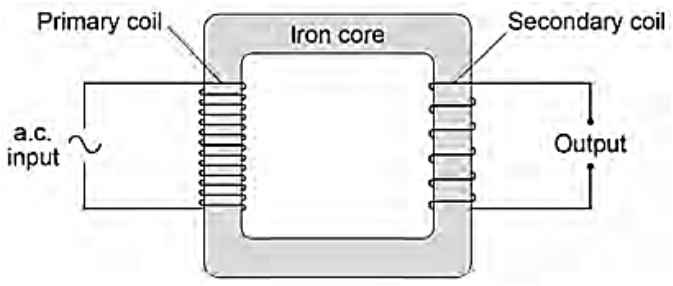
Trans formers GCSE AQA Higher Physics Past Papers Questions

01. **Figure 12** shows the construction of a simple transformer.

Figure 12



1 Why is iron a suitable material for the core of a transformer?

[1 mark]

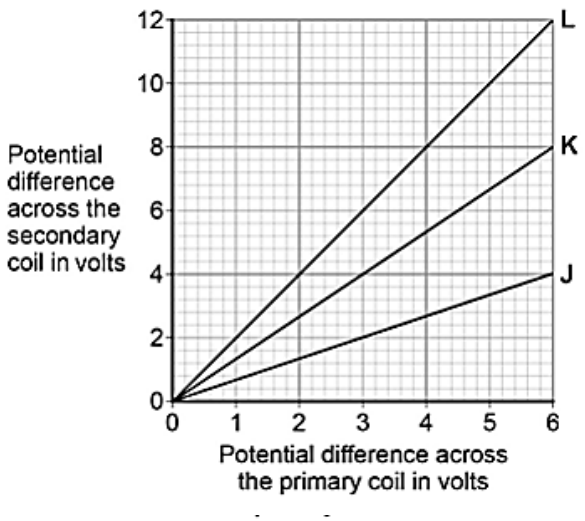
Tick **one** box.

- It is a metal. ☐
- It will not get hot. ☐
- It is easily magnetised. ☐
- It is an electrical conductor. ☐

A student makes three simple transformers, **J**, **K** and **L**.

Figure 13 shows how the potential difference across the secondary coil of each transformer varies as the potential difference across the primary coil of each transformer is changed.

Figure 13



2 How can you tell that transformer **J** is a step-down transformer?

[1 mark]

3 Each of the transformers has 50 turns on the primary coil.

Calculate the number of turns on the secondary coil of transformer **L**.

Use the correct equation from the Physics Equations Sheet.

[3 marks]

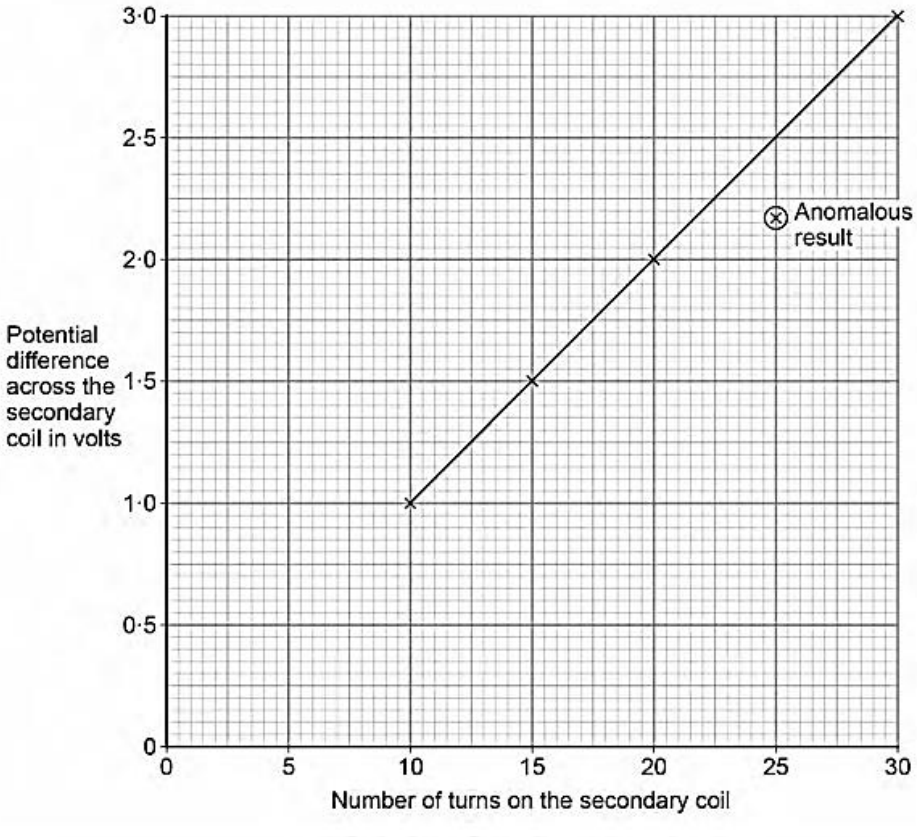
Number of turns on the secondary coil = _____

