment. Would it require a force to move the eggs from their carton to a pan?  
**Yes of course! A force must be applied to set stationary objects in motion - even in space!**
2. A person spends their Saturday sitting at home consuming large quantities of scrambled eggs. How does this affect their inertia?  
**This person's mass will increase with every spoonful of eggs they consume. As their mass increases, so does their inertia!**
3. A 50gm hen egg is rolling horizontally at a speed of 0.5m/s. How much force is required to keep it moving in the same speed and direction?  
**0 N. According to Newton's Law, a moving egg will keep moving in the same direction, at the same speed if it is not acted upon by any outside force.**

## Supporting Activities

Explore kinetic energy and potential energy by building a pendulum for an egg. Investigate the effect of speed, height and mass variables on the egg's potential and kinetic energy and its inertia.

Investigate how raw and cooked eggs interact with inertia in the spinning egg experiment. Hypothesise reasons for the difference in behaviours. Design a way to prove your hypothesis.

Using a video recording technology such as Adobe Spark Video or iMovie (both free to use) create an informative video explaining the difference between potential energy and kinetic energy and their relationship to inertia.

## Extension Opportunity

Investigate the relationship between how far you can jump and your approaching speed. Refer to the concepts discussed in this guide; inertia, potential energy, kinetic energy, mass and forces. Discuss the implications of this investigation on real life.