NEATH PORT TALBOT COLLEGE
COLEG CASTELL NEDD PORT TALBOT

School of Maths & Science
Science Practical

Terminal Velocity of a Paper Cake Case

◆ Aim

In this practical you are going to investigate the factors affecting the terminal velocity of paper cases.

◆ Safety

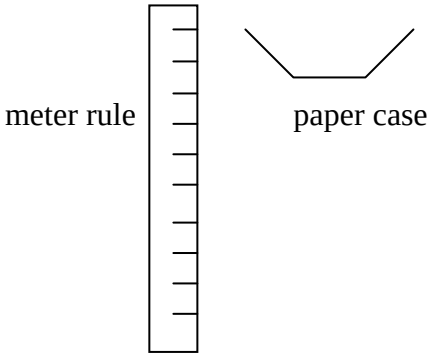
Control Measures

- You are reminded of the need of good laboratory practice in order to maintain a safe working environment.
- **Goggles and lab coats must be worn at all times.**

◆ **Apparatus required**

2 meter rules, 5 paper cases, stop watch, blue tac.

◆ **Procedure**



1. When released from rest a paper case will very quickly reach terminal velocity. Carefully explain why the cup attains this velocity.

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2. Give one property of a case that will affect its terminal velocity.

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3. Assume terminal velocity is obtained almost immediately on release. Design an experiment to calculate the terminal velocity of a single paper case. Describe carefully what you are going to do, including which measurements you are going to make, and any techniques you will use to ensure an accurate result. You will need to state the height you are going to drop the case from.

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4. Several paper cases can be nested together and dropped. A Physics student suggests that the terminal velocity squared, v^2, is directly proportional to the number of cases dropped. You are now going to carry out an experiment to see if this relationship is correct. Complete the following table.

Number of cases (no units)	Time (seconds) 1	2	Ave	Velocity ( )	Velocity squared ( )
1					
2					
3					
4					
5					

5. Draw a graph with v^2 on the y axis against number of cases on the x axis.

6. Use your graph to explain whether the student's suggestion, that terminal velocity squared is directly proportional to the number of cases dropped, is correct or not.

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7. Calculate the cross-sectional area of the widest point of one of the paper cases.

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8. Fluid dynamics theory suggests that:

$$\text{Number of cases} = kAv^2$$

where k = shape factor, A= cross-sectional area and v = terminal velocity.

Using your graph determine a value for the shape factor k.

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