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

Paper Reference(s)

4325/03 4437/07

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Biology – 4325

Paper 3

Science (Double Award) – 4437

Paper 7

Foundation and Higher Tiers

Friday 9 November 2007 – Afternoon

Time: 1 hour 15 minutes

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
Total	

Materials required for examination
Ruler, pencil and eraser

Items included with question papers
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.

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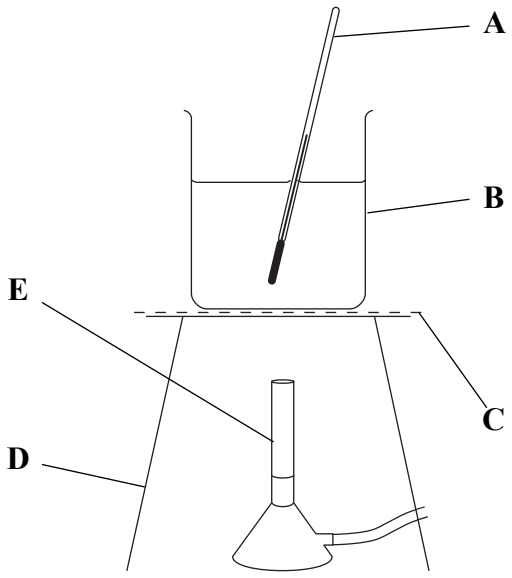
Answer ALL the questions. Write your answers in the spaces provided.

1. Jane wanted to make yoghurt in the laboratory. This is the method she decided to use.

Step	Description
1	Heat raw milk to 95 °C for 25 minutes
2	Cool the milk to 42 °C and then add *Lactobacillus* bacteria
3	Keep the mixture at 42 °C for five hours until yoghurt is made
4	Keep yoghurt cold at 5 °C until ready to eat

The diagram shows the apparatus Jane decided to use in step 1.



(a) (i) Complete the table by naming each part of the apparatus Jane would use in step 1. Two have been named for you.

Letter	Name
A	thermometer
B	
C	gauze
D	
E	

(3)

Leave blank

(ii) Write down **two** safety precautions that Jane should take when carrying out step 1.

1 .....

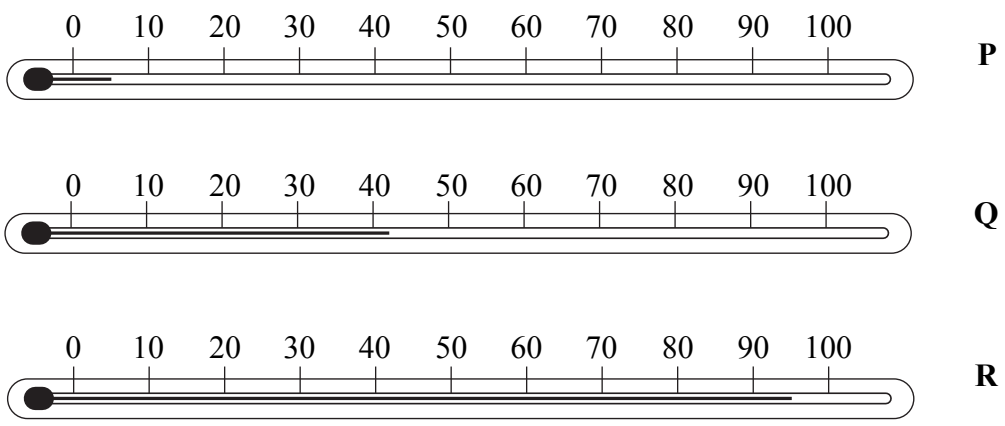
.....

2 .....

.....

(2)

(b) The diagram shows the piece of apparatus **A**, with three different readings, **P**, **Q** and **R**.



(i) Which of **P**, **Q** and **R** records the temperature when bacteria would be added to the milk in step 2?

.....

(1)

(ii) Suggest how Jane could keep the yoghurt cold during step 4.

.....

.....

