

Physical World

Outcomes

A student:

- › plans and conducts scientific investigations to answer testable questions, and collects and summarises data to communicate conclusions ST3-1WS-S
- › plans and uses materials, tools and equipment to develop solutions for a need or opportunity ST3-3DP-T
- › explains how energy is transformed from one form to another ST3-8PW-ST
- › investigates the effects of increasing or decreasing the strength of a specific contact or non-contact force ST3-9PW-ST

Content Focus

Stage 3 of the Physical World strand focuses on the difference between contact and non-contact forces and how energy is transformed from one form to another. Students are provided with an opportunity to investigate how electrical energy can control movement in products and systems. Stage 3 of this strand develops students' abilities to design, test and evaluate a product or system that demonstrates energy transformation, further developing an understanding of the interrelationship between force and energy.

Skills Focus

Working Scientifically

Questioning and Predicting

- pose testable questions
- make and justify predictions about scientific investigations (ACSIS231, ACSIS232)

Planning and conducting investigations

- identify questions to investigate scientific ideas
- plan and apply the elements of scientific investigations to answer problems
- identify potential risks in planning investigations
- manage resources safely (ACSIS086, ACSIS103)
- decide which variable(s) is to be changed, measured and kept the same, in fair tests
- select appropriate measurement methods, including formal measurements and digital technologies, to record data accurately and honestly (ACSIS087, ACSIS104)
- reflect on and make suggestions to improve fairness, accuracy and efficacy of a scientific investigation (ACSIS091, ACSIS108)
- manage investigations effectively, individually and in groups

Processing and analysing

- construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data
- employ appropriate technologies to represent data (ACSIS090, ACSIS107)
- compare data with predictions
- present data as evidence in developing explanations (ACSIS218, ACSIS221)

Communicating

- communicate ideas, explanations and processes, using scientific representations including multimodal forms (ACSIS093, ACSIS110)

Design and Production**Producing and implementing**

- select and use tools competently for specific purposes
- accurately cut, join, bend and measure a range of selected materials to construct the designed solution
- demonstrate safety and sustainability when choosing resources to produce designed solutions, managing constraints and maximising opportunities (ACTDEP026)
- develop project plans that consider resources when producing designed solutions individually and collaboratively (ACTDEP028)

Testing and evaluating

- negotiate criteria for success based on defined needs, sustainability and aesthetics
- develop appropriate and fair processes to test a designed solution according to criteria
- evaluate design ideas, processes and solutions according to criteria for success (ACTDEP027)

Inquiry and Focus Questions

- How can we make a force stronger or weaker?
- What types of energy transformations can be observed?
- How can electricity be used in a product or system?

Content

Describing and exploring specific forces

Inquiry question: How can we make a force stronger or weaker?

Students:

- explore and describe some common contact or non-contact forces, for example:  
 - applied force (eg pushing, kicking)
 - friction and air resistance
 - tension and elastic force
 - gravity
 - magnetism
 - buoyancy
- perform a scientific investigation to explore the effects of changing the strength of a single contact or non-contact force, for example: **SciT**   
 - how a stronger or weaker applied force, such as a push or kick, results in objects travelling longer or shorter distances
 - how increasing or decreasing the strength of the force of air resistance by changing the shape of an object results in increases or decreases in speed

Transfer and transformation of energy

Inquiry question: What types of energy transformations can be observed?

Students:

- identify different types of energy transformations, for example: (ACSSU097) 
 - gravitational energy to energy of movement
 - heat energy to light energy
- investigate how electrical energy can be transferred and transformed in electrical circuits and can be generated from a range of sources (ACSSU097) **SciT Syst**   

Forces and energy in products and systems

Focus question: How can electricity be used in a product or system?

Students:

- describe examples where light, sound, heat and electrical energy transform from one type of energy to another, for example: **ComT Syst**  
 - a toaster transforms electrical energy into heat energy
 - a microphone transforms sound energy into electrical energy
 - a solar panel transforms light energy into electrical energy
- investigate how electrical energy can control movement, sound, or light in a product or system (ACTDEK020) **ComT SciT**  
- design, test and evaluate a product or system that involves an energy transformation to meet an identified need using electrical energy **ComT DesT**    