02. A student used a simple transformer to investigate how the number of turns on the secondary coil affects the potential difference (p.d.) across the secondary coil.

The student kept the p.d. across the primary coil fixed at 2V.

Figure 12 shows the results collected by the student.

Figure 12



1 **Figure 12** contains one anomalous result.

Suggest **one** possible reason why this anomalous result occurred.

[1 mark]

_____

_____

2 The transformer changes from being a step-down to a step-up transformer.

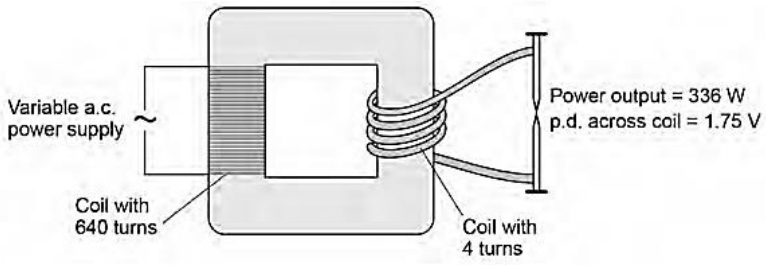
How can you tell from **Figure 12** that this happens?

[1 mark]

A spot-welder is a device that uses a transformer to produce a large current to join sheets of metal together.

Figure 13 shows a transformer demonstrating how a large current can heat and join two nails together.

Figure 13



3 How does the amount of infrared radiation emitted by the nails change when the power supply is switched on?

[1 mark]

4 Calculate the current from the power supply needed to provide a power output of 336 W.

Use the data in **Figure 13**.

The transformer is 100% efficient.

[5 marks]

Current = _____ A

8

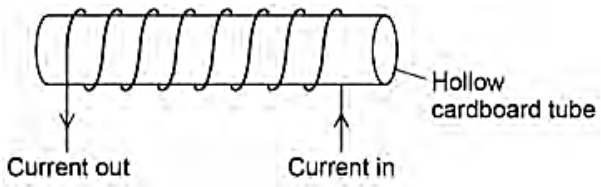
03.

1 **Figure 5** shows a solenoid.

Draw the magnetic field of the solenoid on **Figure 5**.

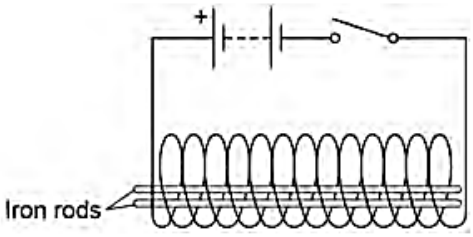
[2 marks]

Figure 5



2 **Figure 6** shows two iron rods placed inside a solenoid.

Figure 6



Explain why the iron rods move apart when the switch is closed.

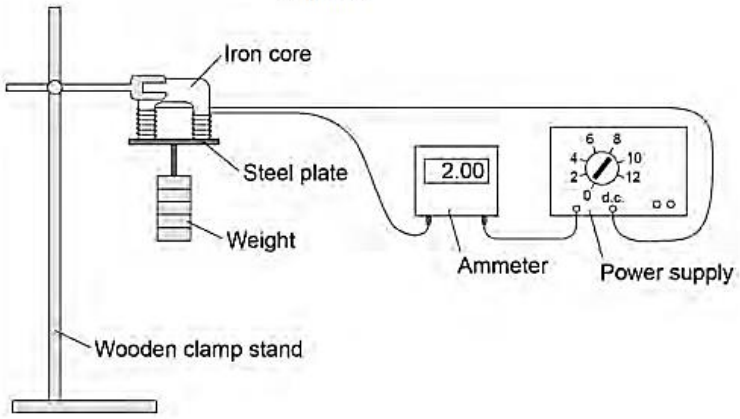
[2 marks]

A student investigated the strength of an electromagnet.