(1)

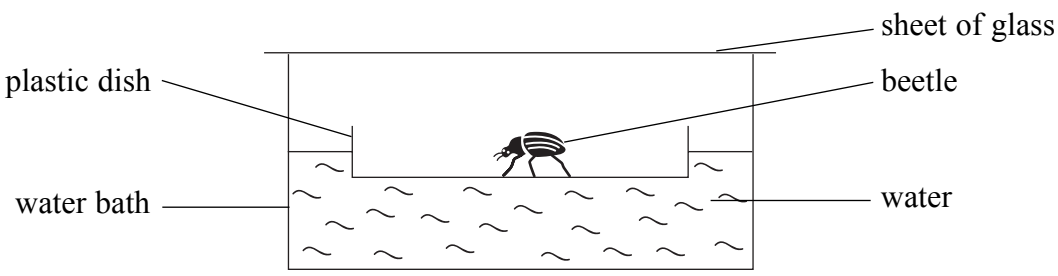
Q1

(Total 7 marks)

Leave blank

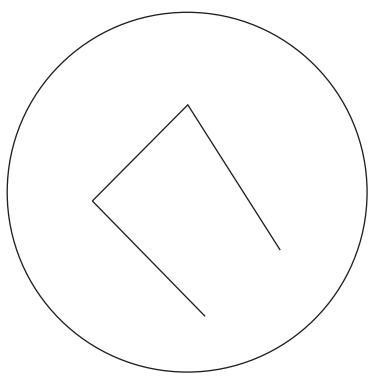
2. A student carried out an investigation to find out how temperature affects movement in beetles. The student placed the beetle in a plastic dish, which was allowed to float on water in a water bath. The water bath could be set at different temperatures from 15 °C upwards.

The apparatus the student used is shown in the diagram below.

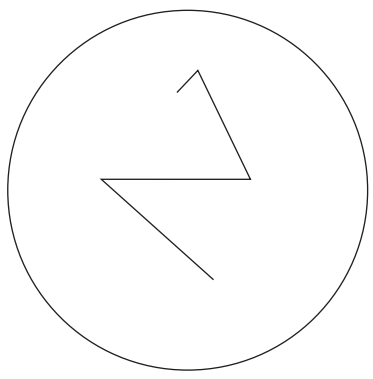


The student wanted to measure the distance moved by the beetle in cm per minute. To do this, the student looked down from the top and recorded the movement of the beetle on the sheet of glass using a pen. The student did this four times (trials) at each temperature using the same beetle.

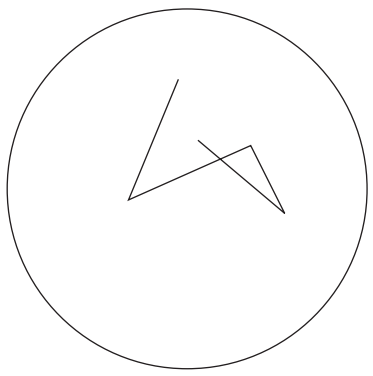
The diagrams show the pen recordings for the beetle movement during one minute at 25 °C.



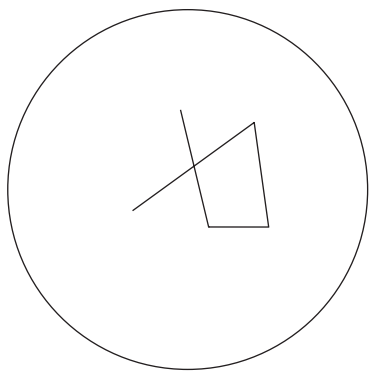
Trial 1



Trial 2



Trial 3



Trial 4

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(a) Table 1 shows the results obtained at 15 °C, 20 °C, 30 °C and 35 °C.

Measure the distance moved in cm by the beetle during each trial at 25 °C. Write your answers in the empty boxes in Table 1.

Table 1

Temperature in °C	Distance moved in cm per minute			
	Trial 1	Trial 2	Trial 3	Trial 4
15	2.4	2.1	1.8	1.7
20	4.3	4.1	4.4	4.0
25				
30	7.0	6.7	6.9	6.6
35	8.3	8.4	8.1	8.0

(4)

(b) (i) Suggest how you could use the apparatus to obtain results at a temperature of 5 °C.

.....

.....

(1)

(ii) Suggest **one** reason why the student should not collect results above 35 °C.

.....

.....

