

## Achievement Standard

**Subject Reference** Physics 2.5

**Title** Demonstrate understanding of atomic and nuclear physics

**Level** 2 **Credits** 3 **Assessment** Internal

**Subfield** Science

**Domain** Physics

**Status** Registered **Status date** 17 November 2011

**Planned review date** 31 December 2018 **Date version published** 20 November 2014

This achievement standard involves demonstrating understanding of atomic and nuclear physics.

### Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> <li>Demonstrate understanding of atomic and nuclear physics.</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrate in-depth understanding of atomic and nuclear physics.</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrate comprehensive understanding of atomic and nuclear physics.</li> </ul>

### Explanatory Notes

- This achievement standard is derived from *The New Zealand Curriculum*, Learning Media, Ministry of Education, 2007, Level 7; and is related to the material in the *Teaching and Learning Guide for Physics*, Ministry of Education, 2010 at <http://seniorsecondary.tki.org.nz>. The standard is aligned to the achievement objectives *Physical Inquiry and Physics Concepts* in the Physical World strand and *Communicating in Science* in the Nature of Science strand.

This standard is also derived from Te Marautanga o Aotearoa. For details of Te Marautanga o Aotearoa achievement objectives to which this standard relates, see the [Papa Whakaako](#) for the relevant learning area.

- Demonstrate understanding* involves writing statements that show an awareness of how simple facets of phenomena, concepts or principles relate to a described situation.

*Demonstrate in-depth understanding* involves writing statements that give reasons why phenomena, concepts or principles relate to a described situation. For mathematical solutions, the information may not be directly usable or immediately obvious.

*Demonstrate comprehensive understanding* involves writing statements that demonstrate understanding of connections between concepts.

- 3 Written statements include mathematical solutions and/or descriptions. Descriptions may include graphs or diagrams.
  - 4 Assessment typically includes:
    - models of the atom (Thomson and Rutherford), gold foil experiment
    - nuclear transformations: radioactive decay (half life), fission and fusion reactions
    - conservation of atomic and mass number
    - products of nuclear transformation: power generation,  $E = mc^2$ ,  $P = E/t$ , properties of nuclear emissions (ionising ability, penetration ability).
  - 5 Conditions of Assessment related to this achievement standard can be found at <http://ncea.tki.org.nz/Resources-for-Internally-Assessed-Achievement-Standards>.
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### Replacement Information

This achievement standard replaced AS90256.

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### Quality Assurance

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

Consent and Moderation Requirements (CMR) reference

0233