MAGNETISM DAY 13: REVIEW & FRQ WORKSHOP

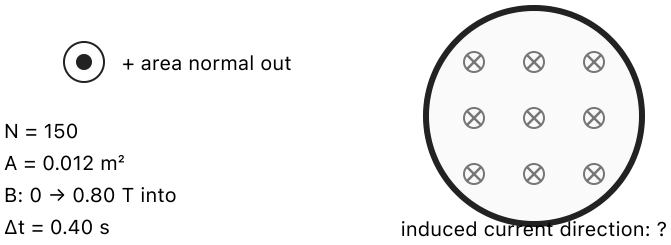
CED 12.1–12.4 · Skill 3.C · FRQ: QQT

GRAPH RETRIEVAL

A flux-time graph is horizontal and below zero. The induced emf is **A positive / B negative / C zero**. Choose and cite the graph feature that decides.

QQT SCENARIO

USE THE STATED AREA-NORMAL CONVENTION



A 150-turn loop has area 0.012 m². Its positive area normal points out of the page. A uniform external field into the page grows from 0 to 0.80 T in 0.40 s, then remains constant.

NOTES / REASONING

QQT: QUALITATIVE, QUANTITATIVE, TRANSLATION

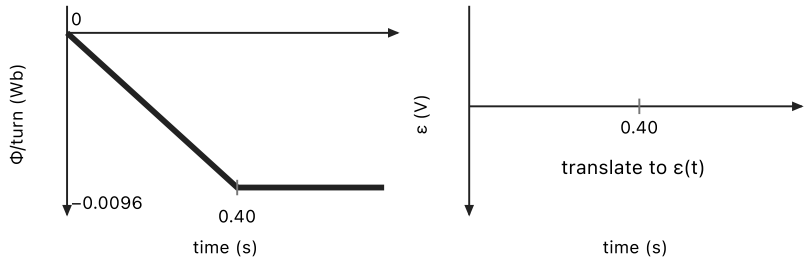
Q1 — Qualitative. Determine the induced-field direction and current direction during the field increase. Explain the complete Lenz-law chain.

Q2 — Quantitative. Calculate the signed flux change per turn and the signed induced emf during the increase. Carry units through the calculation.

T — Translation. Sketch ε(t) from the flux graph, including its value after 0.40 s.

REPRESENTATION TRANSLATION

EXTERNAL FLUX PER TURN → INDUCED EMF



1. If the field returned from 0.80 T into the page to zero in 0.20 s, sketch the additional emf segment and state its sign and magnitude.

2. Explain why the induced current direction reverses during that return interval.

3. State the induced emf while the field is held constant at 0.80 T into the page.

MIXED RAPID SET

4. A positive charge moves right through a field into the page. State the magnetic-force direction and whether its speed changes.

5. A 6.0 A straight wire is 0.030 m from a probe. Find B using $\mu_0 = 4\pi \times 10^{-7}$ T·m/A.

6. Same-direction parallel currents attract. Explain this using the field from one wire at the other, not an analogy to charge signs.

7. A 0.25 m wire carries 3.0 A perpendicular to a 0.40 T field. Find the force magnitude.

8. Name the single graph feature that determines the sign of induced emf.