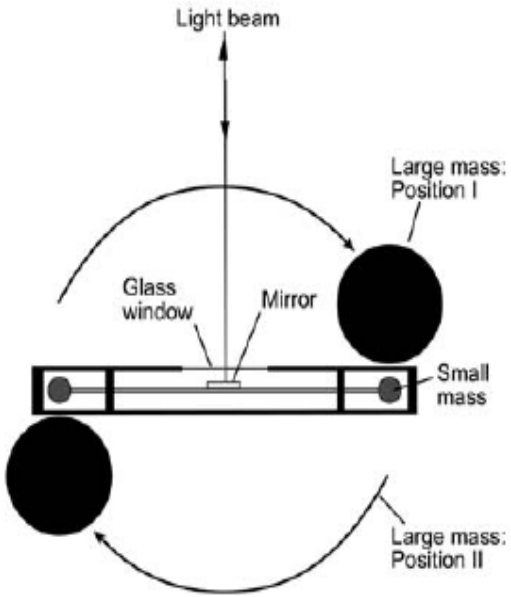
Motivation

- Henry Cavendish Made an Experiment to determine the density of the Earth.
- This was later picked up by others and used to figure out G.
- The literature value for G is $6.67 \times 10^{-11} m^3 kg^{-1} s^2$

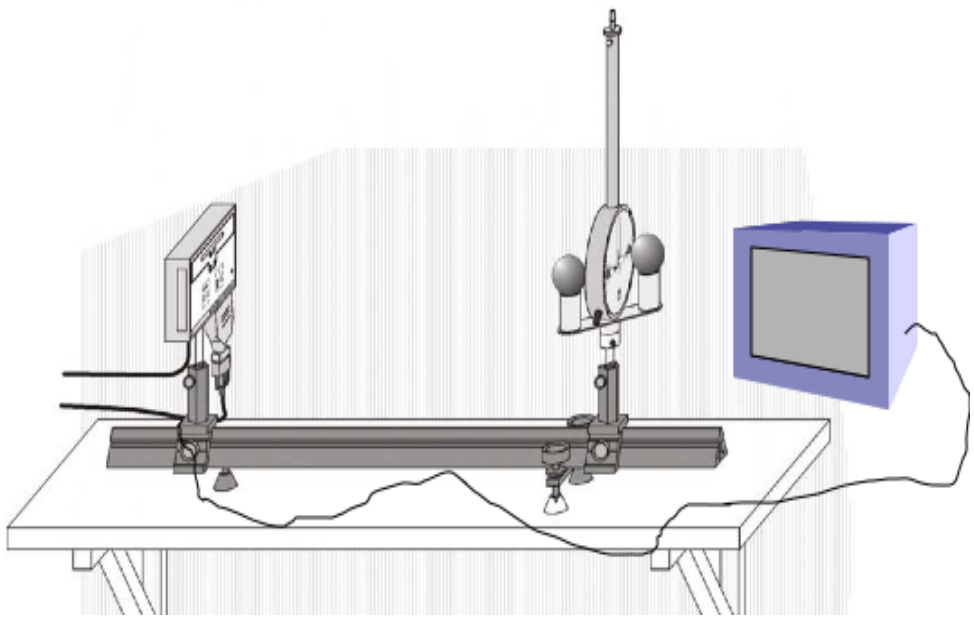
Two Methods

- End Deflection
- Acceleration

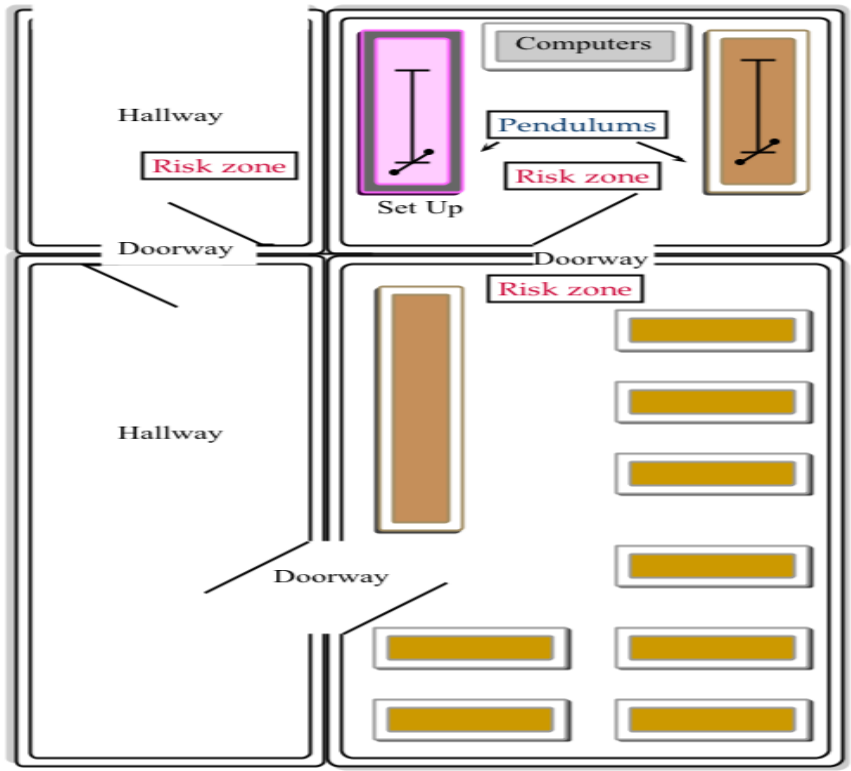


Set Up

- End Deflection
- Acceleration



Set Up


Hallway
Risk zone
Doorway
Computers
Pendulums
