Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.										/			Signature	

Paper Reference(s)

4420/03 4437/09

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Physics – 4420

Paper 3

Science (Double Award) – 4437

Paper 9

Foundation and Higher Tiers

Wednesday 5 November 2008 – Afternoon

Time: 1 hour 15 minutes

Question Number	Leave Blank
1	
2	
3	
Total	

Materials required for examination
Ruler, protractor, compasses, pencil and calculator

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. Write the one for which you have been entered.
Check that you have the correct question paper.
Answer **ALL** the questions. Write your answers in the spaces provided in this question paper.
Show all the steps in any calculations and state the units.
Calculators may be used.

Information for Candidates

The total mark for this paper is 50. The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 12 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

Write your answers neatly and in good English.

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Turn over

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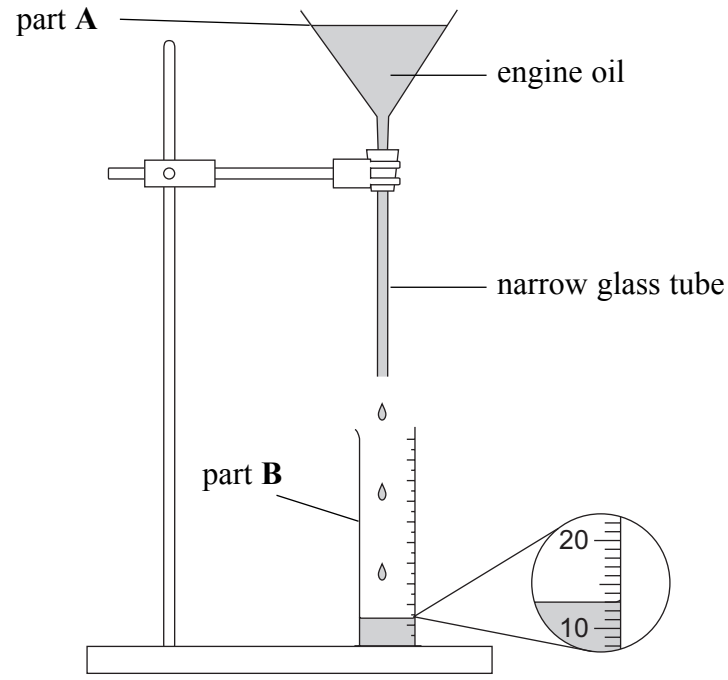
1. A student uses the apparatus in the diagram to investigate the flow of engine oil through a narrow glass tube.



(a) Name part **A**.

.....

(1)

(b) (i) How can the student connect part **A** to the narrow glass tube?

.....

.....

(1)

(ii) Explain why she must take care when doing this.

.....

.....

.....

(1)

(c) (i) Name part **B**.

.....

(1)

(ii) What is the volume in cm^3 of engine oil in part **B**?

Volume = ... cm^3

(1)

Leave blank

(d) The student measures the time taken for engine oil to flow through the narrow glass tube. What can she use to measure the time in seconds?

.....

(1)

(e) The student made a note of the time taken in seconds for different volumes of engine oil to flow through the tube.

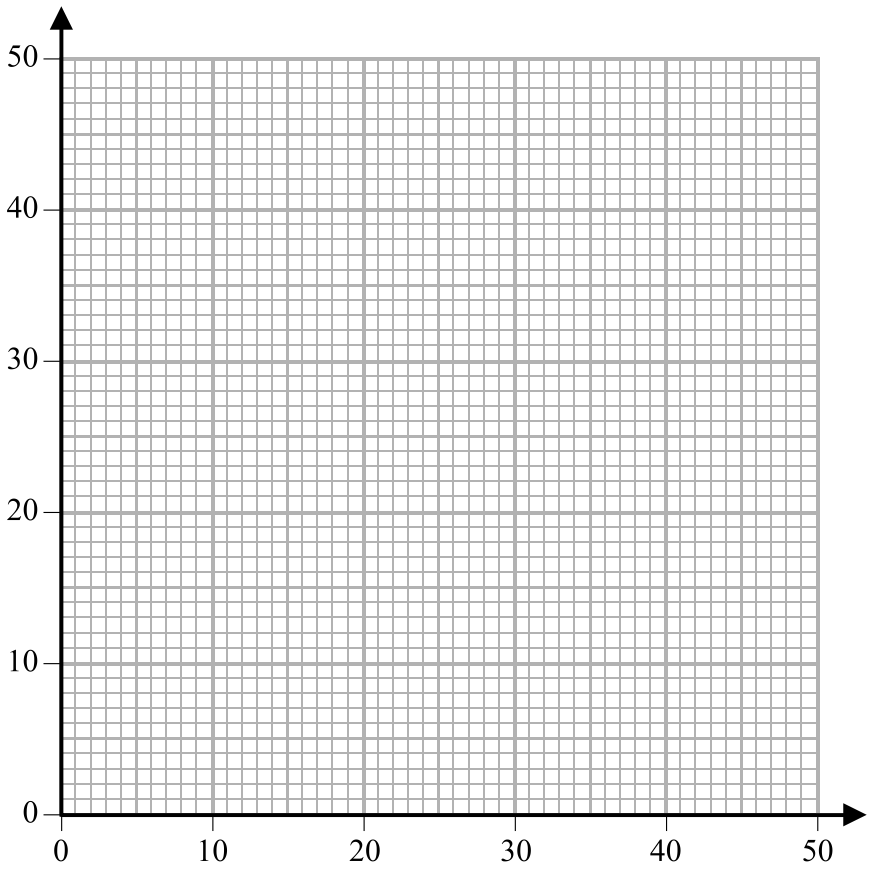
25 / 41s	10 / 16s	15 / 24s
5 / 8s	30 / 49s	20 / 28s

