Doppler effect: modelling moving wave sources

Teacher / technician

YEAR 11 / LESSON 66 / 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: 3.8. Relative source motion and observed frequency.

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 squared paper	1 each per learner	30 of each
Ruler and drawing compass	1 set per pair	15 sets

Immediate safety

Paper modelling only. Use drawing compasses carefully, keep points capped when stored and do not swing sound sources or objects on strings.

Preparation and delivery

Read alongside the student method

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1. Prepare one original completed model to reveal after pupils construct theirs. Check radius order: oldest pulse largest, newest smallest.

2. Keep all wavefronts at the same observation time and use the stated 1 cm source step. Offer a circle stencil instead of a pointed compass where appropriate.

Close of lesson

• Close compasses and return equipment; retain the labelled model.

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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- The emitted frequency.
- They have travelled for longer.
- The stationary observer ahead.
- No.
- No; amplitude and frequency are different.
- The source moved between emissions.

References and provenance

Pearson Physics specification

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.