Redshift: matching spectral patterns

Teacher / technician

YEAR 11 / LESSON 110 / PHYSICS ONLY

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

Coverage and delivery

Physics only: 8.15P, 8.17P. Relative motion and redshift in galaxy spectra.

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 line templates	1 each per learner	30 of each
Ruler and calculator	1 set per pair	15 sets

Immediate safety

Printed or screen spectra only. No fragile gas discharge tubes, high voltage, lasers or solar viewing.

Preparation and delivery

Read alongside the student method

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1. Prepare the exact invented line patterns on labelled wavelength axes and make clear that no element is being identified from real data.

2. Distinguish the school Doppler analogy from cosmological expansion, and avoid equating redshift with a visibly red object.

Close of lesson

• Retain the matched spectra and return calculators.

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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- 5 nm.
- 0.010.
- No: 4, 5 and 6 nm, but the fractional shifts agree.
- It decreases for light in vacuum.
- No; redshift means a shift toward longer wavelength.
- A matching pattern reduces misidentification and tests a common shift.

References and provenance

Pearson Physics specification

NASA: cosmological redshift

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.