(i) Put her results into a suitable table with column headings and units.

(3)

Leave blank

(ii) Use the grid below to plot a graph of time (*y*-axis) against volume (*x*-axis). Label the axes and circle any point which is anomalous or unexpected.
Decide whether a straight line of best fit or a curved line of best fit is more appropriate and draw it on your graph.



(7)

(f) Another student carried out a similar experiment but he used cooking oil.

Suggest and explain why both students carried out their experiments at the same temperature.

.....

.....

.....

(2)

(Total 18 marks)

Q1

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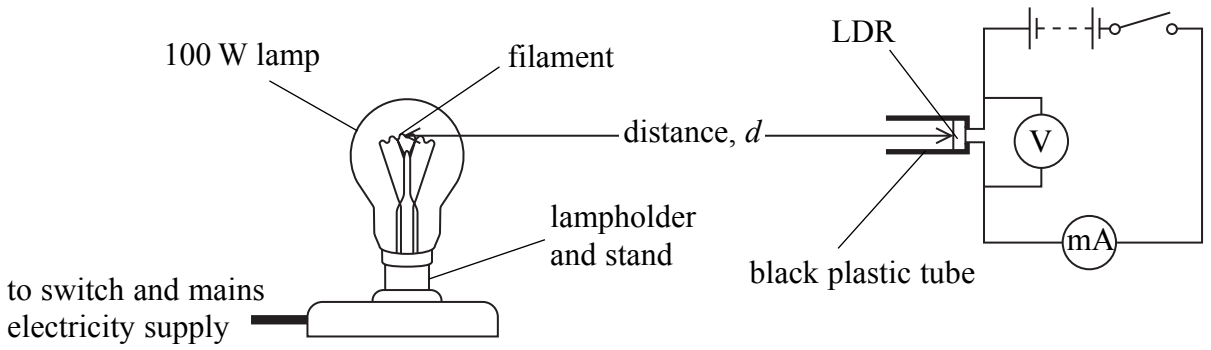
2. A student investigates the light received at different distances *d* from a 100 W lamp.
The diagram shows the 100 W lamp and the circuit which he uses to measure the light.
His circuit contains a light dependent resistor (LDR), a voltmeter and a milliammeter.



(a) Suggest a safety precaution which the student needs to take.

.....

.....

(1)

(b) Most of the light which reaches the LDR comes from the filament.

Explain why very little light reaches the LDR from other sources.

.....

.....

.....

(2)

(c) (i) What can the student use to measure the distance *d* from the filament to the LDR?

.....

(1)

(ii) What problem will he have in measuring the distance *d*?

.....

.....

(1)

(iii) How can he overcome this problem?

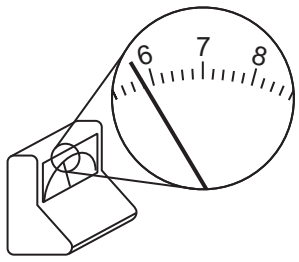
.....

.....

(1)

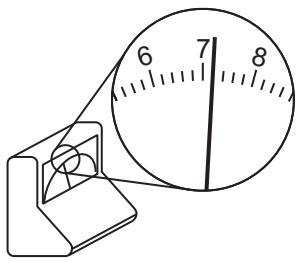
Leave blank

(d) (i) What is the reading in volts on this voltmeter?



