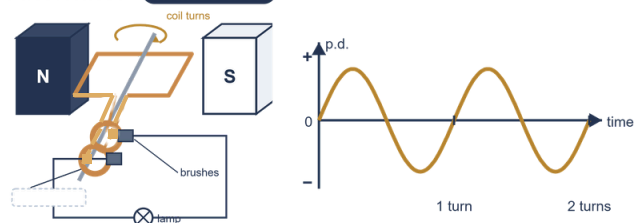


Generators: Alternators and Dynamos *Triple only*

1 · Two kinds of generator

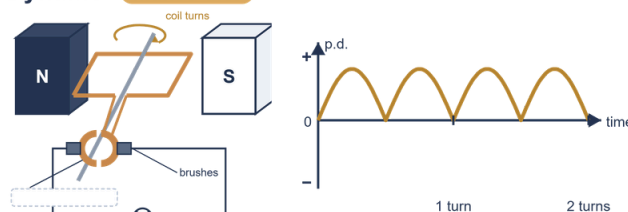
the coil turns in a magnetic field, so a p.d. is induced

Alternator makes a.c.



Each end of the coil is joined to its own _____, so the connections never swap. Each side of the coil _____ the magnetic field, moving _____ then _____, so the induced p.d. _____ every half turn: it is _____

Dynamo makes d.c.



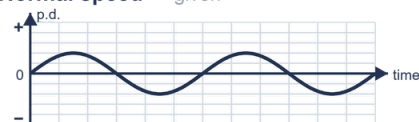
A _____ swaps the coil's connections to the circuit every _____, just as the induced p.d. reverses **direction**. So the output _____: it is _____

Word bank: a.c. · changes direction · cuts · d.c. · down · half turn · never changes direction · slip ring · slip rings · split-ring commutator · up

2 · Turn the coil at a different speed

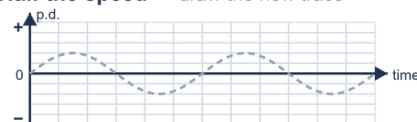
alternator

Normal speed — given



Faster = the coil cuts the field lines faster, so a **bigger** induced p.d. and more turns every second, so a **shorter** time period.

Half the speed — draw the new trace



Twice the speed — draw the new trace



tick one in each row

Time period	☐ longer	☐ shorter	☐ same
Amplitude	☐ bigger	☐ smaller	☐ same

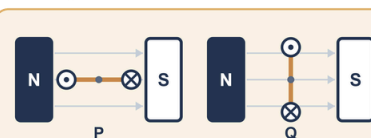
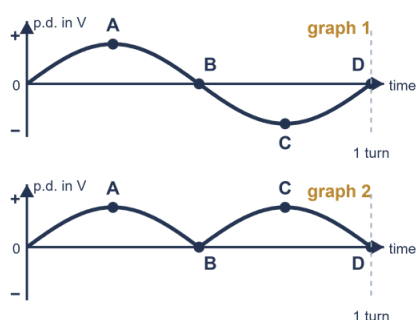
tick one in each row

Time period	☐ longer	☐ shorter	☐ same
Amplitude	☐ bigger	☐ smaller	☐ same

3 · Exam-style question

9 marks

One graph shows the induced p.d. from an alternator during one turn of its coil. The other shows the induced p.d. from a dynamo.



Hint: the coil seen end-on.

P — coil **parallel** to the field. Its sides move at right angles to the field lines, cut them fastest → **biggest induced p.d.**
Q — coil at **right angles** to the field. Its sides move along the field lines, cut none → **zero induced p.d.**

(a) Which graph comes from the **dynamo**? Give a reason. [2]

(d) Explain why the induced p.d. is zero at **B**. [2]

(b) Explain how the dynamo gives this output. [2]

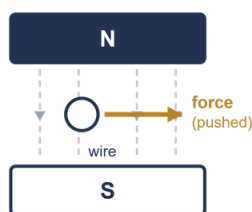
(e) One turn takes 0.020 s. Calculate the frequency of the a.c. [2]

(c) Use the hint. Give the **two** points on graph 1 where the coil is in position **P**. [1]

The Generator Effect: Generators and Microphones *Triple only*

1 · Explain why a p.d. is induced

the generator effect



(a) The wire is held still between the poles. State the induced p.d. [1]

(b) The wire is pushed to the right. Explain why a p.d. is induced across its ends. [3]

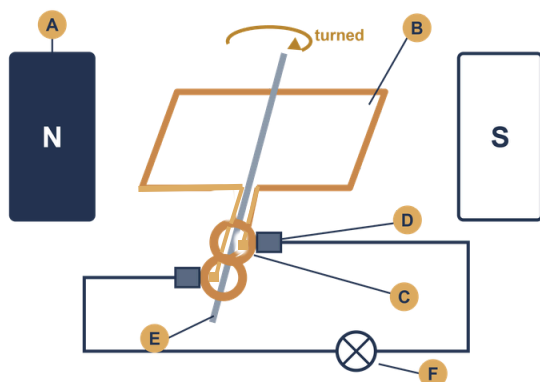
GENERATOR EFFECT

- ☐ A **force** acts on the wire, so it moves
- ☐ The wire **cuts** the **magnetic field** of the magnet
- ☐ A **p.d.** is **induced** across the ends of the wire
- ☐ This is called the **generator effect**

Motor effect: current in → force out.
Generator effect: force (movement) in → p.d. out.

2 · The a.c. generator

we'll do this one together



(a) Label parts A–F of the a.c. generator. [6]

A
B
C
D
E
F

Word bank: axle · brush · coil · lamp · magnet · slip rings

(b) Explain how the generator produces an alternating current. [5]

GENERATOR EFFECT

- ☐ A **force** acts on the coil, so it turns
- ☐ The coil **cuts** the **magnetic field** from the magnets
- ☐ A **p.d.** is **induced** across the ends of the coil

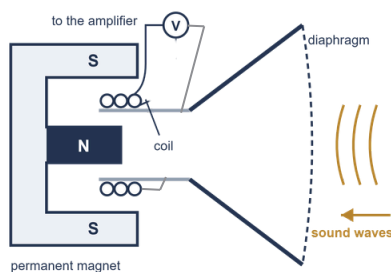
THE GENERATOR

- ☐ Each side of the coil cuts the field moving **up**, then **down**, so the induced p.d. **changes direction** every half turn
- ☐ The **slip rings** and **brushes** connect the coil to the circuit, so an **a.c.** current flows in the lamp

3 · Now you try: the microphone

same three generator-effect steps

Explain how a microphone turns a sound into an electrical signal. [6]



START: THE SOUND

- ☐ Sound waves are a series of **high** and **low pressure**, which creates a **force** on the diaphragm that keeps **changing direction**

GENERATOR EFFECT

- ☐ The diaphragm vibrates, so a **force** acts on the coil and it moves
- ☐ The coil **cuts** the **magnetic field** of the **permanent magnet**
- ☐ A **p.d.** is **induced** across the ends of the coil

THE SIGNAL

- ☐ The coil moves back and forth, so the induced p.d. keeps **changing direction**
- ☐ The p.d. has the **same pattern** as the sound wave: sound → an **electrical signal**