The student investigated how the strength depended on:
- the current in the wire
- the number of turns of wire around the iron core.

Figure 7 shows the equipment used.

Figure 7



The student measured the strength of the electromagnet as the maximum weight the electromagnet could hold.

3 **Table 1** shows the results.

Table 1

Current in amps	Number of turns of wire	Maximum weight in newtons
1.0	30	6.5
1.5	20	6.4
2.0	10	3.7

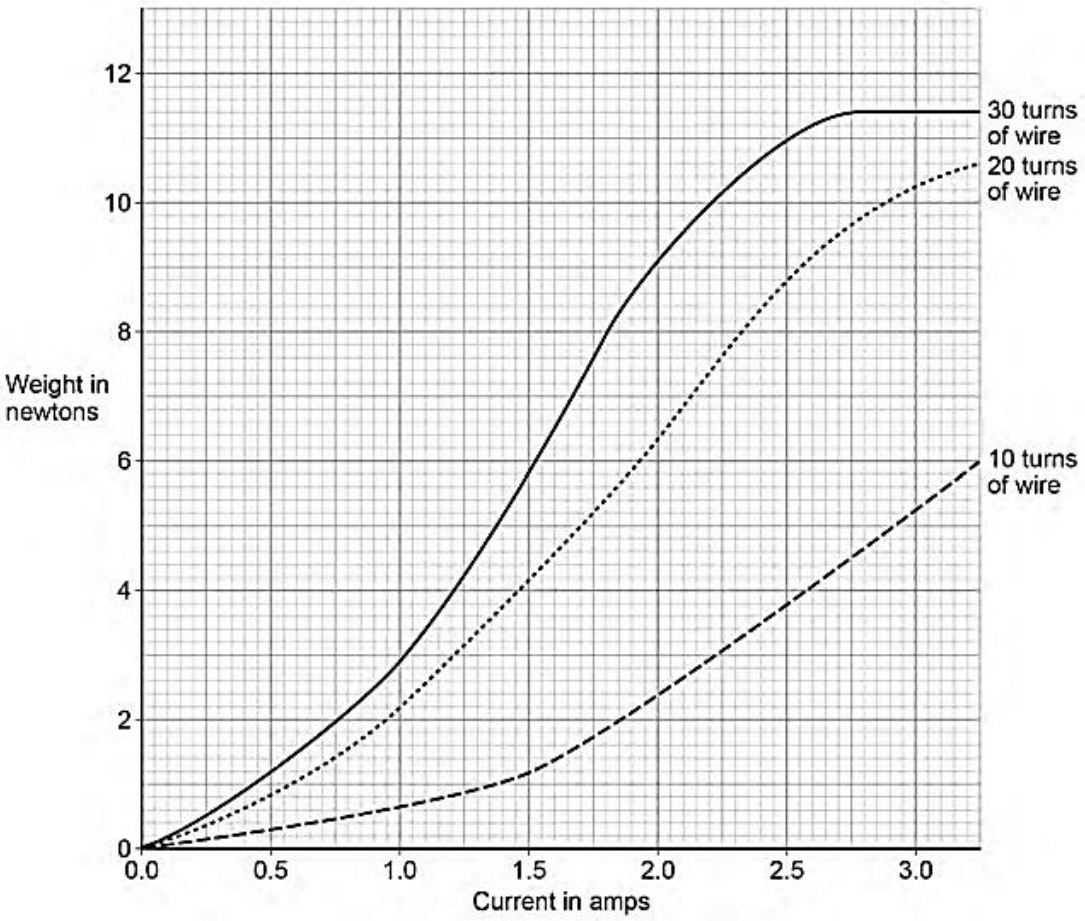
Explain why the method used by the student is **not** valid for this investigation.

[2 marks]

A second student repeated the investigation using the same equipment.

Figure 8 shows the second student's results.

Figure 8



4 How does increasing the current in the wire affect the strength of the electromagnet, when the electromagnet has 30 turns of wire?

[1 mark]

5 How does increasing the number of turns of wire from 10 to 20 affect the strength of the electromagnet, compared to increasing the number of turns of wire from 20 to 30?

[1 mark]

_____

_____

_____

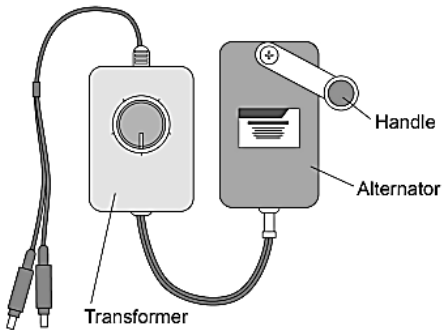
_____

8

04.

