Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	3	7	/	0	9	Signature	

Paper Reference(s)

4437/09

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Science (Double Award)

Paper 9

Common to both tiers

Specimen Paper

Time: 1 hour 15 minutes

Question Number	Leave Blank
1	
2	
3	
4	
Total	

Materials required for examination
Ruler
Protractor
Pencil

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. 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

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

Advice to Candidates

You are reminded of the importance of clear English and careful presentation in your answers.

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Specimen

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1. (a) Diagram 1 shows a spring with a large pin attached alongside a vertical rule. The rule is marked in cm.

Diagram 2 shows the spring with a large mass attached to it.

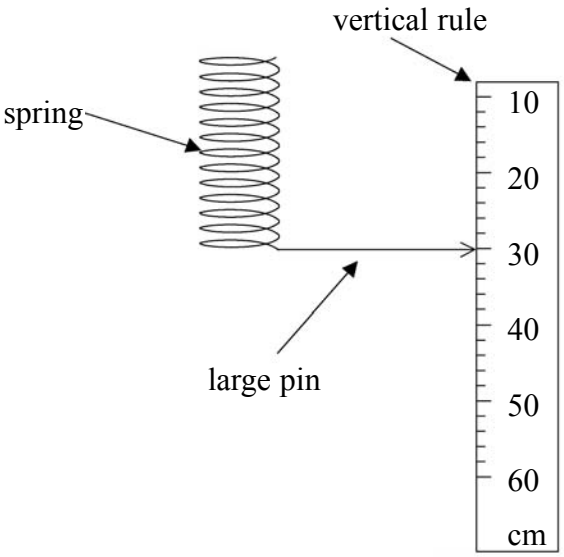

Diagram 1

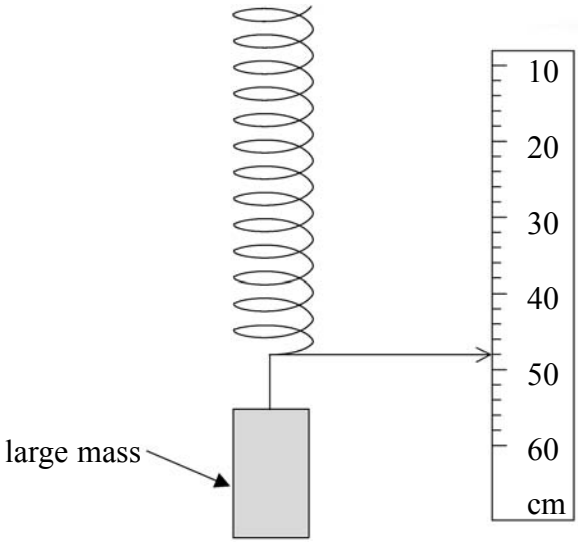

Diagram 2

(i) What is the initial reading on the vertical rule (Diagram 1)?

.....

(1)

(ii) What is the reading on the vertical rule when a large mass is attached to the spring (Diagram 2)?

.....

(1)

(iii) What is the extension of the spring as a result of adding the large mass?

.....

(1)

(iv) Describe two safety precautions that you would take in this experiment.

1 .....

.....

2 .....

.....

(2)

(b) Diagram 3 shows how a string is used to demonstrate the behaviour of a transverse wave.

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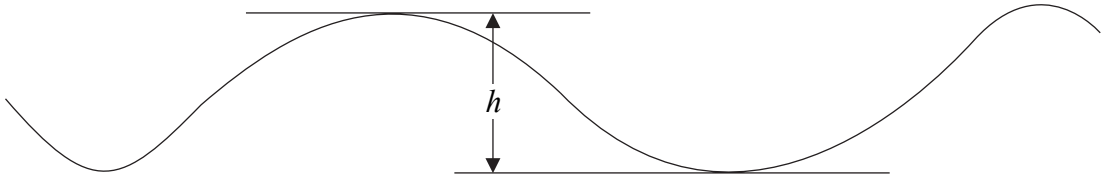

Diagram 3

(i) Distance *w* represents the wavelength of the wave. Show this distance on the diagram.

.....

(1)

(ii) Measure the distance *h*.

h = ... cm

(1)

(iii) What does distance *h* represent?

.....