(1)

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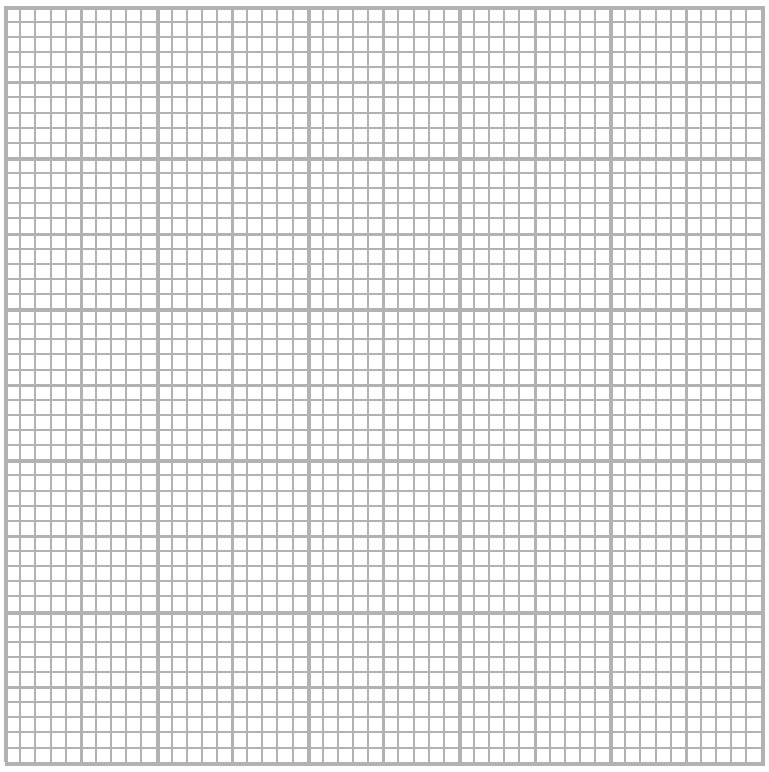
(c) The student repeated his experiment using a younger beetle. He then calculated the average distance moved at each temperature in cm per minute for the older and for the younger beetle.

His results for the older and younger beetle are shown in Table 2.

Table 2

Temperature in °C	Average distance moved in cm per minute	
	Older beetle	Younger beetle
15	2.0	1.0
20	4.2	2.0
25	6.0	3.5
30	6.8	3.8
35	8.2	4.0

Plot the data in Table 2 for the older beetle and the younger beetle as a line graph on the grid below. Use the same axes and use a ruler to join the points.



(5)

(Total 11 marks)

Q2

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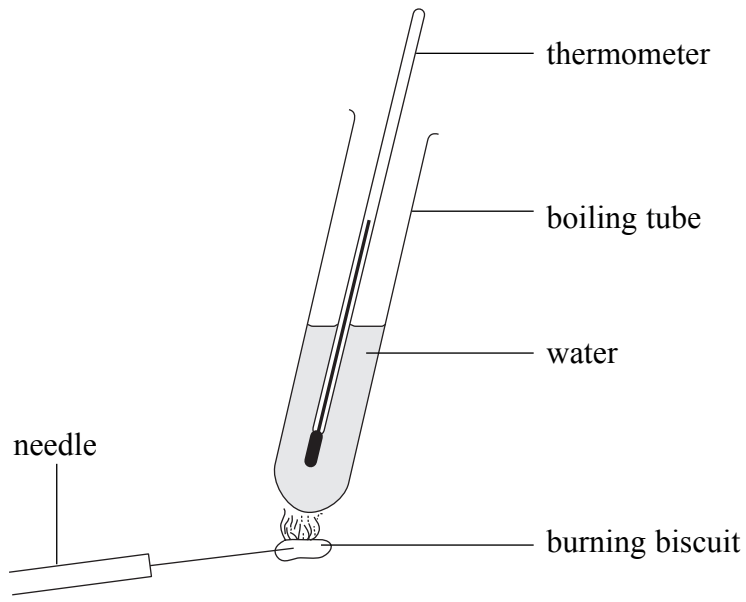
3. A student was asked to find out the energy content of a piece of biscuit. To do this, the student used the apparatus shown below and followed the instructions.



