THIS IS A LEGACY SPECIFICATION

OCR
RECOGNISING ACHIEVEMENT

ADVANCED GCE

PHYSICS A

2826/03/PLAN

Practical Examination 2 (Part A – Planning Exercise)

For issue on or after: **FRIDAY 13 MARCH 2009**

OCE/T61215

2826603

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

TIME **This Plan must be handed in by the deadline given by your teacher.**

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Attach this page to the front of your Plan.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- In this Planning Exercise, you will be assessed on the Experimental and Investigative Skill P: Planning
- You will be awarded marks for the quality of written communication.
- Detailed notes for guidance are given overleaf.
- This document consists of **4** pages. Any blank pages are indicated.

Authentication by teacher

I declare that, to the best of my knowledge, the work submitted is that of the candidate concerned. I have provided details on my Report Form for the Practical Test of any assistance given.

Signature ..... Date .....

FOR EXAMINER'S USE		
Qu.	Max.	Mark
Planning	16	

Notes for guidance

1 Your Plan should have a clear and helpful structure and should be illustrated by diagrams, tables, charts, graphs etc. as appropriate. Remember that these can often be used to replace words in the text. Diagrams should be relevant to the content of your Plan and positioned appropriately. Labels on diagrams, flow charts or tables should be clear and concise. Large blocks of text should be included in the word count.

2 You should take care to use technical and scientific terms correctly and to write in clear and correct English.

3 Your Plan should be hand-written or word-processed on A4 paper, which should have a hole punched at the top left hand corner. Pages should be numbered and should have a clear margin on the right hand side. You should write (or print) on one side of the paper only and each sheet should be marked with your Centre number and Candidate number.

4 You should show that you have consulted an appropriate range and variety of sources. At the end of your Plan you should list clearly the sources you have used and you should refer to these references in your Plan where appropriate. Where you have incorporated material which has been *copied directly* from a source such as a book or the Internet, this must be acknowledged in your Plan and details included in the references at the end. However, it should be noted that the inclusion of copied material will not in itself gain credit. The list of references should not be included in the word count.

5 Your Plan should be based on the use of standard equipment, apparatus, chemicals and other materials available in a school or college science laboratory.

6 Your Plan should be of about **500** words. A Plan that is in excess of 500 words is likely to have poor structure and unselective choice of material, so that full credit may not be available. You should indicate the number of words in the margin of the Plan at approximately 100 word intervals.

7 When you have finished, tie the pages **loosely** together (or use a treasury tag), with this sheet on the top, so that the pages turn over freely. Your Centre will give you the date by which your Plan must be handed in.

NOTICE TO CANDIDATE

The work you submit for assessment must be your own.

If you copy from someone else or allow another candidate to copy from you, or if you cheat in any other way, you may be disqualified from at least the subject concerned.

1. Any help or information you have received from people other than your subject teacher(s) must be clearly identified in the work itself.

2. Any books, information leaflets or other material (e.g. videos, software packages or information from the Internet) which you have used to help you complete this work must be clearly acknowledged in the work itself. To present material copied from books or other sources without acknowledgement will be regarded as deliberate deception.

Declaration by candidate

I have read and understood the **Notice to Candidate** (above). I have produced the work without any help from other people apart from that which I have declared in the work itself. I have acknowledged all source materials in the work itself.

Candidate's signature ..... Date: .....

Planning Exercise

In this Planning Exercise, two marks are available for the quality of written communication.

When a sphere travels through a gas or a liquid, it experiences a resistive force. Under some circumstances this resistive force is given by an equation known as Stokes' law.

Stokes' law states that:

$$F = 6\pi r \eta v, \text{ where}$$

F = the resistive force experienced by the sphere as it travels through the medium
r = radius of sphere
η = the coefficient of viscosity of the medium, which can be treated as a constant, unless the temperature or density of the medium changes.
v = the velocity of the sphere.

When the sphere is falling at terminal velocity v_t, the weight is balanced by the resistive force and the upthrust, leading to the equation:

$$v_t = k r^2 \text{ where } k \text{ can be considered as a constant,}$$

$$\text{such that } k = \frac{2(\rho_s - \rho_m)g}{9\eta}$$

where ρ_s = density of sphere, and ρ_m = density of medium
g = acceleration due to gravity

Stokes' law only applies to the case of streamline flow, where the sphere travels relatively slowly through the medium and no turbulence is formed behind the sphere.

The usual way to investigate Stokes' law in the laboratory is to time the fall of a range of small metal balls of different radius, such as ball-bearings, as they travel at their terminal velocity down a long tube containing a viscous liquid.

You are to design such an experiment. Your account should include:

- a labelled diagram of how the apparatus is to be arranged
- a brief account of the procedure to be followed, including details of how the radius and velocity of the sphere are to be measured
- a sketch of the graph you would plot to best illustrate Stokes' law as it applies to your experiment, indicating the shape to be expected and an explanation of its features
- an explanation showing how the viscosity of the liquid can be derived from the graph
- a brief account of the limitations of the experiment.

Explain why Stokes' law would not be useful for predicting the velocity of falling bodies such as a parachutist through the atmosphere.

[14]

Quality of Written Communication [2]

[Total: 16]