(1)

Q1

(Total 8 marks)

Turn over

2. A student carried out an experiment to demonstrate the bending of a ray of light as it travelled from air to water.

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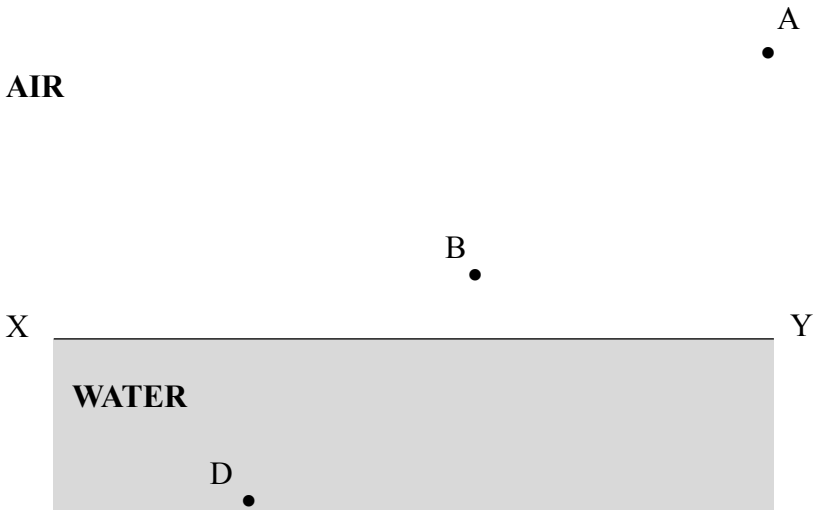
(a) In the diagram below, A and B are two points along the path of the light ray travelling in air. XY is the edge of a water tank. D is a point along the path of the same light ray travelling in water.



(i) Draw a straight line through A and B to show the path of the light ray travelling in air. Continue your line to meet the line XY. Label the point where the lines meet as 'C'.

(4)

(ii) Draw a straight line from C to D to show the path of the light ray travelling in water.

(1)

(iii) Measure the angles ACY and DCX and record their values below.

Angle measured in air ACY = ...

Angle measured in water DCX = ...

(2)

(b) The student recorded the following set of readings for different positions of A and B.

Angle measured in water in °	Angle measured in air in °
46	20
50	30
55	40
61	50
68	60
75	70

(i) On the grid below, plot a graph of angle measured in water (*y*-axis) against angle measured in air (*x*-axis). Label the axes of your graph on the dotted lines provided.

(3)

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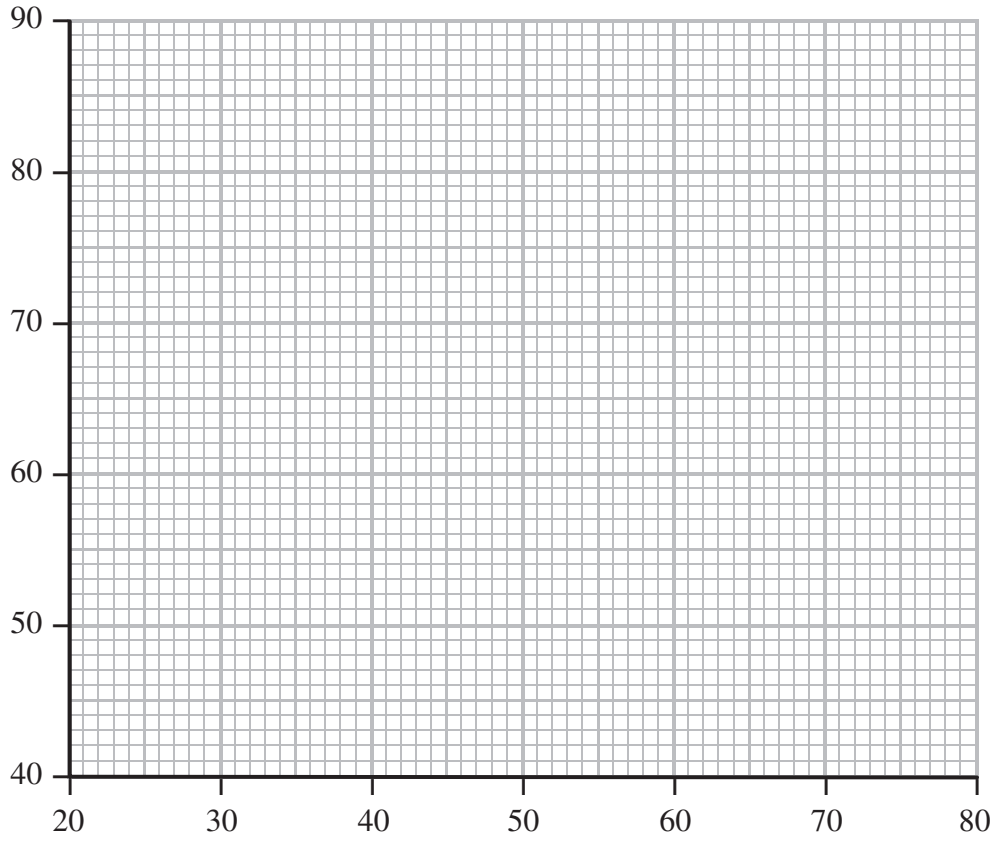

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(ii) Draw a smooth curve through your plotted points.

