

**AS91172 version 1**  
**Demonstrate understanding of atomic and nuclear physics**  
**Level 2 Credits 3**

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

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of atomic and nuclear physics.	Demonstrate in-depth understanding of atomic and nuclear physics.	Demonstrate comprehensive understanding of atomic and nuclear physics.

Written statements include mathematical solutions and/or descriptions. Descriptions may include graphs or diagrams.

Prior to 2012, this was an external standard. It is likely to be assessed using an internal test from 2012 onwards (although teachers can select from a range of assessment techniques).

#### THE ATOM

- Thomson's plum pudding model
- Rutherford's gold foil experiment
- Rutherford's model of the atom

#### NUCLEAR TRANSFORMATIONS

- Conservation of atomic and mass number in alpha, beta and gamma emission reactions
- Alpha  $\alpha$
- Beta  $\beta$
- Gamma  $\gamma$
- neutrons
- protons
- Properties of  $\alpha$ ,  $\beta$  and  $\gamma$ 
  - ionising ability
  - penetrating ability
  - behaviour in a magnetic field
- half life
- Radioactive decay
- Decay curves
- Carbon dating

#### NUCLEAR POWER

- Fission reactions
- Fusion reactions
- Power generation

## SKILLS

- The appropriate use of significant figures
- The appropriate use of units
- Negative index (e.g.  $\text{ms}^{-2}$ ) notation or slash notation (e.g.  $\text{m/s}^2$ )

Notes

### RELATIONSHIPS:

Formulae listed in this achievement standard will be supplied.

$$E = mc^2 \quad P = E/t$$

*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.

This achievement standard replaced AS90256.