Checked MW 23/1

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

London Examinations IGCSE

Physics – 4420

Paper 3

Science (Double Award) – 4437

Paper 9

Foundation and Higher Tiers

Wednesday 3 May 2006 – Afternoon

Time: 1 hour 15 minutes

Materials required for examination	**Items included with question papers**
Ruler, protractor, compasses, pencil and calculator	Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s), the paper reference and your signature.
The paper references are shown above. Write the one for which you have been entered. Check that you have the correct question paper.
Answer **ALL** the questions 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 parts of questions are shown in round brackets: e.g. **(2)**.
There are 16 pages in this question paper. All blank pages are indicated.

Advice to Candidates

Write your answers neatly and in good English.

Turn over

edexcel

INTERNATIONAL

1. A student carries out an experiment with a long glass tube. The tube is full of oil. It is vertical.

glass tube

oil

line **A**

line **B**

X

rubber bung
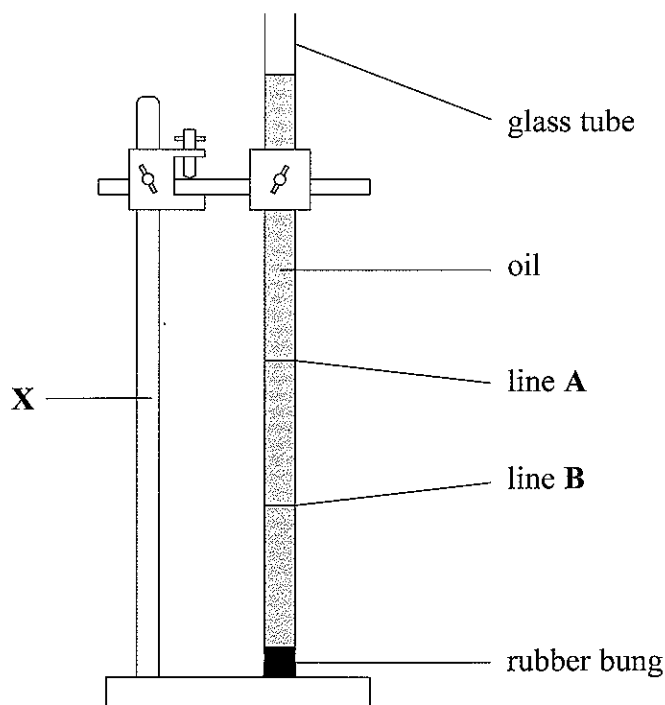
(a) On the diagram, measure the depth in millimetres of the oil.

Depth of oil = ... mm

(1)

(b) The equipment labelled **X** holds the tube so that it is vertical.

(i) Name **X** ....

(1)

(ii) The student has a length of string with a heavy weight fastened to one end. Describe how the student can use this to check that the glass tube is vertical.

....

....

....

(2)

(c) The student measures the time taken for a steel ball to fall from line **A** to line **B**. What can he use to measure this time accurately?

....

(1)

(d) The student measures the vertical distance from line **A** to line **B**.
What can he use to measure this distance?

....

(1)

(e) A steel ball falls through the oil and stops on the rubber bung.

Describe how the student can use a magnet to get the steel ball out of the glass tube.

....

....

....

(2)

(f) The student plans to repeat the experiment several times. Why is this a good idea?

....

....

....

(2)

(g) The student does a similar experiment. This time he uses warm oil. He finds that the steel ball takes less time to fall from **A** to **B**.

(i) Complete the student's conclusion.

In the warm oil the steel ball falls

....

(1)

(ii) What can he use to measure the temperature of the oil?

....

(1)

(Total 12 marks)

Q1

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2. The diagram shows a semi-circular, transparent, plastic block. **X** is the mid-point of the straight side of the block.

narrow beam of light
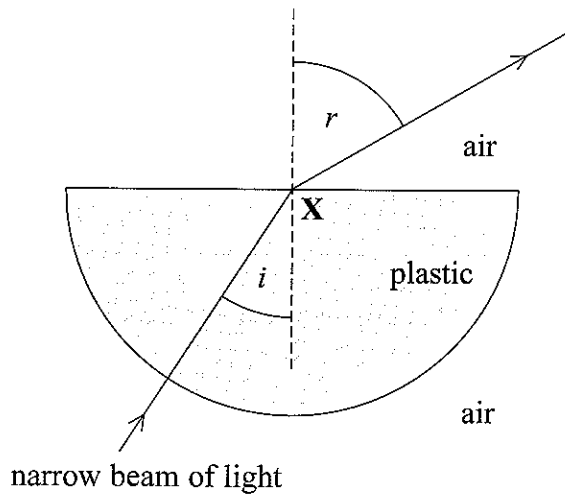
A student aims a narrow beam of light at **X**. She marks the position of the beam of light as it passes through the plastic and into the air. The angle i is the angle of incidence and the angle r is the angle of refraction.

