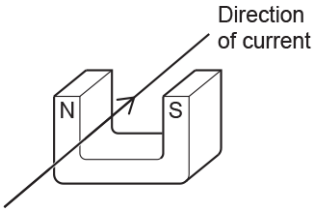
Uses of Magnetism

1. A wire is placed between the poles of a magnet, perpendicular to the magnetic field lines.

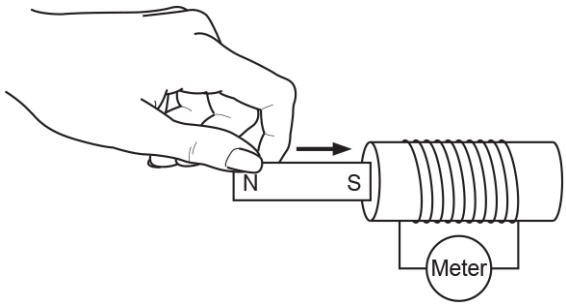


Which direction will the wire move when a current flows?

A Down
B Left
C Right
D Up

Your answer ☐ **[1]**

2. A student inserts a magnet into a coil of wire.

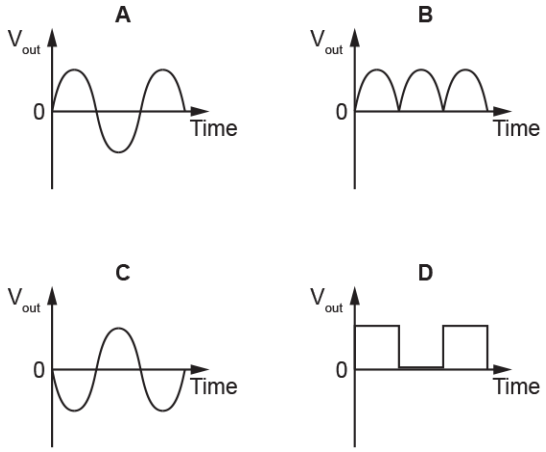


What is induced across the ends of the coil of wire?

A Charge
B Magnetism
C Potential difference
D Resistance

Your answer ☐ **[1]**

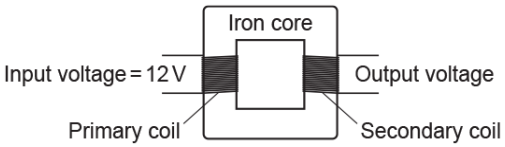
3. Which of the following graphs shows the typical output potential difference, V_{out}, for a dynamo?



Your answer ☐ **[1]**

4 (a). A student investigates building model transformers in the laboratory.

Look at the diagram.



The student builds four different transformers, each with different primary and secondary coils.

Using an input voltage of 12 V the student measures the output voltage.

Look at the results.

Attempt	Number of turns in primary coil	Number of turns in secondary coil	Output voltage (V)
A	100	200	23
B	200	100	6
C	300	600	23
D	600	300	6

* Explain how a transformer works and if this data supports the expected output voltages.

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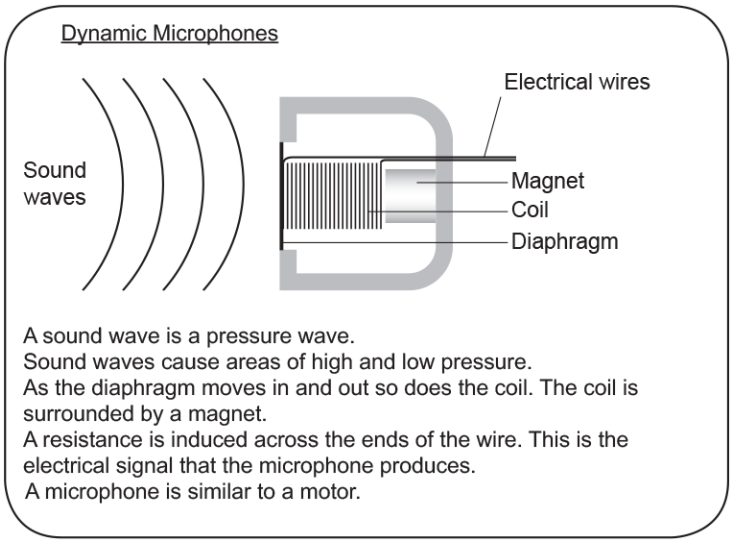
[6]

(b). A student completes a project on how dynamic microphones work.

Look at her project. The student uses two incorrect words in her work.



i. Identify **one** of the incorrect words **and** write a correct sentence to replace the mistake.

Incorrect word ---

Corrected sentence ---

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[2]

ii. Name a device which uses this effect in reverse.

