

OCR B Physics A-Level

PAG 1.2

Investigating terminal velocity



Equipment

- Long plastic tube
- Elastic bands
- Ruler
- Clear viscous fluid
- Steel ball bearing
- Stopwatch
- Strong magnet

Method

1. Wrap elastic bands around the tube of viscous liquid at set intervals measured by the ruler.
2. Drop the ball into the tube and record the time it reaches each band (it will help to use a lap feature on the stopwatch here).
3. Repeat 4 times to reduce the effect of random errors and use the strong magnet to remove the ball bearing from the bottom of the tube.

Calculations

- Calculate the time taken to travel between consecutive bands and calculate the average of this time for each experiment.
- Use the equation $\text{speed} = \text{distance}/\text{time}$ to find the average velocity of the bearing between each set of bands.
- Plot a graph of velocity against time. The velocity to which the graph tends to is the terminal velocity.

Safety

- Use a viscous liquid that doesn't cause skin irritation.

Notes

- Using a taller tube allows the bearing to travel at its terminal velocity for longer.
- Using larger intervals for the bands reduces the percentage uncertainty in both the distance and time between the bands.
- Terminal velocity occurs when the weight of the bearing is equal to the drag force due to the fluid, as there is no resultant force on the bearing, it travels at a constant velocity.