(a) Use a protractor to measure angle i and angle r to the nearest degree.

Angle i = ... degrees

Angle r = ... degrees

(2)

(b) What can the student use to give a narrow beam of light?

....

(1)

QUESTION 2 CONTINUES ON THE NEXT PAGE

(c) The student makes a note of several pairs of angles *i* and *r*.

20° and 32°   35° and 65°   10° and 15°

30° and 53°   25° and 42°   15° and 23°

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

(3)

(ii) Plot these points on the grid opposite. Label the axes. Decide whether a straight line of best fit or a curved line of best fit is appropriate and draw it on your graph.
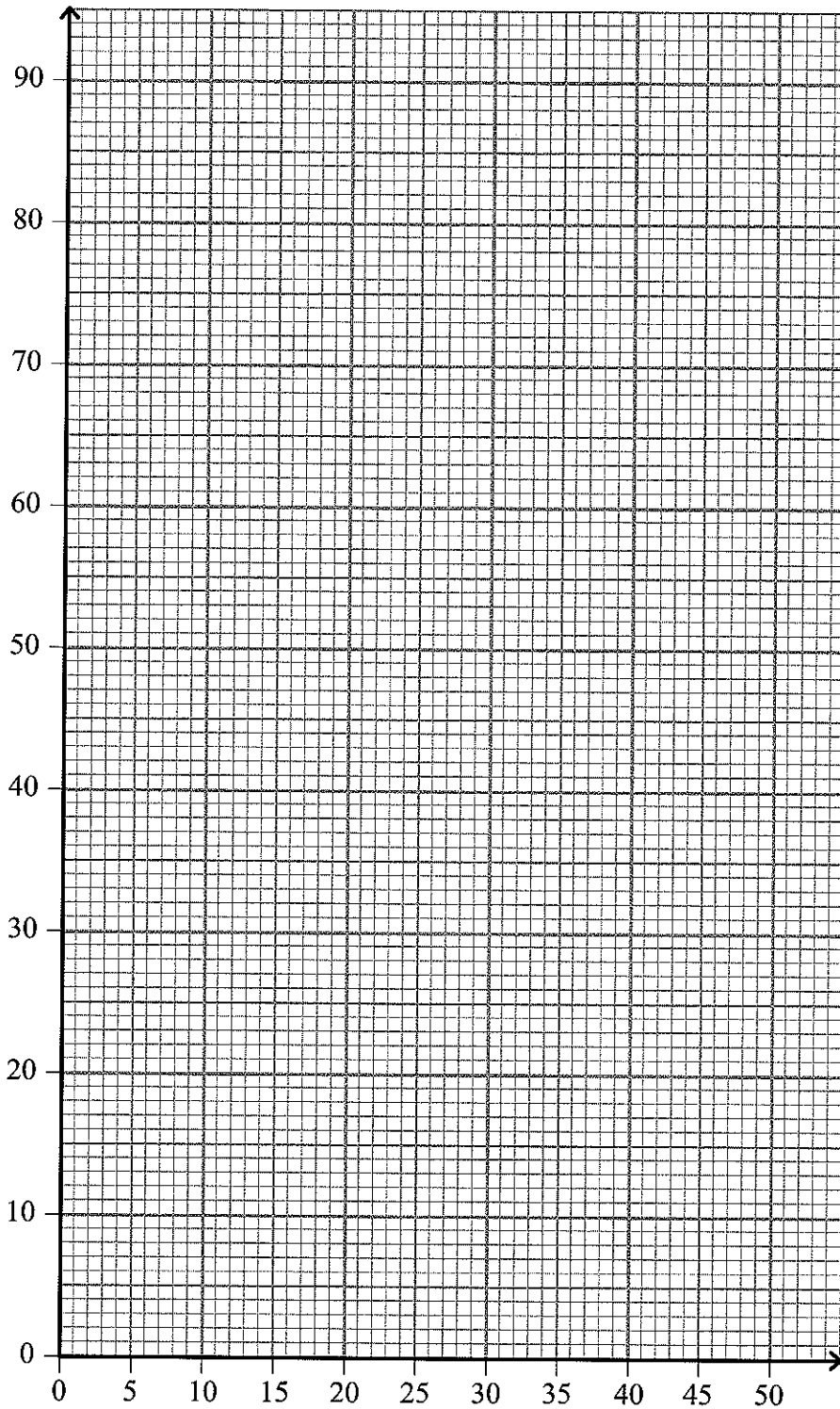
(6)

