

Name of the Student: _____

Max. Marks : 21 Marks

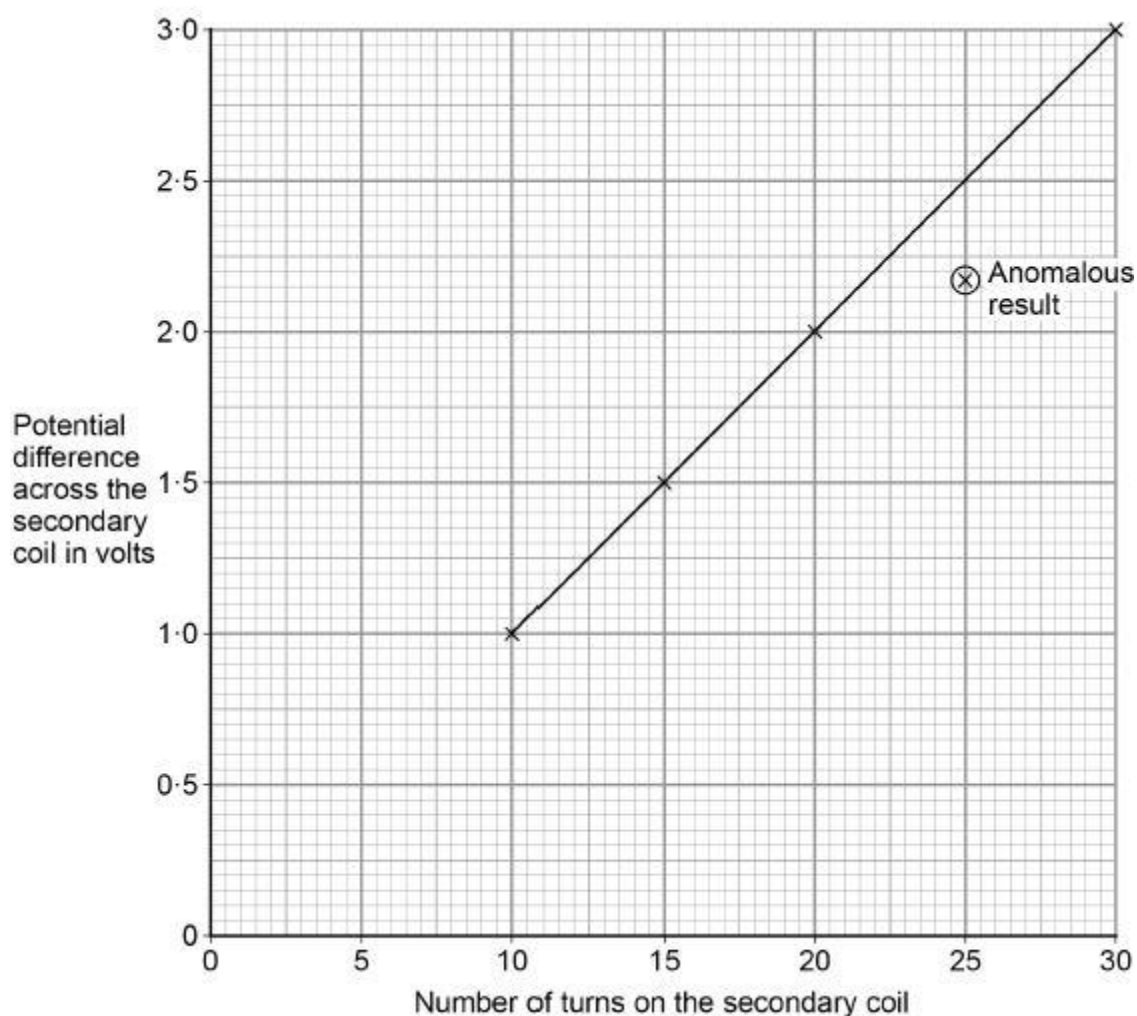
Time : 21 Minutes

Q1.

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 1 shows the results collected by the student.

Figure 1

- (a) **Figure 1** contains one anomalous result.

