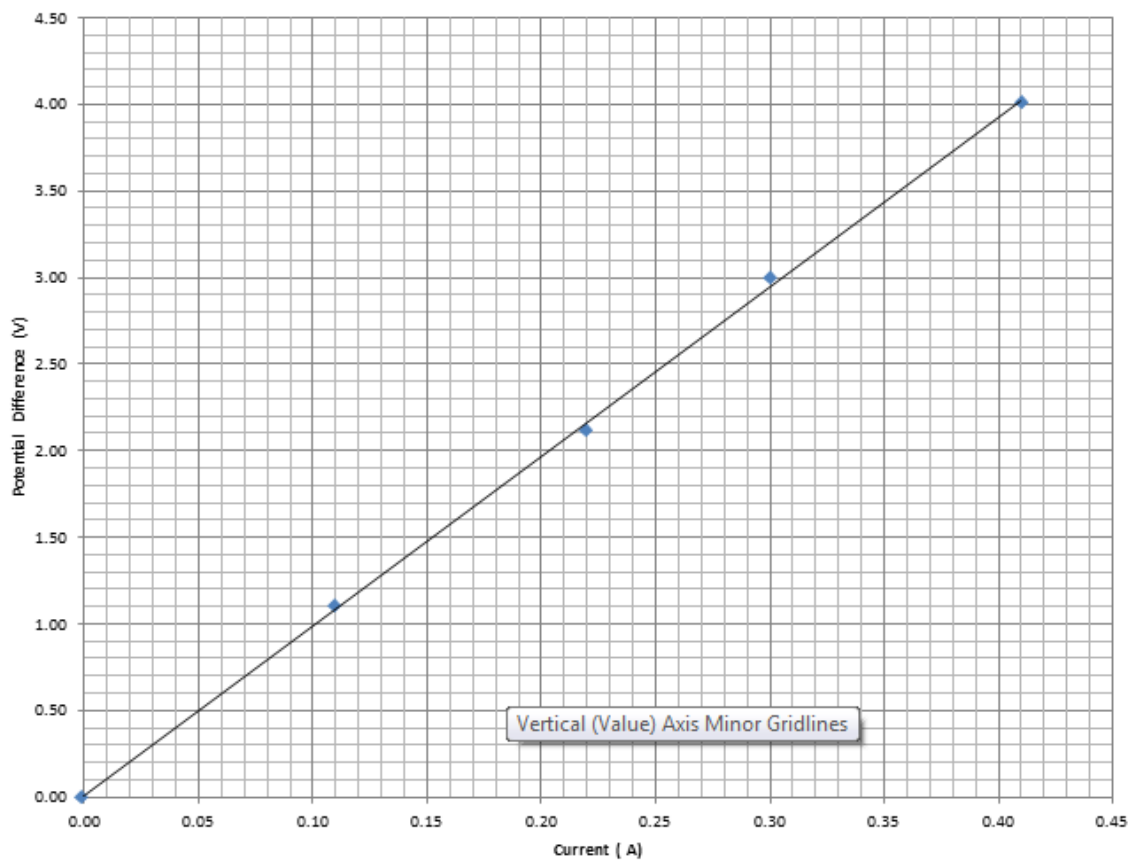


### Practice Questions Problem solving question types

1. In an experiment to demonstrate Ohm's law experiment s2 students collected the following results, presented below as a graph

Current ( A )	Voltage ( V )
0.00	0.00
0.11	1.10
0.22	2.10
0.30	3.00
0.41	4.00





2. The following table is from the NASA exoplanet database and gives information about planets orbiting the star CNC 55 in the constellation of "Cancer the crab".

Part of the data for planet CNC 55 C is shown in the table below

Star	Exoplanet Letter	Mass (x Jupiter mass)	Radius of orbit (AU)	Orbital Period ( days)
CNC 55	E	0.02	0.01	1
CNC 55	B	0.83	0.11	14
CNC 55	C	0.17	0.24	
CNC 55	F	0.14	0.79	262
CNC 55	D	3.88	5.50	4825

### Selecting

- Which of the planets has the highest mass
- Which of the planets is the closest to star CNC 55

### Analysis

- What is the relationship between the radius of orbit and the orbital period
- What is the relationship between the planetary mass and the orbital period

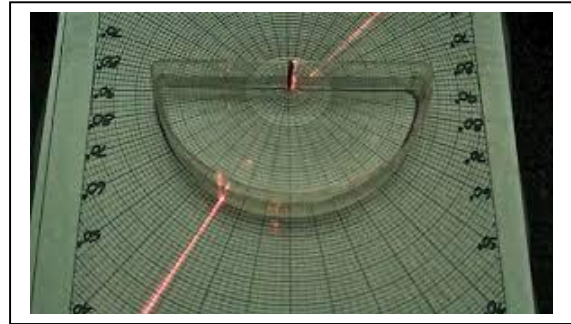
### Prediction

- Based on information in the database suggest a value for the orbital period of planet CNC55 C

3. Gillian is studying Higher Physics and conducts an experiment to investigate the refraction of light as it passes from glass into air. She uses a red laser with a wavelength of 650nm in air.