Instructions

1. Put 20 cm^3 of water into a boiling tube.
2. Measure the temperature of the water.
3. Weigh the biscuit to find its mass in g.
4. Set the biscuit alight using a Bunsen burner.
5. Transfer the burning biscuit to a position underneath the boiling tube of water.
6. When the biscuit stops burning, measure the temperature of the water again.
7. Calculate the rise in temperature of the water in the boiling tube.
8. Calculate the energy content of the biscuit using the formula below.

energy content in J = rise in temperature in °C × volume of water in cm^3 × 4.2

Leave blank

(a) (i) Name the apparatus the student could use to measure 20 cm^3 of water accurately.

.....

(1)

(ii) The temperature of the water was 18 °C at the start and was 33 °C when the biscuit stopped burning. Use the formula to calculate the energy content of this piece of biscuit in J. Show your working.

Answer .....

(2)

(iii) The mass of this piece of biscuit was 0.2 g. Calculate the energy content of 1 g of this biscuit.

Answer ..... J

(1)

Leave blank

(b) The student repeated the experiment. First, he did it five times using boiling tubes containing 20 cm^3 of water. Then he did it five times using beakers containing 200 cm^3 of water. The energy values he calculated are shown in the table.

Result	Energy content of biscuit in J per g	
	Boiling tube	Beaker
1	5 170	8 200
2	7 100	8 000
3	6 500	9 400
4	5 700	8 100
5	5 800	9 100
Mean (average)	6 054	

(i) Calculate the mean (average) for the results obtained using the beaker.

Answer .....

(1)

(ii) The five results using the boiling tube of water were different from each other. The student thought that this was because different amounts of energy were lost, and not transferred to the water. Suggest **two** reasons why the energy might not be transferred to the water.

1 .....

.....

2 .....

.....

(2)

Leave blank

(c) The results show a higher value for the energy content of the biscuit when using a beaker than when using a boiling tube. Use your knowledge of surface area to volume ratio to suggest an explanation for this observation.

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(2) **Q3**

(Total 9 marks)

Leave blank

4. Bread is made from dough. The dough contains yeast, sugar, flour and water. As the yeast respires, it releases a gas that helps the dough to rise.

An experiment was carried out to investigate the effect of temperature and of vitamin C on the rising of dough.

(a) 50 cm^3 of the dough with no vitamin C was put into different measuring cylinders at six different temperatures. There were three measuring cylinders at each temperature.

In a similar way, measuring cylinders were set up using dough with vitamin C. All the measuring cylinders were left for one hour. The table shows the volumes of dough after one hour in each measuring cylinder.

Temperature in °C	**Volume of dough in cm^3 after one hour**	
	With no vitamin C	**With vitamin C**
15	50 50 50	50 50 50
25	55 54 56	58 57 51
35	63 64 65	69 71 70
45	80 82 80	86 87 85
55	65 66 66	67 68 69
65	53 52 52	52 53 52

(i) How many measuring cylinders were used in this experiment?

.....

(1)

(ii) Identify **one** anomalous (unexpected) result in the table and suggest a reason for this result.

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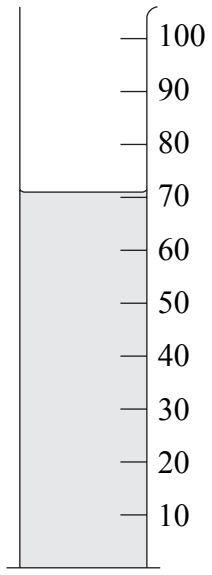
(2)

Leave blank

(iii) The diagram shows one of the measuring cylinders from the experiment.



Use the diagram and the information in the table to complete the following sentence.

This measuring cylinder was kept at ..... °C and contained dough

..... vitamin C.

(2)

(b) (i) The yeast cells contain enzymes used in respiration. Use this information to explain the effect of temperature on the rising of dough with no vitamin C.

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(3)

(ii) What is the effect of adding vitamin C on the rising of the dough?

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(2)

(Total 10 marks)

Q4

Leave blank

5. A student was asked to design an investigation to find out how temperature affected the rate of photosynthesis of a water plant.

(a) He was told that to obtain useful evidence his plan needed to show he understood the meaning of each of the terms in the list below.

