

Induced Potential Generators

GCSE Physics · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Describe the generator effect and two ways it can be produced. (3 marks)

Step 1 · Definition

A potential difference is induced across a conductor when it moves relative to a magnetic field, or when the magnetic field through it changes.

Step 2 · Way 1

Move a wire (or coil) through a magnetic field, cutting the field lines, or move a magnet in and out of a coil.

Step 3 · Way 2

Change the magnetic field around the conductor, for example by switching an electromagnet on and off nearby.

Answer: Relative movement or a changing field induces a p.d.

Check: If the conductor is part of a complete circuit, a current is induced.

2. Now try one with the steps

The north pole of a magnet is pushed into a coil connected to a meter, which deflects to the right. Describe what happens when the magnet is (a) held still and (b) pulled out. Explain (b). (4 marks)

Step 1 · (a) Held still

Step 2 · (b) Pulled out

Step 3 · Reason

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Describe the generator effect. [1]

2. Give two ways of inducing a potential difference in a coil of wire using a magnet. [2]

3. Give three ways to increase the size of the induced potential difference. [3]

4. A magnet is held still inside a coil. State the induced potential difference. [1]

5. State one way to reverse the direction of an induced current. [1]

6. State the rule for the direction of the magnetic field produced by an induced current. [2]

7. A magnet pushed into a coil makes a meter deflect to the left. Describe what happens when it is pulled out. [2]

8. Describe the difference between an alternator and a dynamo. [3]

9. Describe the graph of output potential difference against time for an alternator. [2]

10. An alternator's coil makes 50 turns every second. State the frequency of the output in hertz. [1]

11. An alternator's output has a frequency of 25 Hz. Calculate the period. [2]

12. An alternator is turned twice Describe the effect on the output graph. [2]

13. Explain why a bicycle dynamo light is dimmer when the bicycle is moving slowly. [2]

14. Explain how a moving-coil microphone produces an electrical signal from sound. [4]

4. Before you hand it in

"A magnet sitting inside a coil induces a current."

A p.d. is only induced while the magnet and coil move relative to each other (or the field changes).

Confusing the motor effect and the generator effect

Motor: current + field → movement. Generator: movement + field → induced p.d.

"A dynamo has slip rings."

Alternator: slip rings (a.c.). Dynamo: split-ring commutator (d.c.).

"The induced current helps the magnet move in."

The induced current's field always opposes the change; you have to do work to push the magnet in.