Reading = ... V
(1)

(ii) What is the reading in milliamps on this milliammeter?



Reading = ... mA
(1)

(iii) Use the equation

$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

to calculate the resistance in ohms of the LDR which will give these readings.

Give your answer to two significant figures. 1 A = 1000 mA

.....

.....

Resistance = ... Ω
(2)

(iv) Explain why it is **not** justified to give the answer to more than two significant figures.

.....

.....

.....
(2)

Leave blank

(e) Another student carries out a similar experiment with a different lamp.

This is her table of results.

Distance *d*	**Resistance of LDR**
40	690
50	1100
60	1600
70	2100
80	2800
90	3500

(i) What should she have included in this table?

.....

(1)

(ii) What conclusion can she come to on the basis of these results?

.....

.....

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(2)

Q2

(Total 15 marks)

Leave blank

3. A student uses a telescope to look at the craters on the Moon.

He decides to investigate how a crater is produced. He drops a ball bearing onto the smooth surface of some dry sand.

(a) Suggest and explain **two** reasons why the student uses dry, rather than damp, sand.

1 .....

.....

.....

.....

(2)

2 .....

.....

.....

.....

(2)

(b) Before he drops the ball bearing, the student makes sure that the surface of the sand is flat and level.

Suggest **two** reasons why.

1 .....

.....

2 .....

.....

(2)

(c) The student repeats his experiment several times.

Suggest **two** reasons why.

1 .....

.....

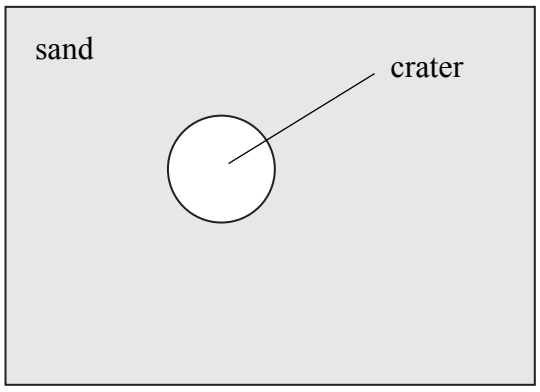
2 .....

.....

(2)

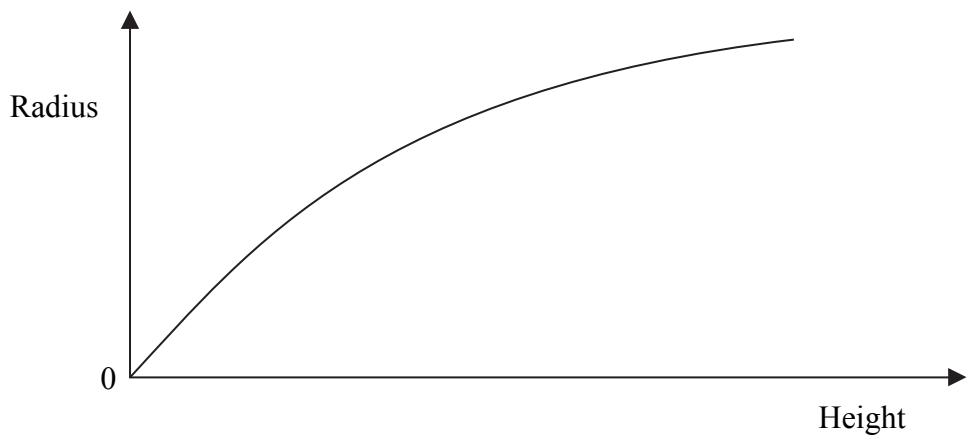
Leave blank

(d) The diagram shows the outline of a crater in the sand.
Measure its diameter in millimetres.



Diameter = ... mm
(1)

(e) The ball bearing is dropped from different heights. The sketch graph shows the general pattern of results.



What conclusion can the student come to on the basis of this graph?

.....

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.....

.....

(2)

QUESTION 3 CONTINUES OVERLEAF

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(f) The student then drops ball bearings of different masses from the same height onto the sand and measures the diameters of each crater produced.

On the axes below, sketch a graph to show the results you would expect.

(3)

(g) The student's friend suggests that he measures the craters formed by different ball bearings dropped from different heights.
Explain why these measurements will **not** be useful.

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.....

(3)

Q3

(Total 17 marks)

TOTAL FOR PAPER: 50 MARKS

END