

Electric and magnetic fields · supported focus

Supported focus · HL

Supported scope

- Supported HL focus. First assessment 2025; full Physics guide acquired (84 PDF pages). Remaining guide, assessment and practical requirements retain their recorded holds.
- State model conditions and distinguish fictional data from measurements.

Electric Fields · 1.1

Reasoning

A negatively charged particle moves opposite to the direction of the electric field. Field direction is defined using a positive test charge. Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Electric Fields · 2.1

Reasoning

Electric field strength is force per unit positive test charge. Like charges repel and unlike charges attract. Field lines point away from positive charges and toward negative charges. Closely spaced lines represent a stronger field within a consistently drawn diagram. electric field strength: Electric force per unit positive test charge; test charge: A small charge used to probe an electric field.

Electric Fields · 3.1

Reasoning

In a uniform field between ideal parallel plates, $E = V/d$ away from edge effects. The force is $F = qE$, so its direction reverses for a negative charge. Coulomb force between ideal point charges decreases with separation squared. Sketch labelled plate polarities, field arrows and the charge before calculating. Convert separation to metres. In school, use simulations or approved low-voltage electrostatic models rather than exposed high-voltage equipment.

Electric Fields · 4.1

Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: plate potential difference is 120 V and separation is 0.020 m. $E = V/d = 6,000 \text{ V/m}$. A +2.0 microcoulomb charge experiences $F = qE = 0.012 \text{ N}$ along the field; a −2.0 microcoulomb charge experiences the same magnitude opposite to it.

Electric Fields · 4.2

Reasoning

Use $E = V/d$. Find E for 100 V across 0.025 m. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

Electric Fields · 5.1

Reasoning

Field strength is a vector. Potential difference is energy per charge and is not the same quantity. A field-line drawing is a model, not a set of physical threads. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Electric Fields · 5.2

Reasoning

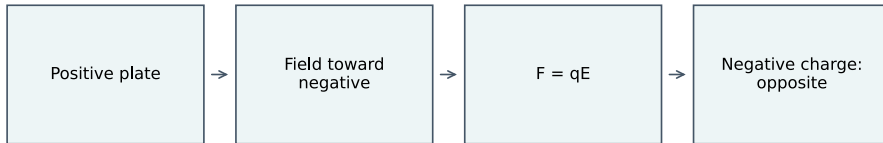
Every charged particle experiences a force along the electric field direction. This claim is false: Field strength is a vector. Potential difference is energy per charge and is not the same quantity. A field-line drawing is a model, not a set of physical threads.

Electric Fields · 5.3

Reasoning

Electric fields: force and a positive test charge: In a uniform field between ideal parallel plates, $E = V/d$ away from edge effects. The force is $F = qE$, so its direction reverses for a negative charge. Coulomb force between ideal point charges decreases with separation squared.

Electric Fields · diagram



- Original teaching diagram: Electric fields: force and a positive test charge
- Use the labels and the stated model together.

Electric Fields · original transfer

Your turn

Parallel plates have 120 V across 0.030 m. Find field and force on a -2.0 microcoulomb charge. State directions and the uniform-field boundary.

Electric Fields · transfer reasoning

Method and interpretation

$E=4,000 \text{ V/m}$ from positive to negative plate. Force magnitude is 0.0080 N opposite the field. The uniform model excludes edge fringing.

Check yourself

- Explain test charge using the stated model.
- Explain electric field strength using the stated model.
- Change one value in the original transfer; explain which assumption still matters.