# Measuring the sound velocity in air

# WE DID THIS RESEARCH TO INVESTIGATE THE SPEED OF THE SOUND THAT EMITTED BY A TUNING FORK IN THE AIR, WHICH WAS STATED AS A CONSTANT OF 330M/S

*research question: can we make sure that the speed of sound is 330m/s, using simple method.

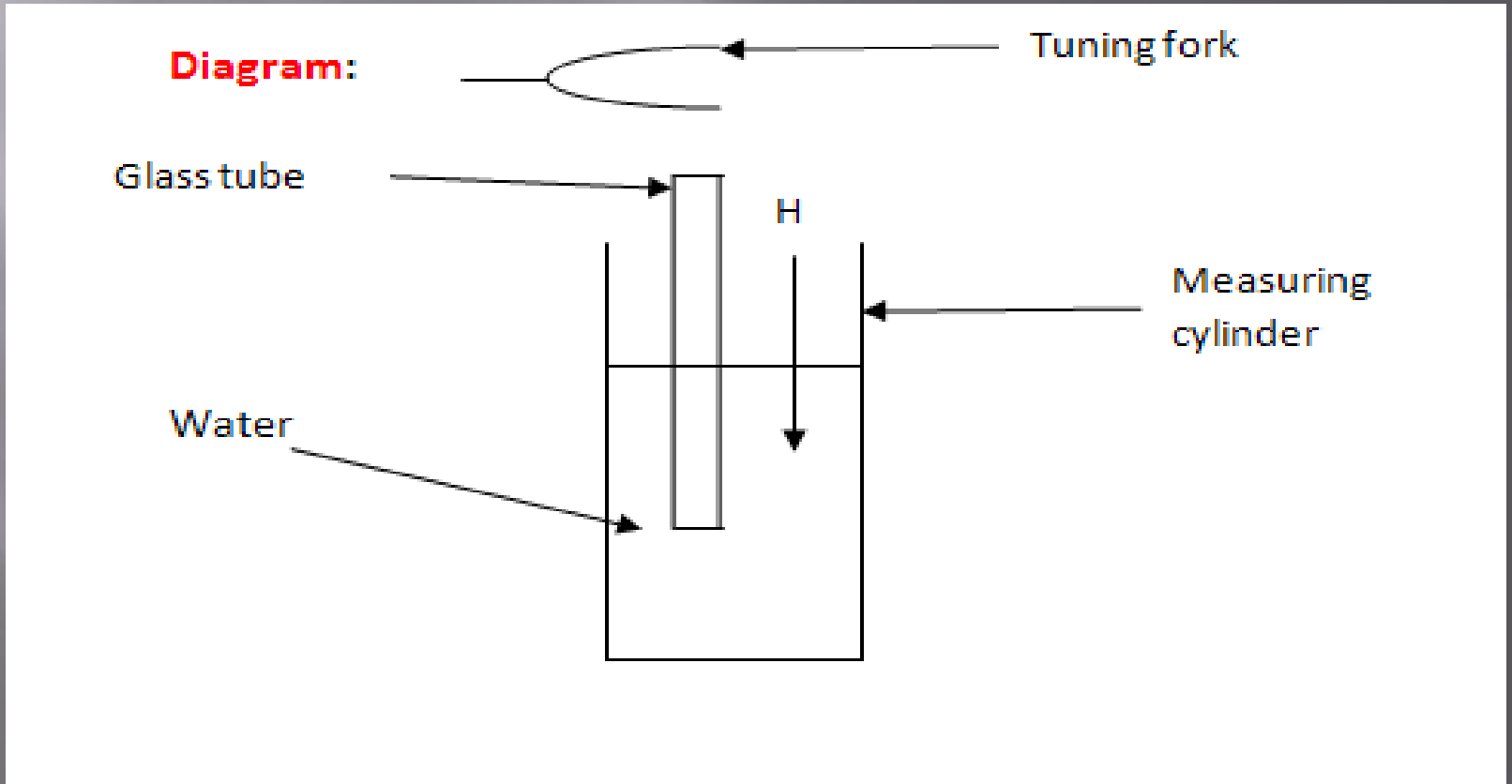
# introduction

- **Introduction**: Sound travels approximately in air. A very good way of measuring the speed of any sound wave is to freeze it. With A stationary wave, since it is not moving it is easy to measure the wavelength and the velocity if we know the frequency. Using the following equation $V = \lambda F$

# Apparatus

- **Apparatus:** large measuring cylinder,
- glass tube.
- package of tuning forks with different frequencies.
- meter ruler.

# Using simple tools that can be found anywhere we produced a primary diagram of the apparatus as shown below:



# Procedures:

1. Place the glass tube into the water.
2. Choose a tuning fork and record the frequency, then let it vibrate and put it above the glass tube.
3. While the fork is vibrating, move the tube up and down until you find the highest sound.
4. Measure the length (H), ***(the height ends with the surface of the water).***
5. Repeat the experiments for a couple more trial to erase any uncertainty.

