Investigating the impact of air resistance

Aim

The purpose of the investigation is to identify which equation best describe the air resistance in the case of an air balloon falling through air.

Model 1: $F_d = \frac{1}{2}\rho u^2 c_d A$ 　　　　 Model 2: $F_d = 6\pi\mu R v$

The constants in the equations are ρ: density of air, Cd: Drag coefficient, μ=viscosity of air.

Variables – Fd is the drag force (air resistance), u and v represent velocity, A is the cross-sectional area of the falling object and R its radius.

Method

In this investigation you have to take many decisions to test the models.

Choosing the approach

Your variables will define your approach.

Dependent variable:

Independent variable:

Controlled variables (that are kept constant):

How will you test the validity of the two models with your experimental results?

Data collection method

How do you prepare your system?

How do you measure your variables?

What precautions do you take?

Justify your methodology, what has informed some elements of your data collection process? (how did you make use of the simulation?)

Final graph(s)

Include the final graph that helps you reach a conclusion about the validity of the models.

Conclusion

Write a conclusion based on the evidence that you can see from the graph. If possible, use evidence from your data and final graph to identify which model is more adequate to describe air resistance for a falling air balloon.

Assessment criteria

Maximum: 24 marks	
Mark	**Descriptor**
0	The student's report does not reach a standard described by the descriptors below.
1-2	The methodology of the investigation is only appropriate to address the aim of the investigation to a very limited extent since it takes into consideration few of the significant factors that may influence the relevance, reliability and sufficiency of the collected data.
	The processed data is incorrectly or insufficiently interpreted so that the conclusion is invalid or very incomplete.
	A conclusion is **outlined** which is not relevant to the aim of the investigation or is not supported by the data presented.
	The conclusion makes superficial comparison to the accepted scientific context.
3-4	The methodology of the investigation is mainly appropriate to address the aim of the investigation but has limitations since it takes into consideration only some of the significant factors that may influence the relevance, reliability and sufficiency of the collected data.
	The processed data is interpreted so that a broadly valid but incomplete or limited conclusion to the aim of the investigation can be deduced.
	A conclusion is **described** which is relevant to the aim of the investigation and is supported by the data presented.
	A conclusion is described makes some relevant comparison to the accepted scientific context.
5-6	The methodology of the investigation is highly appropriate to address the aim of the investigation because it takes into consideration all, or nearly all, of the significant factors that may influence the relevance, reliability and sufficiency of the collected data.
	The processed data is correctly interpreted so that a completely valid and detailed conclusion to the aim of the investigation can be deduced.
	A conclusion is **described and justified** which is relevant to the aim of the investigation and is supported by the data presented.
	A conclusion is correctly **described and justified** through relevant comparison to the accepted scientific context.