(1)

(iii) Plot your measured values from (a)(iii) in the graph. Label the point P.

(1)

(iv) Does P fit the pattern of the experiment? Explain your answer.

.....

.....

.....

.....

(2)

(Total 14 marks)

Q2

Turn over

3. A student carried out an experiment to find out the densities of four solid objects, A, B, C and D.

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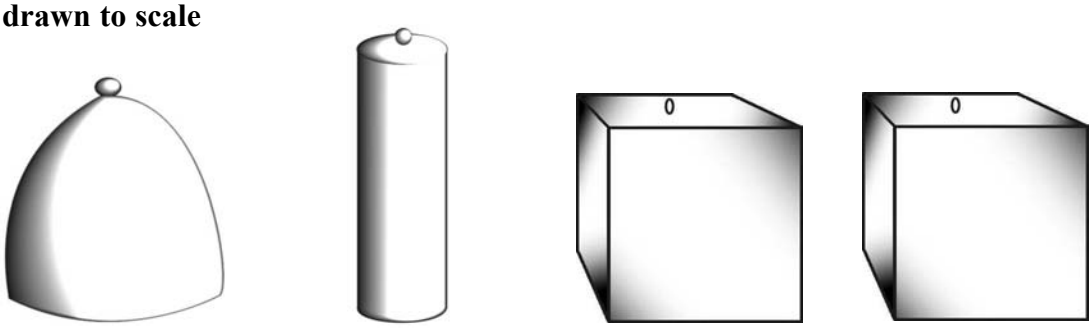
Objects NOT drawn to scale



A B C D

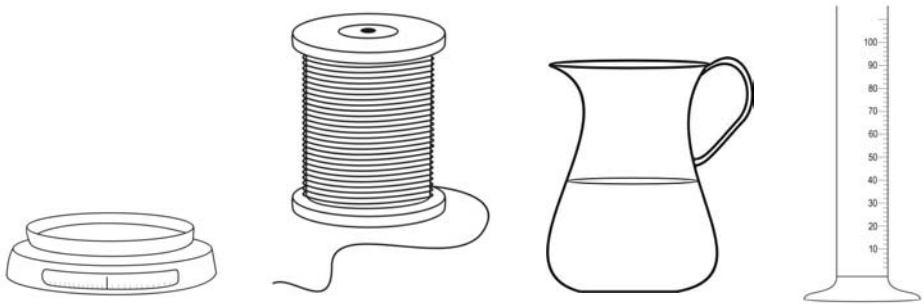
(a) The student was given the apparatus shown below.

Draw diagrams to show how the student may set up this apparatus to measure

(i) the mass of object A;

(ii) the volume of object A.

Write a brief method to describe what he did.



Apparatus NOT drawn to scale

Draw your diagrams here

Write your brief method here

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(4)

(b) The student took measurements of the mass and volume for the other three objects. He calculated the density for each object. His results are shown in Table 1.

Table 1

Solid object	Mass in g	Volume in cm^3	Density in g / cm^3
A	75	23	.....
B	40	10	4.0
C	53	16	3.3
D	83	21	4.0

(i) Complete Table 1 by determining the density of solid object A. Give your answer to an appropriate number of significant figures. You may use the space below for your calculations.

(3)

(ii) Justify the number of significant figures for your calculated values of density in (i).

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(2)

Turn over

(c) (i) Using Table 1, write a suitable conclusion for the student's experiment.

Leave blank

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(2)

The student had predicted that the two cubes C and D were made of the same material.

(ii) Relate the results to the student's prediction.

.....

.....

(1)

(d) Another student points out that the reading for the mass of D in Table 1 is wrong. It should be 86 g.

In the space below show that this error in the mass reading has no effect on your conclusion in (c)(i).

Include a calculation.

Q3

(3)

(Total 15 marks)

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4. You have been asked to investigate the use of a suspended magnet to measure the mass of small objects.