# Data:

| $lenght \pm 0.05cm$ | Radius/cm±0.05 | $wave\ length$ /m | Frequency/Hz | Velocity/$ms^{-1}$ | Period/s |
|---|---|---|---|---|---|
| 30.7 | 1.6 | 1.266 | 261.62 | 331.21 | 0.003822 |
| 26.3 | 1.6 | 1.130 | 293.67 | 331.96 | 0.003405 |
| 25.5 | 1.6 | 1.058 | 311.13 | 329.18 | 0.003214 |
| 20.2 | 1.6 | 0.846 | 392.00 | 331.63 | 0.002551 |
| 18.4 | 1.6 | 0.774 | 426.6 | 330.19 | 0.002344 |
| 14.8 | 1.6 | 0.630 | 523.25 | 329.65 | 0.001911 |

# Data analysis:

-the uncertainty of lengths was found using the following method: $\frac{limit\ of\ reading}{2}$, the limit of the reading 0.1cm in the regular ruler $\frac{0.1cm}{2} = 0.05cm$.

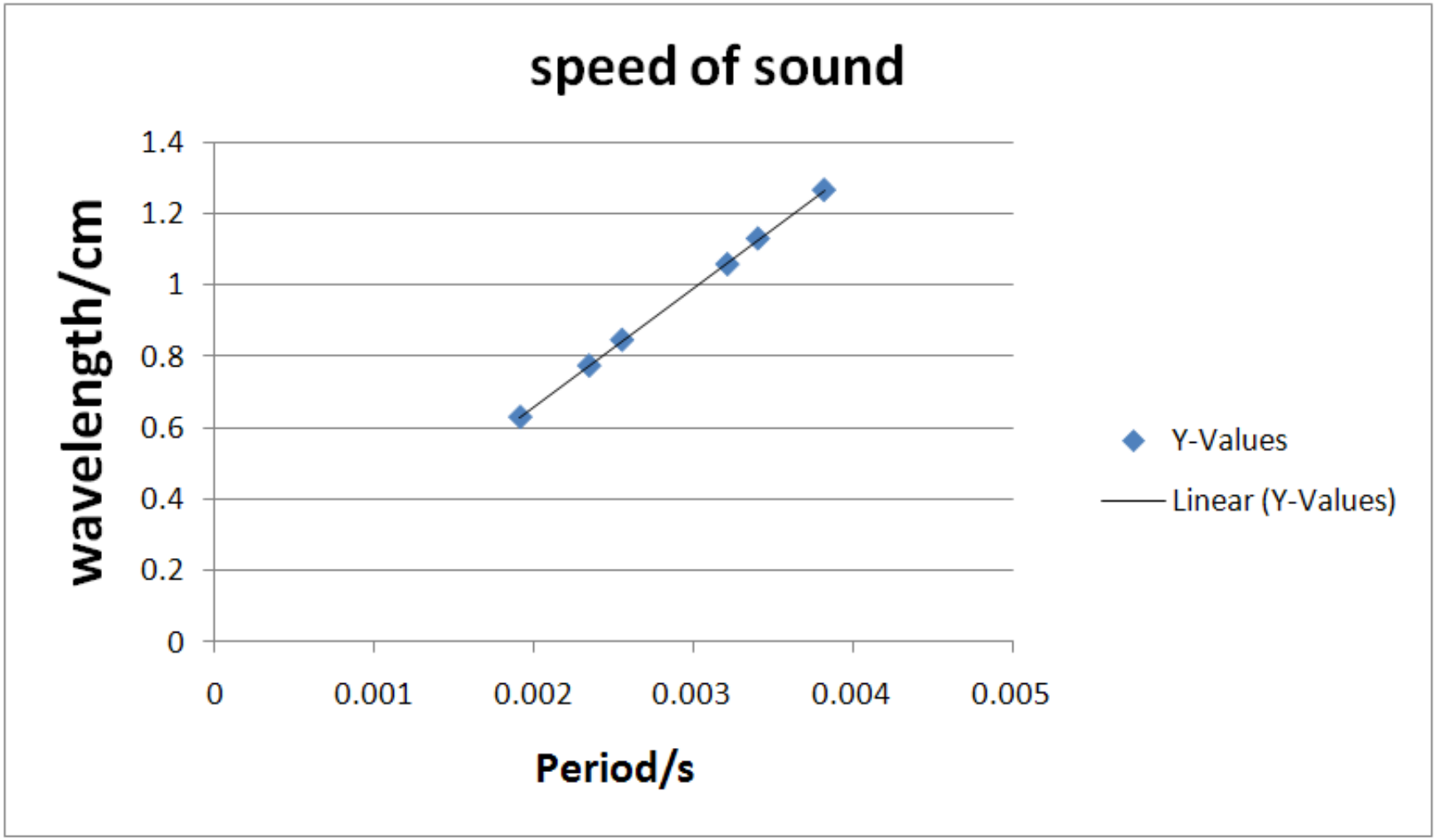
-also the uncertainty for the radius $\frac{0.1cm}{2} = 0.05cm$ .

-wavelength was found: **4(Length+ (1.6 x 0.6))** in cm to convert it to metre divide the result by 100.

-frequency was written on the tuning forks.

-period can be found by dividing the frequency by 1

# Graph


speed of sound
wavelength/cm
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
0.001
0.002
0.003
0.004
0.005
Period/s
Y-Values
Linear (Y-Values)

# Conclusion

*The speed of the sound in the air is* $330ms^{-1}$ *from the graph we can calculate the speed of the sound (speed =distance/time), the distance here is the wavelength and the time is the period, for example:* $\frac{0.65}{0.002} = 325ms^{-1}$ *which is very near to the constant speed of sound.*

# Resources:

- Our own IB curriculum and note books and tools used from the laboratory

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