Risk zone
Set Up
Doorway
Risk zone
Hallway
Doorway

End Deflection

Difference between equilibrium positions

$$G = \frac{\pi^2 db^2}{T^2 m_2} cos\beta$$

Acceleration

- First minute: Not Enough data points
- Not Very Reproducible
- a_o is the slope of linear graph

$$G = \frac{b^2 a_o d}{2m^2} cos\beta$$

Main Result

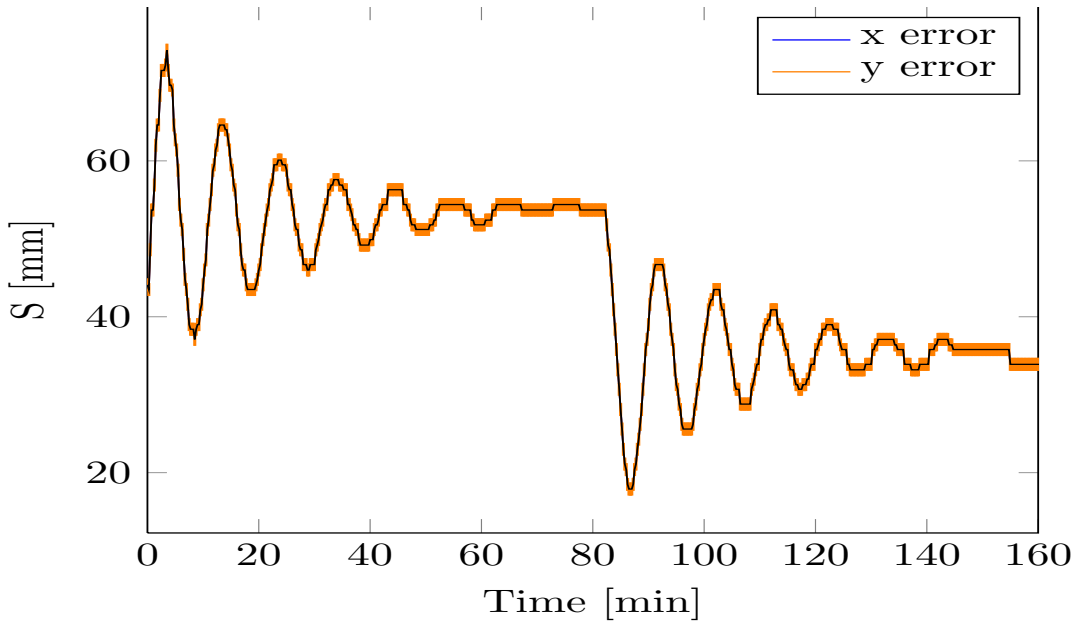


Figure : Main result. The x error bars are too small to see. The y error bars are in orange. $6.56(2)) \times 10^{-11} m^3 kg^{-1} s^2$