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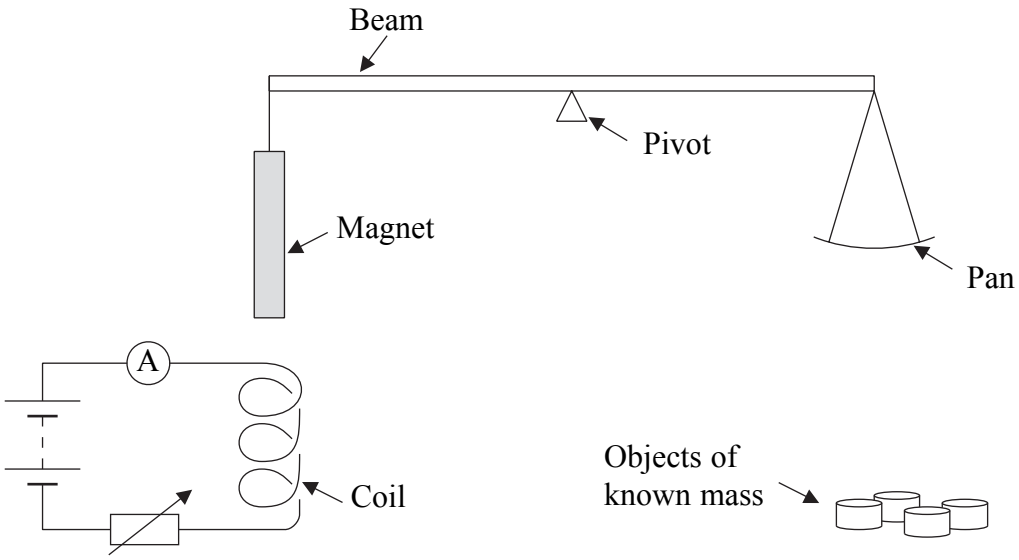
A magnet and an empty pan of **equal** mass are suspended from a beam at equal distances from a pivot. **The pivot remains at the mid-point of the beam throughout.**



When an object of known mass is placed on the pan, the beam tilts down to the right. When the current is switched on, the beam tilts down to the left because the magnet is attracted to the coil.

(a) Describe how you would use the above apparatus and a number of objects of known mass to determine the relationship between current and mass.

.....

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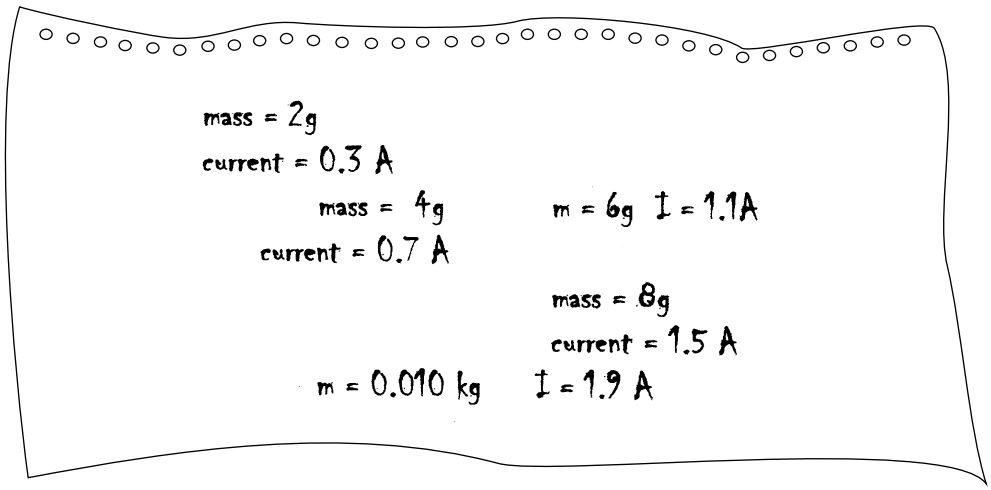
(4)

(b) (i) Here are a student's raw data. Display these data in the form of a table, with column headings and appropriate units.

Leave blank



(3)

(ii) Display the results as a sketch graph. In the spaces provided, write in the labels for the graph axes.

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(2)

Turn over

(c) Describe how you would use the apparatus and the graph to find the mass of an unknown object, X.

Leave blank

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.....

.....

(2)

(d) The apparatus can be adjusted to enable larger masses to be measured **without increasing the current**. State and explain **one** other way in which this might be done.

An example is given below.

State ..... *increase number of turns on coil* .....

Explain ..... *stronger force between magnet and coil* .....

.....

State .....

Explain .....

.....

(2)

Q4

(Total 13 marks)

TOTAL FOR PAPER: 50 MARKS

END