Figure 10 shows a portable power supply.

Figure 10



1 The portable power supply has an alternator connected to a transformer.

The transformer can be adjusted to have different numbers of turns on the secondary coil.

Suggest why.

[2 marks]

2 A lamp is connected to the power supply.

The lamp requires an input potential difference of 5.0 V.

The alternator generates a potential difference of 1.5 V.

The primary coil of the transformer has 150 turns.

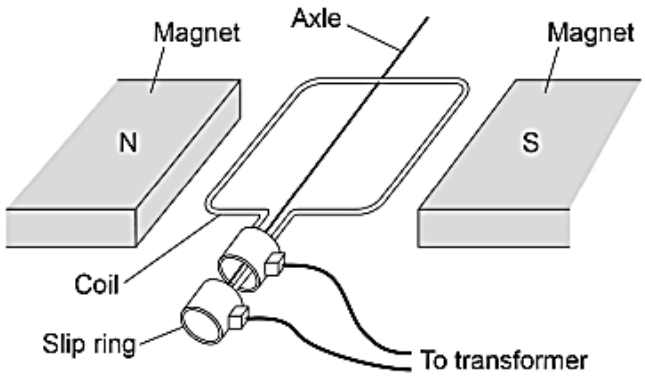
Calculate the number of turns needed on the secondary coil.

[3 marks]

Number of turns on the secondary coil = _____

Figure 11 shows the inside parts of the alternator.

Figure 11



. 3 The handle of the alternator is turned, causing the coil to rotate.

Explain why an alternating current is induced in the coil.

[5 marks]

. 4 Suggest the purpose of the slip rings.

[1 mark]

. 5 The alternator from the portable power supply is disconnected from the transformer and lamp.

Explain why the handle of the alternator becomes much easier to turn.

[3 marks]

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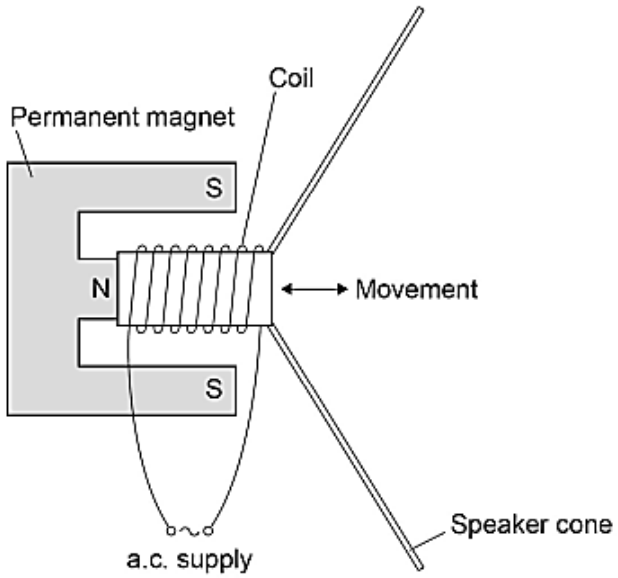
05. A student made a moving-coil loudspeaker.

Figure 15 shows a diagram of the loudspeaker.

Figure 15



1 What is the name of the effect used by the moving-coil loudspeaker to produce sound waves?

[1 mark]

_____

. 2 Explain how a moving-coil loudspeaker produces a sound wave.

[4 marks]

. 3 A student investigated how the loudness of sound from the loudspeaker depends on:

- the number of turns on the coil
- the frequency of the supply.

Table 2 shows the results.

Table 2

Number of turns	Frequency of supply in Hz	Loudness of sound in arbitrary units
100	200	32
200	400	47
300	600	63

Explain why the results **cannot** be used to make a valid conclusion.

[2 marks]

_____

_____

_____

_____

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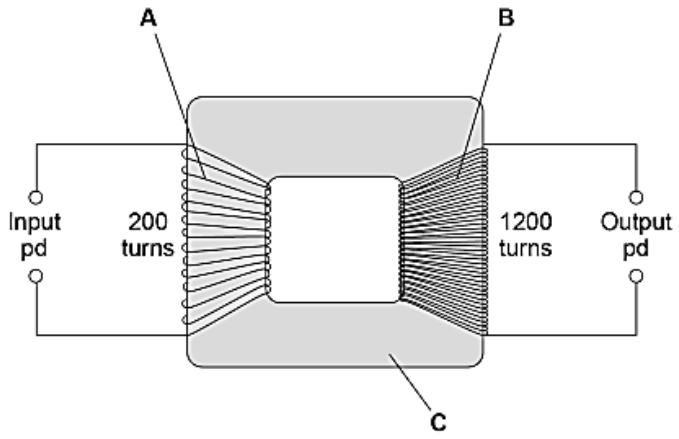
06. The National Grid uses transformers to change potential difference (pd).