Acceleration

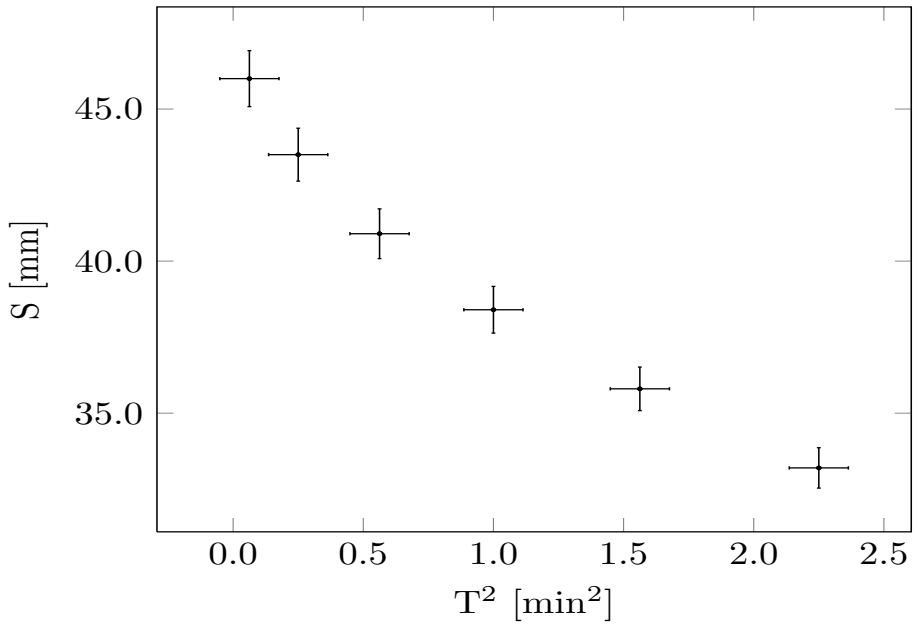


Figure : Acceleration from the second curve sloping downwards. The first six points were recorded up to 1.5 minutes. This yielded a result of $6.68(2) \times 10^{-11} m^3 kg^{-1} s^2$

Systematic Errors

Need to resolve forces

$$m_1 a = \frac{G m_1 m_2}{b^2}$$

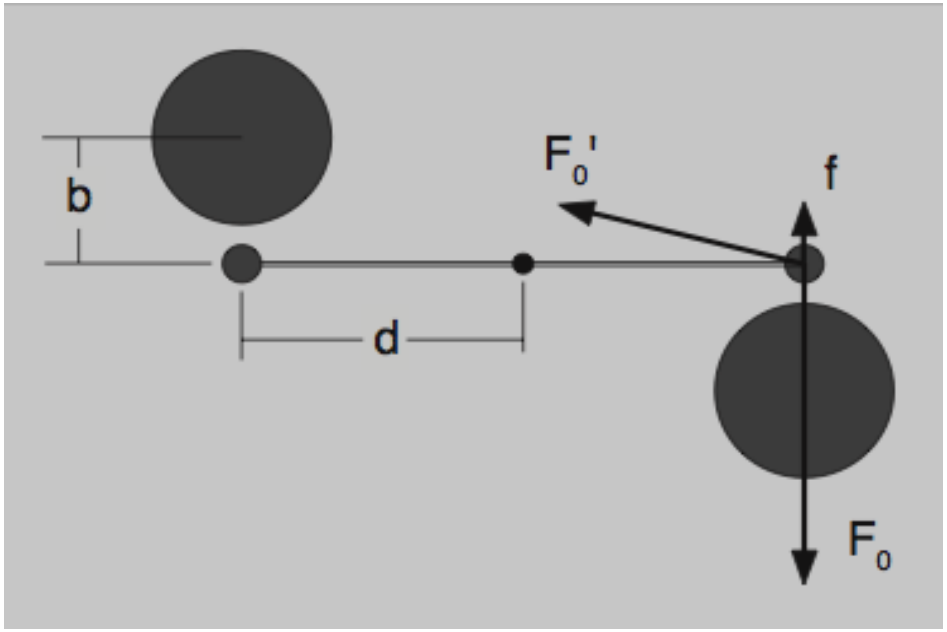


Figure : A Schematic of the forces involved in the calculation

Errors

- The Acceleration was analysed using a java program
- end deflection was analysed using CASSY Lab

Errors

$$\sqrt{\left(\frac{\partial^2 G}{\partial a^2}\Delta a\right)^2 + \left(\frac{\partial^2 G}{\partial b^2}\Delta b\right)^2}$$

For b, d, m_{1rf} and ΔS and the error on L cancelled out $\frac{L_o}{L}$.

Questions?