MAGNETISM DAY 10: LAB: INDUCTION VARIABLES

CED 12.4 · Skills 3.A/3.C · FRQ: ED

QUICK RETRIEVAL

The same flux change occurs in half the time. The induced-emf magnitude is **A half as large / B unchanged / C twice as large**. Choose and give one equation-based reason.

INVESTIGATION QUESTION

How do motion rate, number of turns, and magnet polarity affect the magnitude and sign of the induced emf?

Independent variables
motion rate, turns N, polarity

Dependent variable
peak signed voltage

Prediction. State one prediction for each independent variable and justify it with Faraday's or Lenz's law.

CONTROLLED PROCEDURE

1. Mark the same start and end positions for every pass.
2. Choose a positive meter direction and record which magnet pole faces the coil.
3. For each coil, move the magnet through the same path slowly and quickly.
4. Repeat each condition. Record the signed peak and note whether the trace returns to zero after motion stops.
5. Reverse the magnet polarity without changing the path or speed.

Measurement rule: compare matched trials. Do not compare a fast close pass with a slow distant pass.

Trial	N	motion	pole toward coil	peak 1 (V)	peak 2 (V)	mean |peak| (V)
1	100	slow	N			
2	100	fast	N			
3	200	slow	N			
4	200	fast	N			
5	100	fast	S			

NOTES / REASONING

CLAIMS FROM MATCHED COMPARISONS

1. Rate. Compare Trials 1 and 2. State a claim and cite numerical evidence.

2. Turns. Compare Trials 2 and 4. State a claim and cite numerical evidence.

3. Polarity. Compare Trials 2 and 5. Distinguish the sign from the magnitude.

4. Why should the meter return to zero when the magnet stops, even if the magnet remains inside the coil?

LENZ-LAW DIRECTION RECORD

For each row, view the coil from the magnet side. A counterclockwise current makes that face a north pole.

Motion seen from magnet side	Near coil face must become	Current seen from magnet side
N pole approaches	_____	_____
N pole withdraws	_____	_____
S pole approaches	_____	_____
S pole withdraws	_____	_____

5. Describe one limitation that makes real peak-voltage ratios differ from exact integer factors.

Required record: predictions, repeatable path, two trials per condition, signed peak table, three evidence-based claims, and the Lenz direction table.

If equipment is unavailable, teacher-provided sample data may support analysis practice, but it does not replace your experimental lab record.