

## Achievement Standard

**Subject Reference** Physics, Earth and Space Science 1.4

**Title** Demonstrate understanding of a physical system using energy concepts

**Level** 1      **Credits** 5      **Assessment** External

**Subfield** Science

**Domain** Science - Core

**Status** Approved      **Status date** December 2023

**Planned review date** December 2028      **Date version published** December 2023

### Purpose Statement

Students are able to demonstrate understanding of a physical system using energy concepts.

### Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> <li>Demonstrate understanding of a physical system using energy concepts</li> </ul>	<ul style="list-style-type: none"> <li>Explain a physical system using energy concepts</li> </ul>	<ul style="list-style-type: none"> <li>Analyse a physical system using energy concepts</li> </ul>

### Explanatory Notes

- 1 *Demonstrate understanding of a physical system using energy concepts* involves:
- describing a physical system
  - describing change to the physical system, using evidence
  - describing relevant energy concepts, using evidence.

*Explain a physical system using energy concepts* involves:

- explaining change to the physical system, using relevant energy concepts and evidence.

*Analyse a physical system using energy concepts* involves:

- examining implications of the change to the physical system, using relevant energy concepts and evidence.

- 2 A *physical system* refers to a defined space with either an object or interacting objects.

Examples of a physical system include:

- vacuum flask
- insulated home
- simple electrical circuits
- falling objects
- lifting of objects.

For the purpose of this achievement standard, a physical system can be described in terms of its physical properties or behaviour that relate to energy concepts.

Examples of physical properties or behaviour include:

- the height of a falling object
- motion
- the resistance of a wire
- the temperature of an object.

*Change* to a physical system is any change to physical properties or behaviour of the system.

- 3 For the purpose of this achievement standard, *energy concepts* are ideas and principles related to energy that are used to understand change in physical systems.

Examples of energy concepts include:

- energy transfer
- conservation of energy
- forms of energy (mechanical, thermal, electrical).

Associated formulae include:

- $\Delta E = Pt$
- $E_k = \frac{1}{2} mv^2$
- $E_p = mg\Delta h$
- $W = Fd$
- $E \text{ (thermal)} = mc\Delta T$
- $E \text{ (thermal)} = mL$
- $P = VI$
- $V = IR$ .

- 4 *Evidence* may include written accounts, representations, or calculations.

- 5 Refer to the NCEA [glossary](#) for Māori, Pacific, and further subject-specific terms and concepts.

- 6 This achievement standard is derived from the Science Learning Area at Level 6 of *The New Zealand Curriculum*: Learning Media, Ministry of Education, 2007.

**Replacement Information**

This achievement standard and AS92044-AS92046 replaced AS90935-AS90939.

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**Quality Assurance**

- 1 Schools and institutions must have been granted consent to assess by NZQA before they can register credits from assessment against achievement standards.
- 2 Schools and institutions with consent to assess must engage with the moderation system that applies to those achievement standards.

Consent and Moderation Requirements (CMR) reference 0233

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