(iii) Use your graph to predict the value of *i* which will result in *r* being 90°.

i = ... degrees

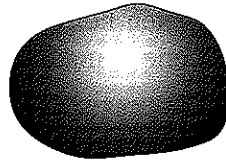**(1)**

(Total 13 marks)

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3. The drawings show two pieces of stone.
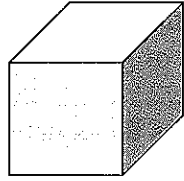
X is a cube   **Y** is a pebble.

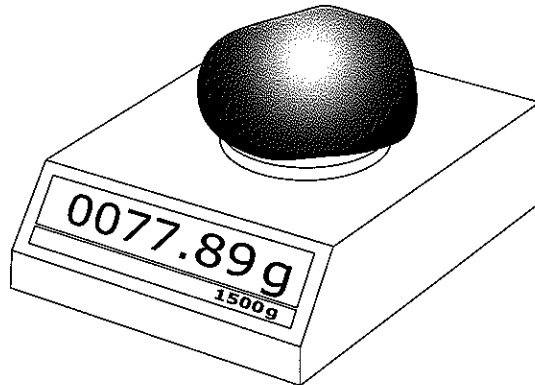(a) (i) How can you use a ruler to find the volume of **X**?

....

....

....

(2)

(ii) How can you use a measuring cylinder to find the volume of **Y**?

....

....

....

(2)

(b) A student uses this instrument to find the mass of **Y**.

(i) Name the instrument.

....

(1)

(ii) What is the mass of **Y** to the nearest gram?

Mass = ... g

(1)

(c) A student has five different objects, **A** to **E**. They are all made of solid glass.

He picks up each object. Then he predicts that four of the objects are made of the same sort of glass but that one is made of a different sort of glass.

He measures the mass and volume of each object. He uses the equation

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

to calculate their densities.

The table shows his results.

Object	Mass (g)	Volume (cm^3)	Density (g/cm^3)
A	22	9	2.4
B	38	14	2.7
C	52	19	2.7
D	65	24	2.7
E	98	41	

(i) Calculate the density of object **E**. Give your answer to an appropriate number of significant figures. Write your calculation in the box below.

Complete the table of results.

(3)

(ii) Justify the number of significant figures for your calculation.

....

....

....

(2)

(iii) Use the results to write a suitable conclusion to the experiment.

....

....

....

(2)

(iv) Was the student's prediction about the sorts of glass correct?

Explain your answer.

....

....

(1)   Q3

(Total 14 marks)

QUESTION 4 IS ON THE NEXT PAGE

4. A student wants to measure the brightness of different parts of a room. She uses a light dependent resistor (LDR). This resistor has a high resistance when it is in the dark. Its resistance is low when it is in the light. The student fits the LDR in one end of a black plastic tube.

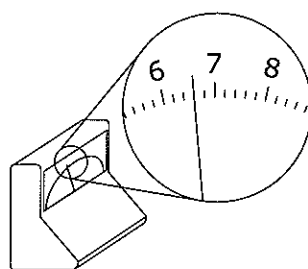The diagram shows how she includes the LDR in an electrical circuit.
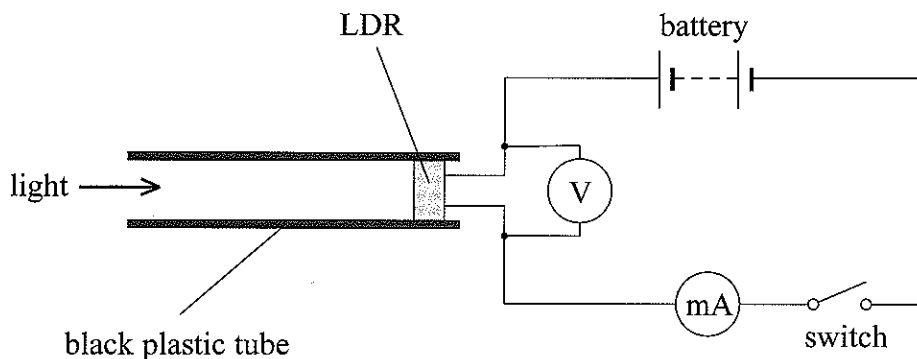
(a) (i) What is the reading shown on the voltmeter?
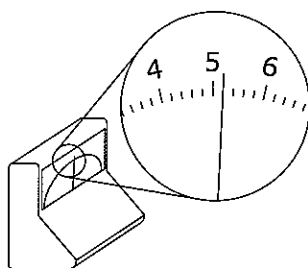
Reading = ... V

