

Name of the Student: _____

Max. Marks : 21 Marks

Time : 21 Minutes

Q1.

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.

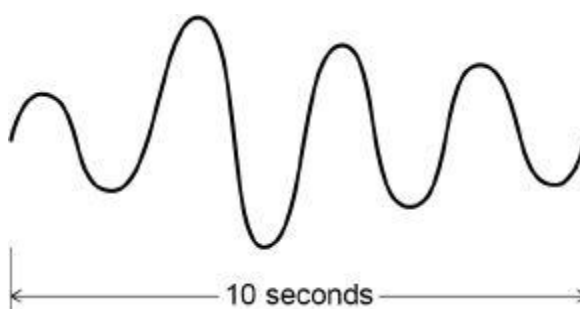
P-waves are longitudinal and S-waves are transverse.

(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

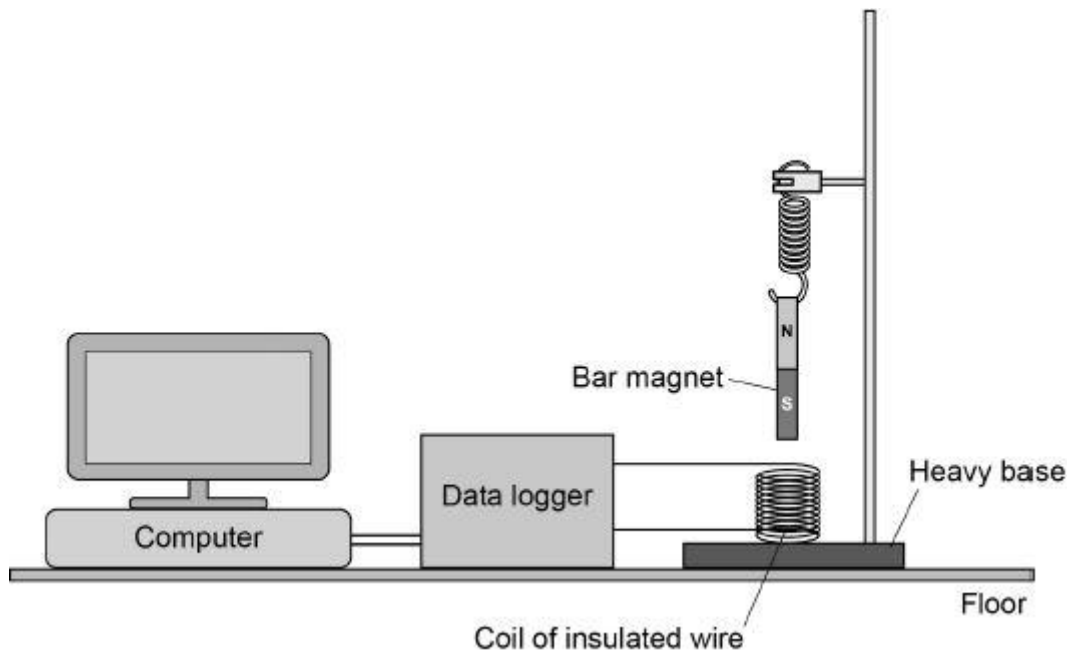
(3)

(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?

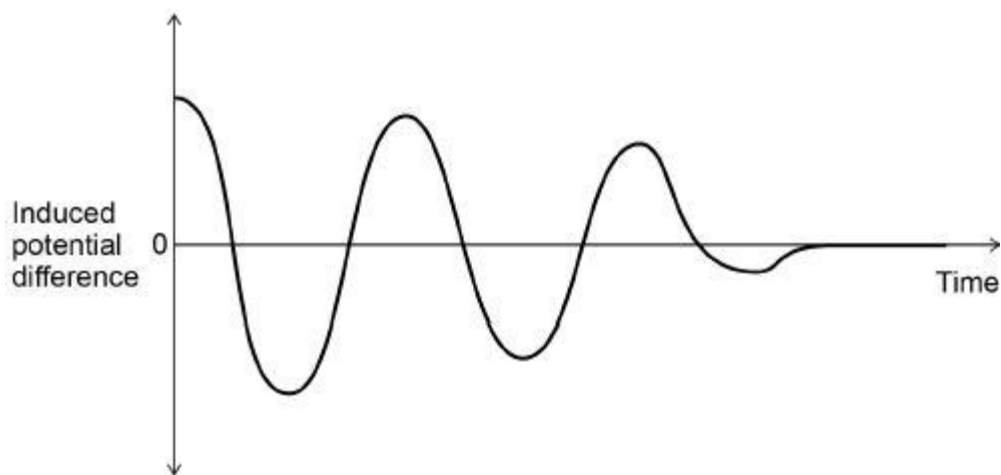
(1)