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

(1)

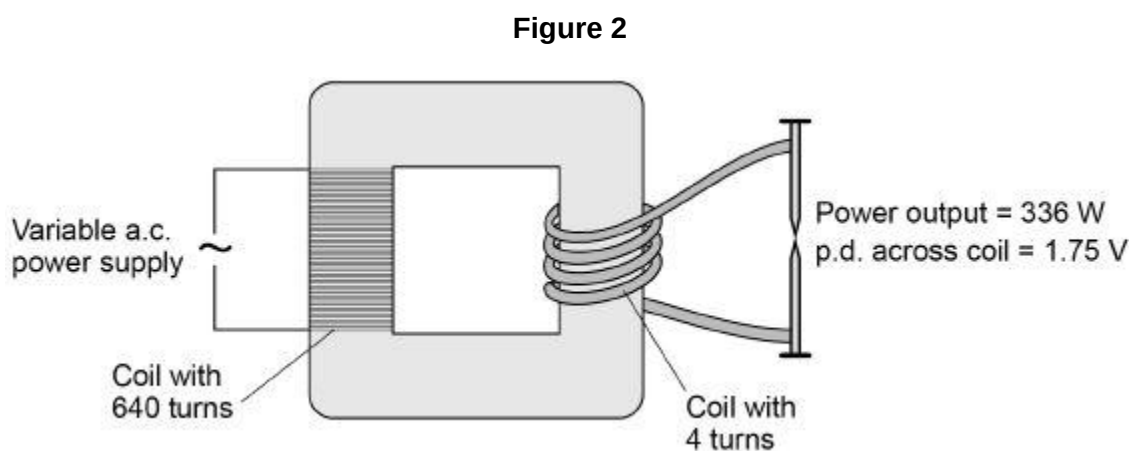
- (b) The transformer changes from being a step-down to a step-up transformer.

How can you tell from **Figure 1** that this happens?

(1)

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

Figure 2 shows a transformer demonstrating how a large current can heat and join two nails together.



- (c) How does the amount of infrared radiation emitted by the nails change when the power supply is switched on?

(1)

- (d) Calculate the current from the power supply needed to provide a power output of 336 W.

Use the data in **Figure 2**.

The transformer is 100% efficient.

Q2.

P-waves and S-waves are two types of seismic wave caused by earthquakes.

- (a) Which **one** of the statements about P-waves and S-waves is correct?

Tick **one** box.

P-waves and S-waves are transverse.

☐

P-waves and S-waves are longitudinal.

☐

P-waves are transverse and S-waves are longitudinal.

☐

P-waves are longitudinal and S-waves are transverse.

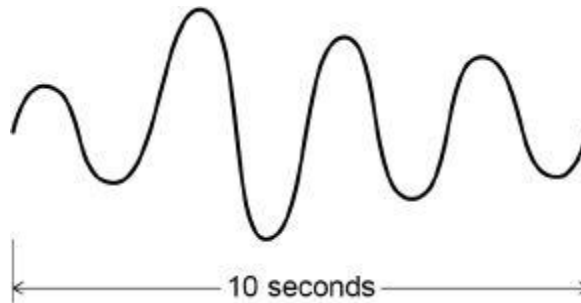
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(1)

Seismometers on the Earth's surface record the vibrations caused by seismic waves.

Figure 1 shows the vibration recorded by a seismometer for one P-wave.

Figure 1



- (b) Calculate the frequency of the P-wave shown in **Figure 1**.

Frequency = _____ Hz

(1)

- (c) Write down the equation which links frequency, wavelength and wave speed.

(1)

- (d) The P-wave shown in **Figure 1** is travelling at 7200 m/s.
Calculate the wavelength of the P-wave.

