ELECTRICITY DAY 16: REVIEW & FRQ WORKSHOP

CED 10.1–10.7 · Skill 3.C · featured FRQ: ED · target: translate among force, field, potential, energy, and experiment

MIXED RETRIEVAL - NO DEMO

1. Two charges move twice as far apart. What happens to F?
2. At one point, name which is scalar: E or V.
3. A positive charge moves to lower V. What is the sign of ΔU?
4. Which capacitor change increases C: larger d or larger A?

FEATURED ED FRQ - FIELD MAPPING

A student has conductive paper, two electrodes, a low-voltage DC supply, a digital voltmeter, probes, and a ruler. Design an experiment that produces an equipotential map and determines the electric-field magnitude at a selected location.

A. Setup and variables: draw a labeled apparatus and identify measured quantities and controls.

B. Procedure: give enough detail for another group to collect reproducible V(x,y) data.

ED FRQ - ANALYSIS

C. Map construction: explain how measured values become equipotential contours and field lines.

D. Numerical field: explain which two measurements are used and write the finite-difference equation, including direction.

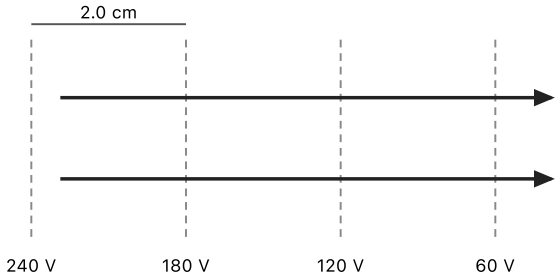
E. Uncertainty: identify one important uncertainty and a specific way to reduce or quantify it.

SELF-CHECK

Evidence present	yes / revise
Coordinate grid, reference lead, electrode voltages	
Repeated measurements and controlled supply/geometry	
Interpolation to contours; field lines normal toward lower V	
E from ΔV over perpendicular distance in meters	
Uncertainty tied to effect and improvement	

TRANSLATION BETWEEN REPRESENTATIONS

EQUIPOTENTIAL MAP



1. Adjacent contours are 2.0 cm apart. Find E magnitude and direction.

2. A $-2.0\mu\text{C}$ charge moves from the 240 V contour to the 60 V contour. Find ΔU and work by the field.

3. Draw the initial force direction on that negative charge at the 240 V contour.

4. Explain why equally spaced contours in this map imply a uniform field.

MIXED PRACTICE

1. Charges $+1.7\mu\text{C}$ and $-3.3\mu\text{C}$ are 0.37 m apart. Find force magnitude and direction on each.

2. Find E and V 0.37 m from an isolated $+1.7\mu\text{C}$ source. Identify which answer is a vector.

3. A capacitor has A = 85 cm², d = 1.8 mm, and κ = 3.2. Find C. Then find Q and U at 75 V.

4. Explain why V can be zero while E is nonzero at the midpoint of an equal positive/negative pair.

5. A student plots Coulomb force against r and sees a curve. Name the linearized horizontal axis and the physical meaning of its slope.