(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)

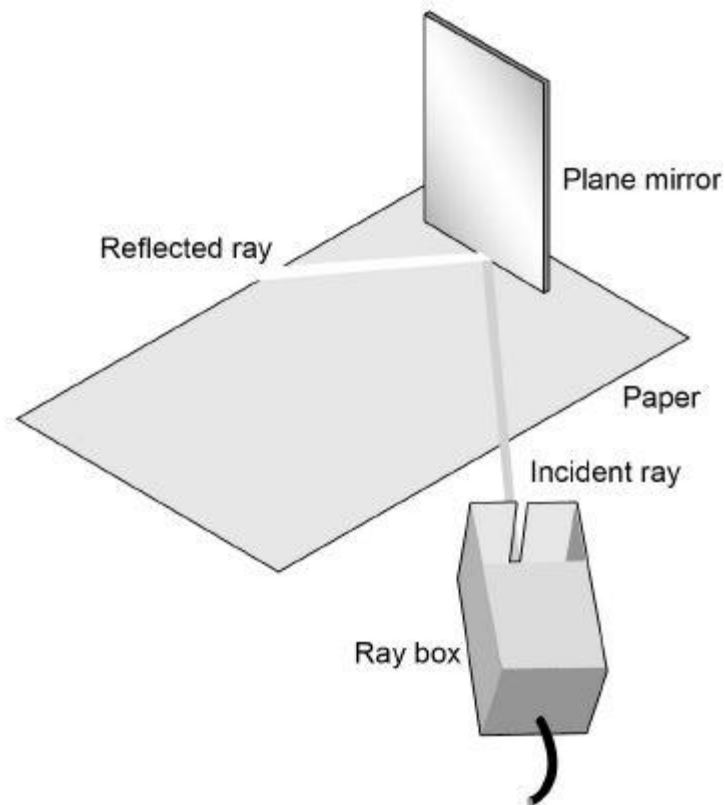
Q2.

The diagram below shows the apparatus a student used to investigate the reflection of light by a plane mirror.

The student drew four ray diagrams for each angle of incidence.

The student measured the angle of reflection from each diagram.

The table below gives the student's results.



Angle of incidence	Angle of reflection			
	Test 1	Test 2	Test 3	Test 4
20°	19°	22°	20°	19°
30°	31°	28°	32°	30°
40°	42°	40°	43°	41°
50°	56°	49°	53°	46°

(a) For each angle of incidence, the angle of reflection has a range of values.

This is caused by an error.

What type of error will have caused each angle of reflection to have a range of values?

(1)

- (b) Suggest what the student may have done during the investigation to cause each angle of reflection to have a range of values.

(1)

- (c) Estimate the uncertainty in the angle of reflection when the angle of incidence is 50° .
Show how you determine your estimate.

Uncertainty = \pm _____ $^\circ$

(2)

- (d) The student concluded that for a plane mirror, the angle of incidence is equal to the angle of reflection.

Explain whether you agree with this conclusion.

Use examples from the results in the table below in your answer.

(2)

- (e) What extra evidence could be collected to support the student's conclusion?

(1)

- (f) State **one** change the student should make to the apparatus if he wants to use the same method to investigate diffuse reflection.

(1)

(Total 8 marks)