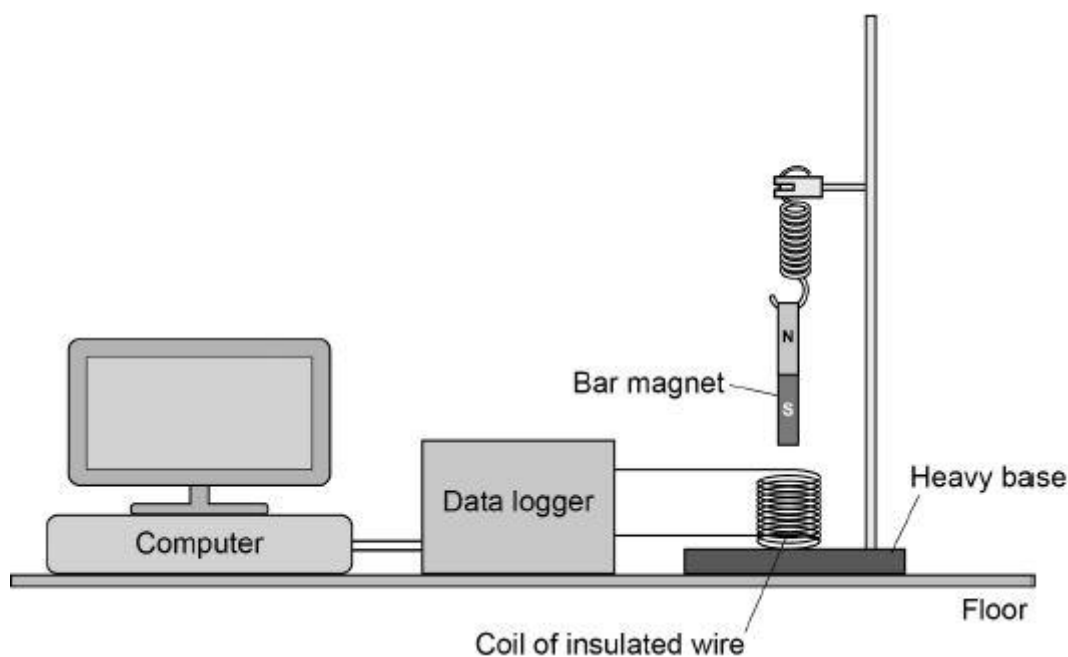
Wavelength = _____ m (3)

(e) Explain why the study of seismic waves provides evidence for the structure of the Earth's core.

(2)

Figure 2 shows a simple seismometer made by a student.

Figure 2



To test that the seismometer works, the student pushes the bar magnet into the coil and then releases the bar magnet.

(f) Why does the movement of the bar magnet induce a potential difference across the coil?

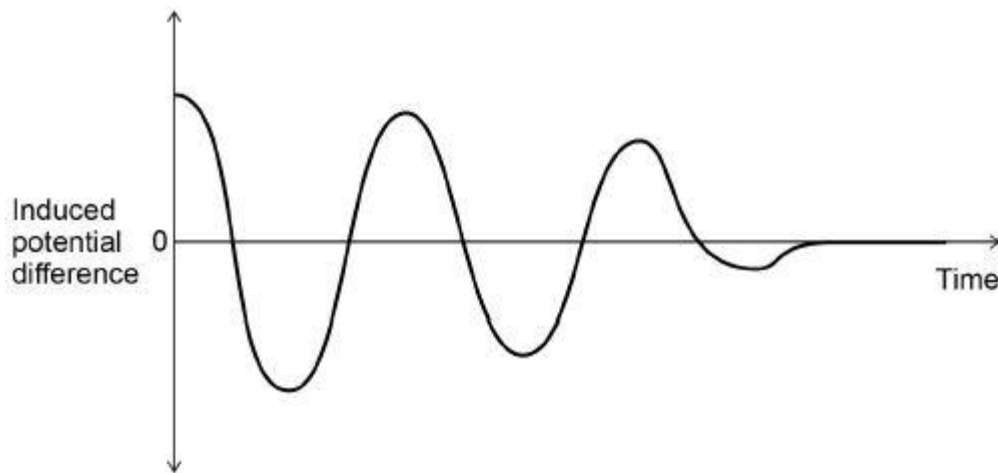
(1)

(g) Why is the induced potential difference across the coil alternating?

(1)

- (h) **Figure 3** shows how the potential difference induced across the coil varies after the bar magnet has been released.

Figure 3



Which statement describes the movement of the magnet when the induced potential difference is zero?

Tick **one** box.

Accelerating upwards.

☐

Constant speed upwards.

☐

Decelerating downwards.

☐

Stationary.

☐

(1)

- (i) The seismometer cannot detect small vibrations.

Suggest **two** changes to the design of the seismometer that would make it more sensitive to small vibrations.

1. _____

2. _____

(2)

(Total 13 marks)