Electromagnetic induction: moving a magnet

Teacher / technician

YEAR 11 / LESSON 86 / PHYSICS + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Initial comparison table shown; use a continuation table for three repeats. Motion speed is qualitative unless measured separately.

Coverage and delivery

Shared Physics / Double Award: 6.15–6.16. Induced voltage and electricity generation.

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

Requisition • class of 30, five groups of six

Item	Per pair / setup	Class total
Magnet, coil and logger	1 checked set per group	5 sets
Supports and travel markers	1 set per group	5 sets
Booklets and diagrams	1 each per learner	30 of each

Immediate safety

Use small classroom magnets and secure coils. Keep fingers clear and do not drop or strike magnets into coils. Keep magnets away from sensitive devices and follow medical-device guidance; provide recorded traces if needed. No supply, mains generator or powered rotating machinery is used.

Preparation and delivery

Read alongside the student method

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1. Pilot the logger range and sample rate so slow and faster hand motion give readable unsaturated voltage traces. Prepare five supervised stations for groups of six.

2. Provide a continuation table for three repeats per speed/direction. Save actual traces with pole and lead orientation, and do not substitute invented measurements.

Close of lesson

• Disconnect loggers, return magnets and retain labelled traces.

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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- There is no sustained induced voltage when field linkage is unchanged.
- The magnetic field linking the coil changes.
- The voltage sign reverses for the same leads and pole.
- The peak magnitude increases if the change occurs more rapidly.
- The pulse sign reverses for otherwise comparable motion.
- Its field linkage changes direction through successive half-turns.

References and provenance

Pearson Physics specification

IOP: electromagnetism

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.