Paper Reference (complete below)

| Surname | Initial(s) |
| Signature | |

Paper Reference(s)

4420/03 4437/09

London Examinations IGCSE

Physics – 4420

Paper 3

Science (Double Award) – 4437

Paper 9

Foundation and Higher Tiers

Tuesday 22 May 2007 – Morning

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 12 pages in this question paper. All blank pages are indicated.

Advice to Candidates

Write your answers neatly and in good English.

Turn over

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1. (a) Diagram 1 shows how to find the position of the centre of gravity **G** of a thin rectangular card by drawing diagonal lines.
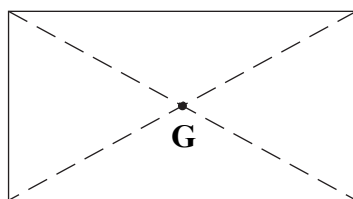

Diagram 1

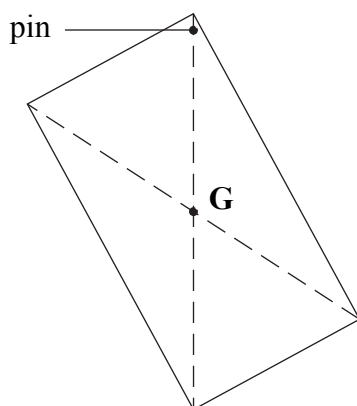Diagram 2 shows the position of the card when it is freely suspended from a corner using a pin.

Diagram 2

Diagram 3 shows the card displaced to the right. Two vertical lines are shown, one through the pin and one through the centre of gravity **G**.

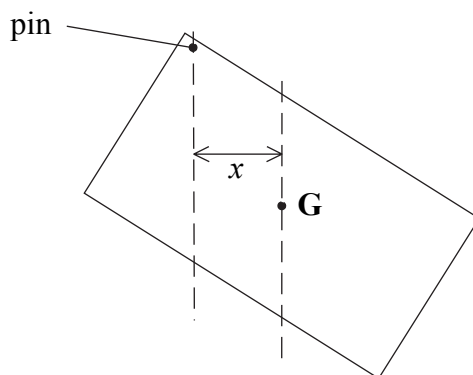Measure the perpendicular distance x between these two lines.

Diagram 3

Distance $x =$ .... mm

(1)

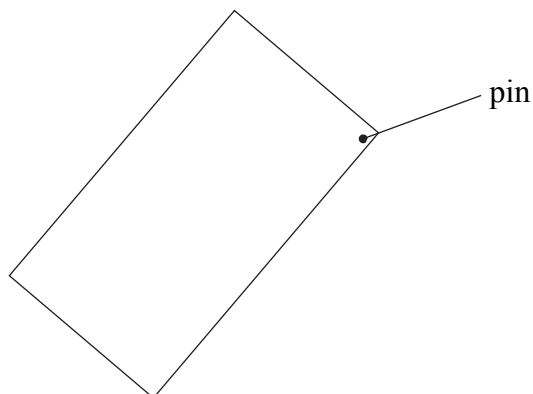(b) Diagram 4 shows the card displaced to the left.

Diagram 4

(i) Find the position of the centre of gravity **G**.

(2)

(ii) Draw lines to determine the new value of distance x.

(2)

(iii) Measure the new distance x.

Distance x = ... mm

(1)

(iv) The card is released. Describe and explain the initial movement of the card.

....

....

....

....

(2)

(v) In what position does the card eventually come to rest?

....

(1)

QUESTION 1 CONTINUES ON THE NEXT PAGE

(c) A card is cut to the shape shown below.
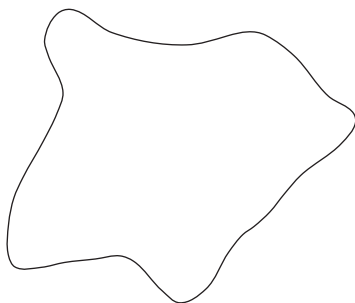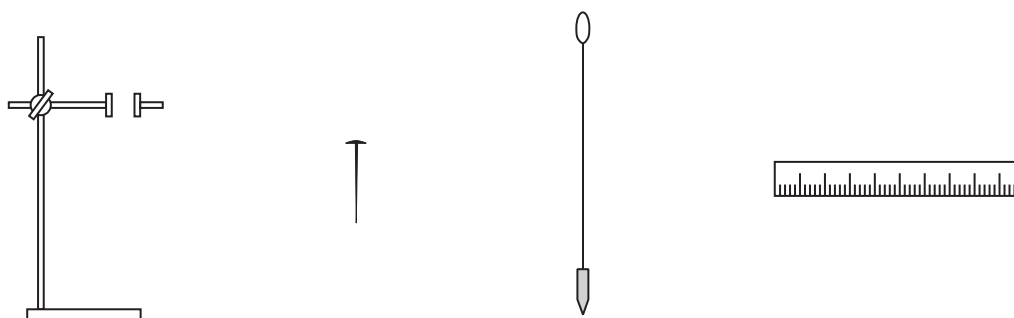
Explain why it is not possible to find the position of the centre of gravity by the method in diagram 1.

