

MR SULLY UNFOLDS PHYSICS ANSWERS

The generator effect

AQA 4.7.3.1–4.7.3.3
Magnetism · Paper 2
Physics only · Higher

Name _____ Class _____ Date _____

Moving a conductor in a magnetic field, or changing the field around it, can **induce** a potential difference.

KEY IDEAS

- A p.d. is induced when a wire moves relative to a magnetic field or the field through a coil changes. In a complete circuit, a current flows.
- The induced current makes its own magnetic field that **opposes** the change that caused it.
- **Alternators** generate a.c.; **dynamos** generate d.c. Moving-coil microphones use the generator effect.

Section A · Recall

Grade 5–6

1 What is the generator effect? [2]

When a conductor moves relative to a magnetic field (or the field changes),

a potential difference is induced across it.

2 State three ways to increase the size of the induced p.d. [3]

Move the magnet or wire faster.

Use a stronger magnet.

Use more turns on the coil.

3 What is the difference between an alternator and a dynamo? [2]

An alternator produces alternating current (a.c.).

A dynamo produces direct current (d.c.).

Section B · Explain

Grade 6–7

4 A magnet is pushed into a coil connected to a sensitive ammeter. The needle moves to the right. Describe what happens when: [3]

a the magnet is held still inside the coil

No current: the field isn't changing.

b the magnet is pulled back out

The needle moves to the left (current reverses).

c the magnet is pushed in faster

The needle moves further to the right (bigger current).

5 Explain how a moving-coil microphone converts sound into an electrical signal. [3]

Sound waves make the diaphragm and coil vibrate.

The coil moves in the field of a magnet, inducing a p.d.

The p.d. varies in the same way as the sound waves.

Section C · Stretch

Grade 7+

6 Explain why it is harder to push a magnet into a coil when the coil is part of a complete circuit. [3]

An induced current flows in the coil.

It creates a magnetic field that opposes the change (repels the magnet),

so more force / work is needed to push the magnet in.

Exam-style question

AQA style

7 A bicycle dynamo has a magnet that spins inside a coil as the wheel turns.

a Explain why a p.d. is induced in the coil. [2]

The magnetic field through the coil keeps changing

as the magnet spins.

b Sketch a graph of p.d. against time for an alternator, then show how it changes if the coil spins faster. [3]

Sine-shaped wave (1); faster: higher peaks (1) and more cycles in the same time (1).

c Explain why the bike's light gets brighter as the cyclist goes faster. [1]

The magnet spins faster, inducing a bigger p.d. (and current).

Total: _____ / 22

How confident am I?	Not yet	Nearly	Got it
I can describe the generator effect	☐	☐	☐
I can explain factors that affect the induced p.d.	☐	☐	☐
I can explain how alternators, dynamos and microphones work	☐	☐	☐