She collects the following results

Angle of incidence °	Angle of refraction °
0	0
10	15
20	31
30	49
40	75



### Analysis

- Which of the following statements best fits Gillian's results?
  - A. There is no relationship between the angle of Incidence and the angle of refraction
  - B. As the angle of incidence increases the angle of refraction also increases
  - C. The angle of incidence is directly proportional to the angle of refraction

### Prediction

Gillian's classmate Usman complete a similar experiment but uses different angles of incidence

- Suggest a value for the angle of refraction Usman measures when the angle of incidence is 25°
- Suggest a value for the angle of incidence which gave Usman an angle of refraction of 10°

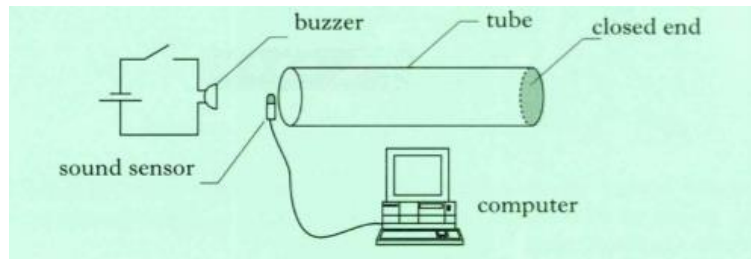
### Processing

- Calculate the frequency of the laser light in air.

While passing through the glass block the speed of the light slows to  $2 \times 10^8 \text{ms}^{-1}$

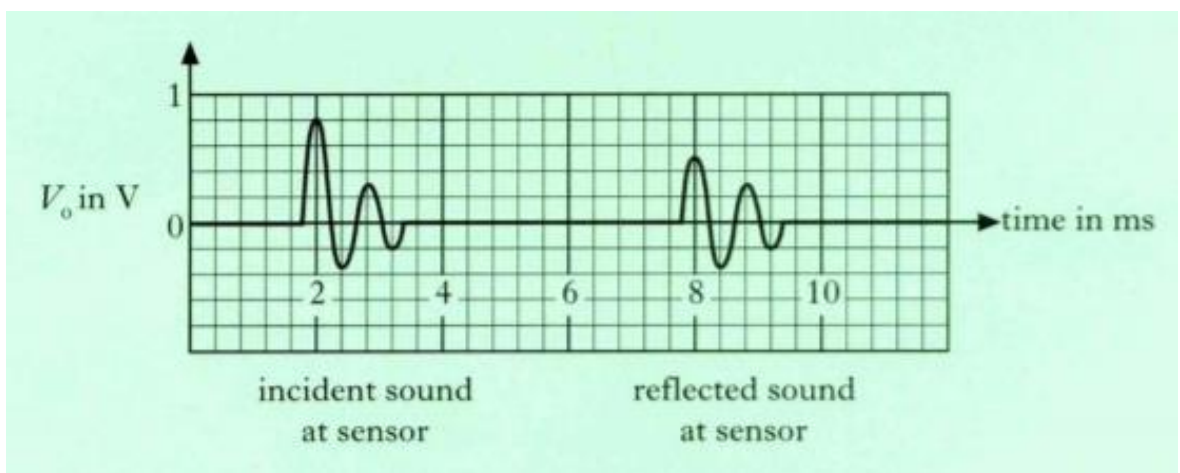
- Calculate the wavelength of the light as it passes through the block

4. A buzzer is placed in front of the open end of a tube. The tube is closed at the other end; A sound sensor linked to a computer is placed at the open end of the tube as shown.



The buzzer produces a short pulse of sound and at the instant the switch is operated the computer begins to record the output voltage of the sound sensor

The following graph of the output is displayed on the computer screen.



### Selection

- State the time interval between the first peak of the incident sound and the first peak of the reflected sound arriving at the sound sensor

### Analysis

- How does the amplitude of the reflected sound compare to the amplitude of the original sound.

### Processing

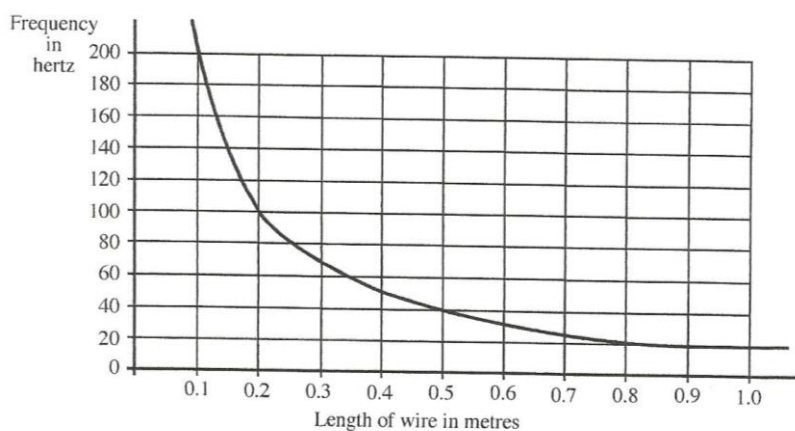
- The speed of sound in air is  $340\text{ms}^{-1}$ . Calculate the length of the tube.

### Prediction

The experiment is now repeated using a shorter tube

- In the second experiment is the time interval between the incident and reflected sound increased, decreased or unchanged?
- In the second experiment is the time interval between the incident and reflected sound increased, decreased or unchanged?

5. The graph below shows how the frequency of the sound produced by a stretched wire alters as the length of the wire is varied



### Analysis

- What happens to the frequency of the sound produced as the length of wire increases?

### Selection

- What length of wire produces a frequency of 40Hz

6. The table represents the data collected from the decay of a gamma emitter source used for diagnosis in a hospital.

Time (Hours)	Measured Activity (kBq)	Corrected Activity (kBq)
0	1242	
3	837	
6	596	
9	452	
12	367	

### Processing

- The background activity is 242kBq, complete the table and hence calculate the half life of the source.

### Prediction

- Suggest a value for the measured activity 5 hours after the beginning of the experiment