(1)

(ii) What is the reading shown on the milliammeter?

Reading = ... mA

(1)

(b) Suggest and explain one reason why the student uses a black tube.

....

....

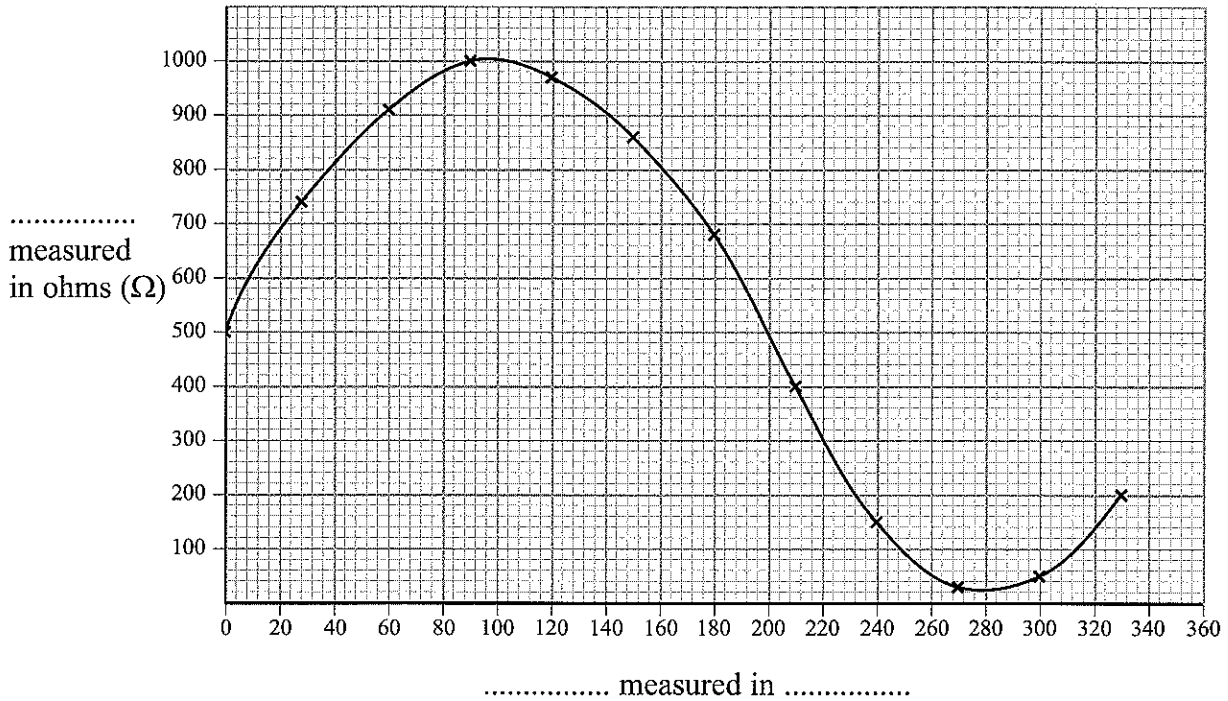...

(2)

(c) The student points the tube in different directions and takes sets of readings.
She measures the direction as the angle in degrees from her starting direction.
The graph shows her results.

....
measured
in ohms (Ω)

.... measured in ....

(i) Complete the labels for the *x*-axis and the *y*-axis.

(2)

(ii) Some parts of the room are bright and others are dull.

Suggest the direction for the brightest part.   = ... degrees

Suggest the direction for the dullest part.   = ... degrees

(2)

(iii) Predict what the resistance will be when the direction is 360°.

Resistance = ... Ω

(1)

(iv) Explain how you made this prediction.

....

....

....

(2)

Q4

(Total 11 marks)

TOTAL FOR PAPER: 50 MARKS

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