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[1]

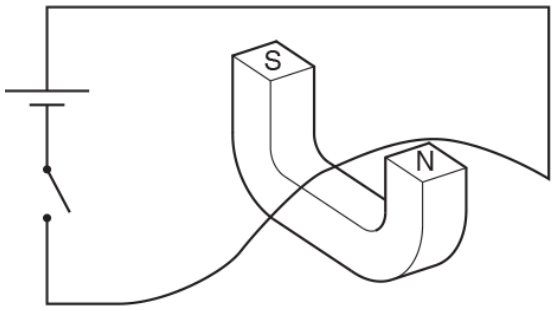
5. A 0.5 m length of wire is placed inside four different magnetic fields.

Magnetic Field	Force on wire (N)	Current in wire (A)
A	2.0	0.1
B	2.0	0.2
C	4.0	0.1
D	4.0	0.4

Which magnetic field has the **greatest** magnetic flux density?

Your answer ☐ **[1]**

6. A wire is placed inside a horseshoe magnet.

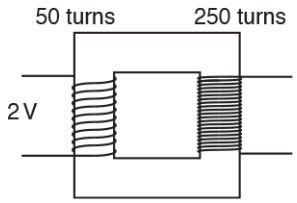


Which direction will the wire move when the switch is closed?

A Downwards
B Left
C Right
D Upwards

Your answer ☐ **[1]**

7. What output voltage does the transformer produce?



A 0.2 V
B 0.4 V
C 5 V
D 10 V

Your answer ☐ **[1]**

8 (a).

i. Write down the name of the rule which can be used to predict the direction of the force perpendicular to a current-carrying conductor in a magnetic field.

---

[1]

A student places four wires of different lengths perpendicular to different magnetic fields with different currents flowing.

Look at the table of their results.

Wire	Magnetic flux density (T)	Current (A)	Length (m)
A	0.10	2.5	0.50
B	0.15	2.0	0.75
C	0.20	4.5	0.25
D	0.25	5.0	1.00

ii. Use the data to show that wire **D** experiences the highest force.

Show your working.

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[2]

(b).

i. The student decides to build a model transformer.

The transformer is a step-up transformer which doubles the input voltage.

Describe how they could build this step-up transformer in a science laboratory.

_____

_____

_____

_____

_____ **[4]**

ii. Suggest **one** risk associated with this experiment and how it can be reduced.

_____

_____ **[2]**

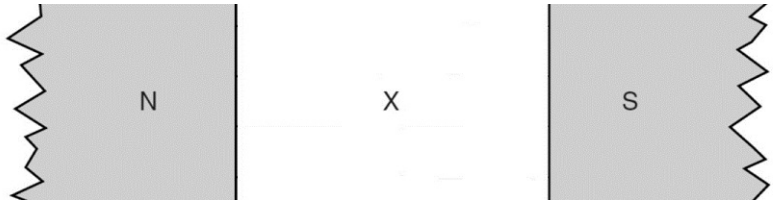
(c). Describe how a microphone works.

_____

_____

_____ **[2]**

9. The diagram shows two poles of a magnet.



X is the position of a wire carrying a current perpendicularly into the paper.

Which direction does the wire move?

A. ↓
B. →
C. ←
D. ↑

Your answer ☐

[1]

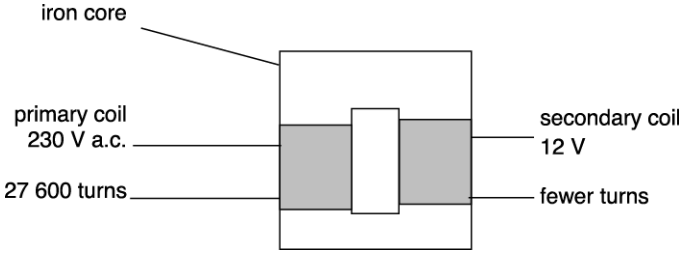
10. Which of the following is **not** needed to generate a.c. in an alternator?

A. changing magnetic field
B. coil of wire
C. commutator
D. rotating magnet

Your answer ☐

[1]

11(a). The diagram below shows the structure of a transformer.



Explain why there is more alternating current in the secondary coil than in the first.

_____

_____

_____

_____ **[3]**

(b). The secondary coil produces an output of 12 V.

Calculate the number of turns needed on the secondary coil.

Show your working.

_____

_____

_____ **[2]**

(c). Voltage is increased before transmission through the National Grid.

It is increased from 25 000 V up to 400 000 V. This increases the voltage 16 times.

i. How much would this increase in voltage affect the current?

_____

_____ **[2]**

ii. Use the formula: **power = current^2 × resistance**

to explain why this voltage increase is important to power loss in transmission cables.

_____

_____

_____ **[2]**

END OF QUESTION PAPER