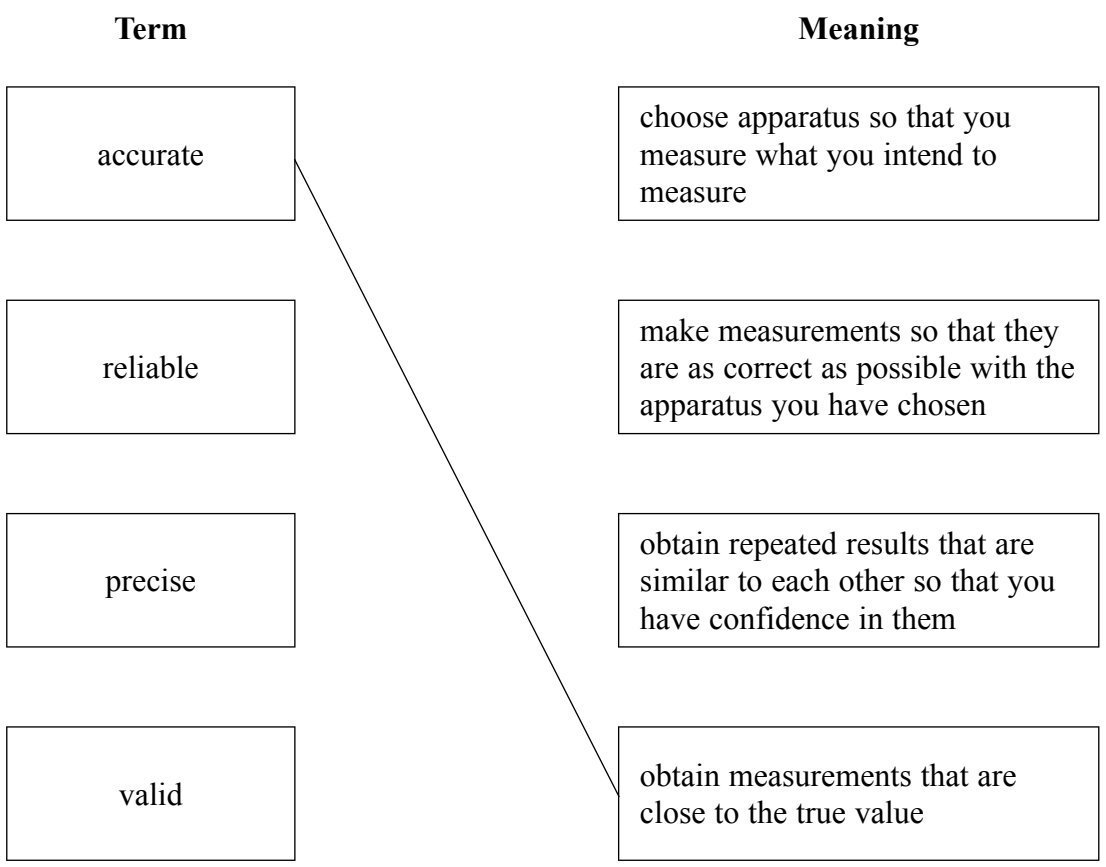
accurate

reliable

precise

valid

In the diagram below, join each of these terms to its correct meaning. The first one has been done for you.



(3)

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(b) The student intended to measure the rate of photosynthesis of the water plant by counting bubbles of gas given off.

Give **two** ways in which this method might produce results that are not accurate.

1 .....

.....

2 .....

.....

(2)

Q5

(Total 5 marks)

6. Alison noticed that the same species of plant was found on the sunny side and on the shady side of a hill. She decided to compare the population size of this plant on each side of the hill. The plan she wrote is shown below.

I will go to a field on the sunny side of the hill and walk into the middle. I will then put a 1 m^2 quadrat on the ground and count how many of the plants I can see in the quadrat. I will do the same thing on the shady side of the hill.

(a) Suggest **two** ways in which Alison could change her plan to improve it.

1 .....

.....

2 .....

.....

(2)

QUESTION 6 CONTINUES ON THE NEXT PAGE

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(b) When Alison counted the plants she found more in the quadrat on the sunny side of the hill than on the shady side. She also thought that they looked different in size. She concluded that plant growth might be affected by light intensity.

Describe an investigation you could carry out in the laboratory to find the effect of light intensity on the growth of plants. You should include full experimental details in your account.

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(6) **Q6**

(Total 8 marks)

TOTAL FOR PAPER: 50 MARKS

END