

Induction · 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.

Fields · 1.1

Reasoning

A magnet beside a wire does not always produce a current. An induced electromotive force depends on changing magnetic flux linkage. Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Fields · 2.1

Reasoning

A field describes a force effect at positions in space. A current-carrying conductor in a magnetic field can experience a force. Electromagnetic induction occurs when magnetic flux linkage changes. induction: Creation of emf by changing flux linkage; transformer : A device transferring energy between coils through changing flux.

Fields · 3.1

Reasoning

Changing field strength, coil area, orientation or relative motion can change flux linkage. Lenz law describes an induced effect opposing the change producing it, consistent with energy conservation. Use a coil and sensitive meter to compare magnet motion in each direction. Record that a stationary arrangement gives no induced signal. Use approved low-voltage supplies for motor demonstrations.

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: a transformer has 200 primary turns, 50 secondary turns and 12 V primary voltage. For an ideal transformer, $V_s/V_p = N_s/N_p$. $V_s = V_p N_s/N_p = 12 \times 50/200 = 3.0$ V. Real transformers also dissipate energy.

Fields · 4.2

Reasoning

An ideal transformer has $N_p=400$, $N_s=100$ and $V_p=20$ V. Find V_s . Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

Fields · 5.1

Reasoning

A transformer needs changing magnetic flux; a steady DC input does not provide continuous transformer action. Magnetic field direction is not automatically the direction of force. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Fields · 5.2

Reasoning

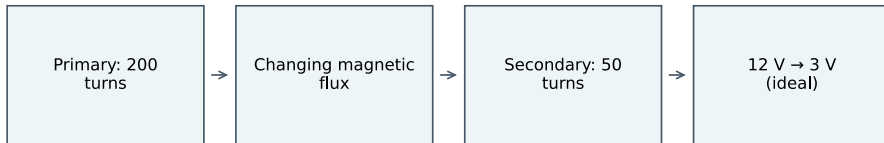
A steady DC input produces continuous ideal transformer action. This claim is false: A transformer needs changing magnetic flux; a steady DC input does not provide continuous transformer action. Magnetic field direction is not automatically the direction of force.

Fields · 5.3

Reasoning

Fields, motors and induction: Changing field strength, coil area, orientation or relative motion can change flux linkage. Lenz law describes an induced effect opposing the change producing it, consistent with energy conservation.

Fields · diagram



- Original teaching diagram: Fields, motors and induction
- Use the labels and the stated model together.

Fields · original transfer

Your turn

An ideal transformer reduces 20 V to 5 V with primary current 0.30 A. Find secondary current and power. Why does steady DC not fit the model?

Fields · transfer reasoning

Method and interpretation

Power is 6 W; secondary current is $6/5=1.2$ A. Ideal power conservation exchanges voltage and current. Induction requires changing flux, absent in the steady DC state.

Check yourself

- Explain induction using the stated model.
- Explain transformer using the stated model.
- Change one value in the original transfer; explain which assumption still matters.