Induction: independent written practice

Student activity • observation and reasoning

YEAR 11 / LESSON 90 / PHYSICS + SCIENCE (DOUBLE AWARD)

The question

Can you connect changing field linkage to a justified prediction?

Complete an original practice set, then improve the explanations using feedback.

Equipment

- Booklet, ruler and calculator

Paper-based independent work. No electrical apparatus is connected.

Course coverage: Shared Physics / Double Award: Shared induction and generation review; labelled Physics-only transformer practice.

Plan, model or apparatus sketch

Draw labelled coils, field directions, motion and circuit connections as relevant.

Method and reasoning

Read the whole sequence before starting

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1. Work independently for fifteen minutes on the shared induction questions. Draw labelled diagrams and state what each comparison keeps fixed.

2. Explain the signals when a north pole is pushed into a coil, held still and withdrawn using unchanged sensor leads.

3. Describe two ways of increasing the induced voltage and explain why the magnetic field alone does not guarantee a sustained induced voltage.

4. Compare the useful energy transfers of a generator and motor, including a real loss in each.

5. Physics-only extension: for an ideal transformer use 10 V input, 500 primary turns and 100 secondary turns to calculate output voltage; at 0.40 A output, find input current. Double Award alternative: explain the output changes when a generator spins faster.

6. Check the answer guidance, keep the original attempt and rewrite one explanation. The task is original practice and does not provide an official grade.

Cleanup

- Keep corrected work and return calculators.

Record your evidence

Blank spaces are for your own work

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Reference and task data

All numerical values are invented practice examples. The ideal transformer extension gives 2.0 V output, 0.80 W power and 0.080 A input current. It is not an instruction to wire a transformer.

Task	Initial response	Improved explanation
Insertion / hold / withdrawal		
Increasing voltage		
Energy transfers		
Course extension / alternative		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. What causes the insertion pulse?

2. What happens while the magnet is held still?

3. Why does withdrawal reverse the pulse?

4. How can induced voltage be increased?

5. Compare motor and generator energy transfer.

6. Extension: calculate output voltage and input current.