....

....

(1)

(d) You are given the equipment below. Describe how you would use this to find the position of the centre of gravity of the shape shown in (c).

....

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....

....

....

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....

....

(4)

(e) How would you ensure the accuracy of your experiment?

....

....

(1)

Q1

(Total 15 marks)

QUESTION 2 IS ON PAGE 7

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2. The diagram shows the outline of a young child's shoe.
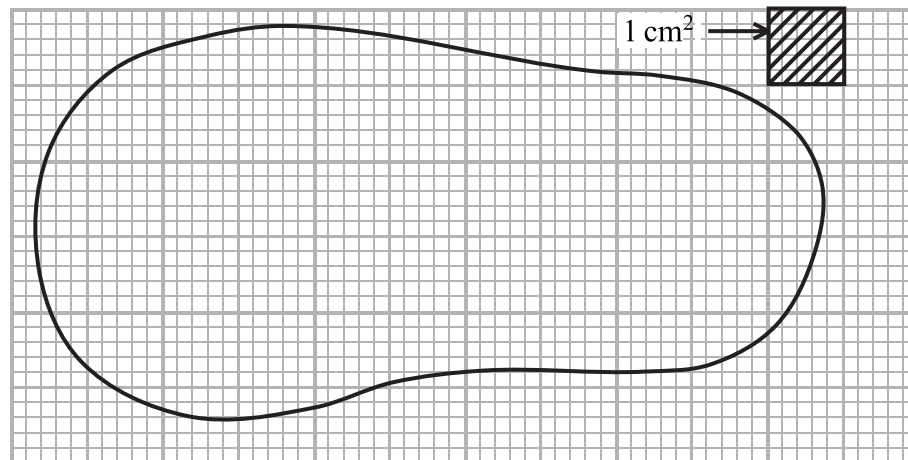
(a) Estimate the area of the shoe.

Area of shoe = ... cm^2

(3)

(b) The weight of the child produces a force of 95 N on the floor.

(i) The child stands on both feet. Calculate the pressure in N/cm^2 exerted on the floor.
Give your answer to an appropriate number of significant figures.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

....

....

Pressure = ... N/cm^2

(3)

(ii) Explain why your number of significant figures is appropriate.

....

....
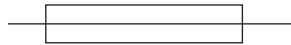
(1)   **Q2**

(Total 7 marks)

3. The circuit symbol for a fuse is

A student reads the following in an article.

Some 1 A fuses can take 10 A for 0.1 s to allow for a large current when a circuit is first switched on.

He decides to investigate this statement by allowing different values of current above 1 A in a 1 A fuse and measuring how long it takes to blow.
His experiment produced results shown by the graph.
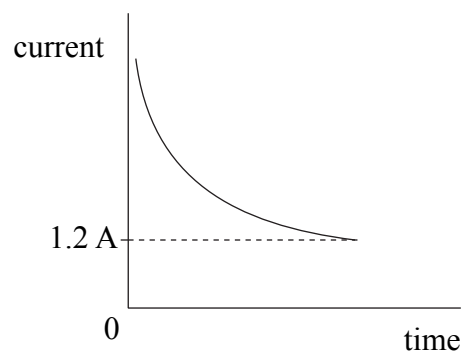
(a) Describe how the student would perform this experiment. Your description should include:

- a circuit diagram
- values for the circuit components
- the range of the meter
- method used.

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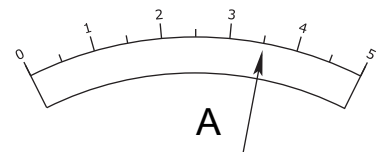..

(9)

(b) During the student's investigation he took readings from an ammeter and a stopwatch.

Record his readings.

ammeter   stopwatch
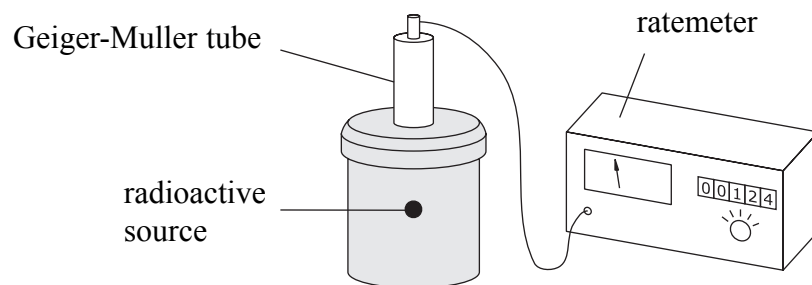
.... A   .... s

(2)

(Total 11 marks)

Q3

4. (a) A teacher uses apparatus to measure the half-life of a radioactive source.

Geiger-Muller tube

ratemeter

radioactive
source

Which part of the apparatus takes safety into account?

....

(1)

(b) Before the source is put in place the teacher takes three readings of count rate, in counts per minute, at one-minute intervals.

23, 22, 27

Calculate the average background count rate.

....

Average background count rate = ... counts per minute

(1)

(c) At one point during the experiment the ratemeter reading is 78 counts per minute. Calculate how much of this reading is due to the source.

