Balancing nuclear equations

Teacher / technician

YEAR 11 / LESSON 94 / PHYSICS + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Record actual measurements separately from labelled practice examples.

Coverage and delivery

Shared Physics / Double Award: 7.7–7.8. Alpha, beta-minus, gamma and neutron emission; conserving nucleon number and charge.

Allow about 60 minutes. Follow the student sequence and use the answers to check reasoning.

Requisition • class of 30, working in 15 pairs

Item	Per pair / setup	Class total
Booklets and periodic tables	1 each per learner	30 of each
Symbol-card sets	1 per pair	15 sets

Immediate safety

Paper equation models only. No radioactive substances or radiation detectors are used.

Preparation and delivery

Read alongside the student method

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1. Prepare symbols with distinct A and Z positions, including the negative beta-minus charge number.

2. Use the periodic table to identify elements by proton number, and label the neutron balance as illustrative.

Close of lesson

• Collect cards and keep balanced equations.

Check before teaching

Check the cards, reference data and quantities against this requisition. Keep the staff answer guide separate until the checking stage. Supplied numerical practice datasets are labelled examples; they are not class measurements.

Answers and teaching notes

Expected explanations • do not give as experimental observations

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- Thorium-234, Z = 90.
- Nitrogen-14, Z = 7.
- A neutron converts into a proton, with an electron and antineutrino emitted.
- Nuclear energy decreases but A and Z stay the same.
- A = 14 and Z = 6.
- No; energy and other physical conditions also matter.

References and provenance

Pearson Physics specification

IOP: teaching radioactivity

Prepared 22 November 2026. Original wording, tables and questions. Sources inform the concepts and technique; the lesson scope and classroom quantities are explicitly described here. No laboratory trial or final school risk approval is claimed.