Figure 12 shows a transformer.

Figure 12



1 Identify the parts of the transformer labelled in **Figure 12**.

[2 marks]

A _____

B _____

C _____

2 There is an alternating input pd of 230 V.

Determine the output pd.

Use the Physics Equations Sheet.

[3 marks]

_____

_____

_____

_____

_____

Output pd = _____ V

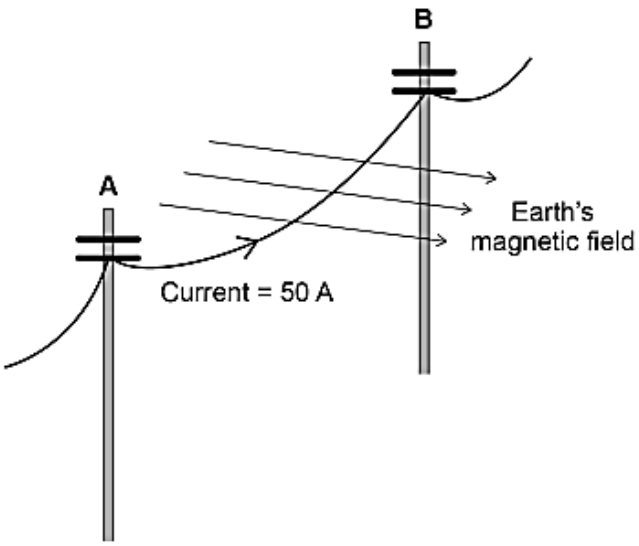
3 The input pd causes an alternating current.

Explain why there is an alternating current in the output when the transformer is connected to a circuit.

[3 marks]

Figure 13 shows a large cable supported by two wooden poles. The cable is connected to an electricity supply.

Figure 13



4 There is a force on the cable due to the Earth's magnetic field when the current is in the direction **A** to **B**.

What is the direction of this force?

[1 mark]

Tick (✓) **one** box.

Down ☐

Left ☐

Right ☐

Up ☐

5 The cable experiences a force of 0.045 N due to the Earth's magnetic field.

magnetic flux density = 60 μT

current = 50 A

Calculate the length of the cable between **A** and **B**.

Use the Physics Equations Sheet.

[4 marks]

Length = _____ m

6 State **one** assumption you made in your calculation.

[1 mark]

_____

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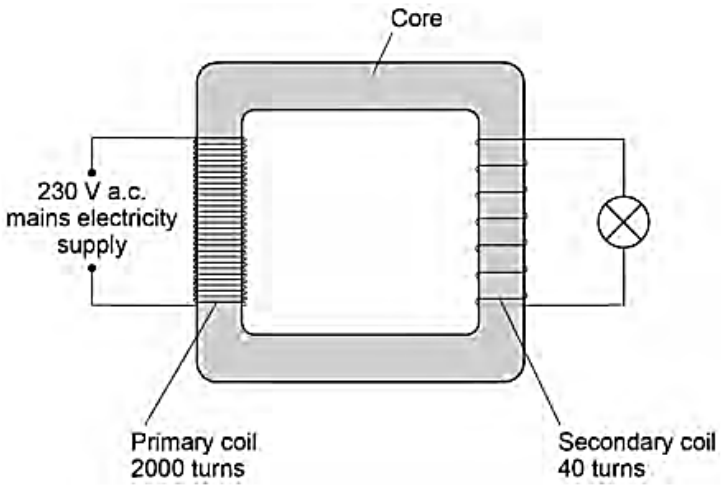
07. **Figure 21** shows a transformer used to power a lamp using the mains electricity supply.

Figure 21



1 What material is used to make the core of the transformer?

Give the reason for using this material.

[2 marks]

Material _____

Reason _____

_____

. 2 Determine the current in the secondary coil when the power output of the transformer is 6.9 W.

The transformer is 100% efficient.

Use the Physics Equations Sheet.

[5 marks]

Current in the secondary coil = _____ A

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