....

........................ counts per minute

(1)

(d) Some students record readings from the ratemeter at five-minute intervals. The data is corrected for background count and placed in a table.

Time (minutes)	Corrected count rate (counts per minute)
0	92
5	54
10	34
15	21
20	14
25	9

(i) Using the grid, plot a graph of corrected count rate against time. Draw the best-fit curve for your points.

Corrected count rate in counts per minute
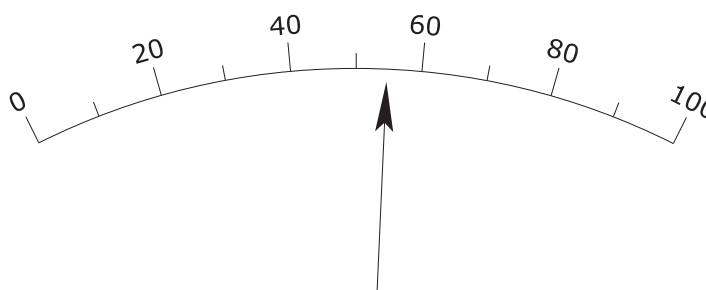
Time in minutes
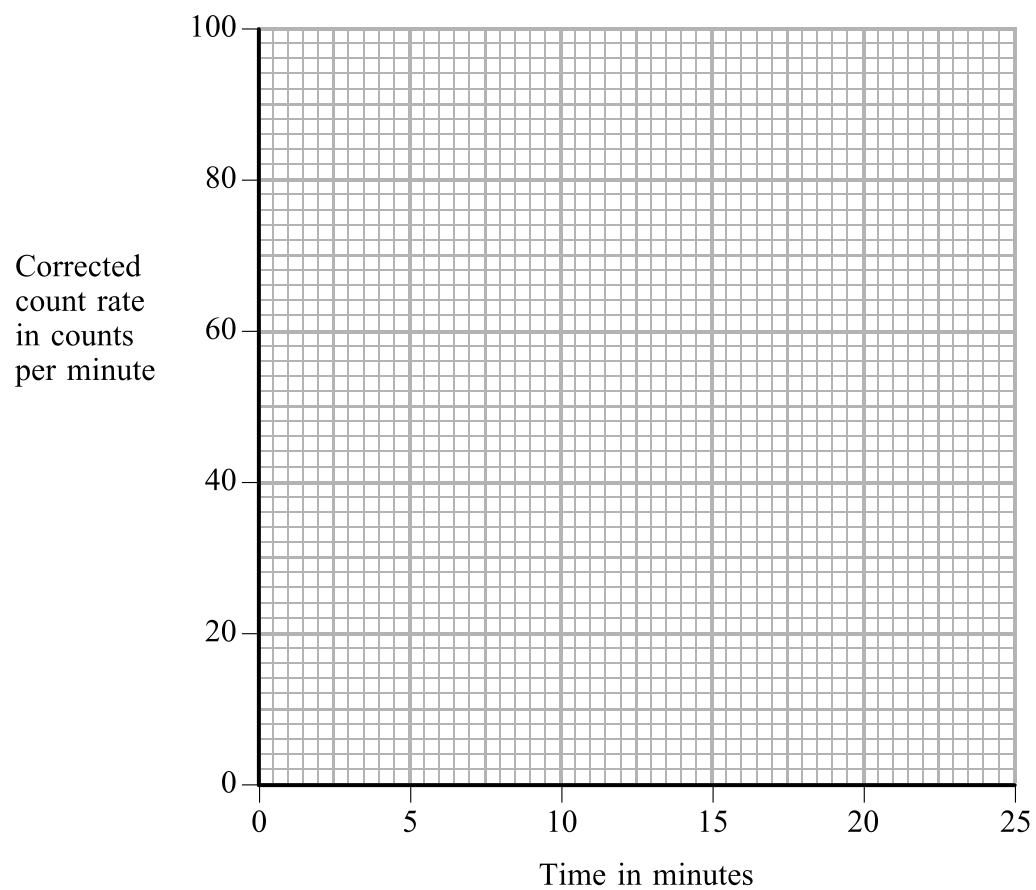
(3)

(ii) Half-life is the time taken for the corrected count rate to drop to half of its initial value. Draw lines on your graph to determine a value of half-life.

Half life = ... minutes

(2)

(e) During the experiment another student looks at the ratemeter.

(i) Record the reading.

Count rate = ... counts per minute

(1)

QUESTION 4 CONTINUES ON THE NEXT PAGE

(ii) Determine the time after the start of the experiment at which she saw this reading.

....

....

Time = ... minutes

(3)

(f) The teacher took several readings at the beginning of the experiment. Explain why the students took only one reading for each time interval.

....

....

....

....

(2)

(g) Another student comes late to the lesson but sits at the front of the class. She uses her own watch to record the following reading and asks the teacher to include it in the table of data.

> *489 counts after five minutes*

List three criticisms of her data.

1 ....

2 ....

3 ....

(3)

Q4

(Total 17 marks)

TOTAL FOR PAPER: 50 MARKS

END