

Write your name here	
Surname	Other names
Edexcel	Centre Number
International GCSE	Candidate Number
Biology Unit: 4BI0 Paper: 2BR	
Thursday 13 June 2013 – Morning	Paper Reference
Time: 1 hour	4BI0/2BR
You must have: Calculator	Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- Show all the steps in any calculations and state the units.

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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PEARSON

Answer ALL questions.

- 1 Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

Japanese knotweed: a space invader

Invasive species are one of the biggest threats to wildlife and plants worldwide. The Department for Environment, Food and Rural Affairs (DEFRA) is introducing new measures that will ban the sale of some of the most dangerous foreign species in the UK.

- 5 DEFRA is attempting to prevent a problem before it happens. The majority of invader species are plants. Of the most recent count of 2 721 non-native species, 1 798 were plants. Over £1.5 billion has been spent removing a single plant species, the Japanese knotweed.

- 10 Japanese knotweed was first introduced as a garden plant. Japanese knotweed causes problems as it lacks natural predators in the UK and is very difficult to remove completely. Also, the vegetation of the knotweed is so dense, that other plants cannot grow through it. The fast-growing plant can grow up to 4 metres tall and is so strong it can break through paving stones and tarmac.



- 15 Japanese knotweed has a large network of underground stems (rhizomes). These rhizomes have to be killed if the plant is to be completely removed. The rhizomes might also be described as 'underground runners'. All above-ground portions of the plant need to be controlled repeatedly for several years in order to weaken and kill the entire patch. Digging up the rhizomes is a common solution where the land is to be developed, as this is quicker than the use of herbicides.
- 20 Scientists have looked at the weed's natural predators with the aim of finding one that feeds on Japanese knotweed and little else. After testing the predators on 90 different UK plant species, including plants closely related to Japanese knotweed, they discovered that the insect, *Aphalara itadori*, was the best control agent. It keeps the weed under control in its native Japan by feeding on the sap
- 25 in the transport tissue in the leaves, which reduces the growth of the plants. The introduction of *Aphalara itadori* would be the first time that biological control has been used in Europe to fight a weed.

(a) Suggest what is meant by the term **invasive species** (line 1).

(2)

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(b) Calculate the percentage of invasive species in the UK that are plants (lines 6 and 7).

Show your working.

(2)

Answer %

(c) Give **one** reason why Japanese knotweed has spread so successfully in the UK.

(1)

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(d) Suggest why the dense growth of the Japanese knotweed reduces the growth of other plants (line 11).

(2)

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- (e) The use of *Aphalara itadori* to feed on Japanese knotweed is an example of biological control.

Describe another example of biological control.

(2)

- (f) (i) Name the transport tissue in the leaves that contains sap (line 25).

(1)

- (ii) Suggest why the plant growth is reduced when insects feed on the plant sap (lines 24 and 25).

(2)

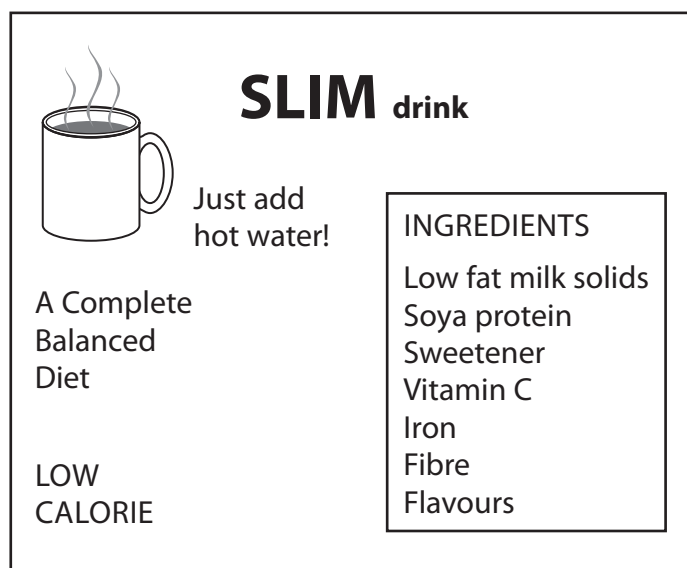
- (g) Why is it important that the insect 'feeds on Japanese knotweed and little else' (line 21)?

(1)

(Total for Question 1 = 13 marks)



- 2 The diagram shows the label on a packet of a new kind of food for people who want to lose weight.



The food is a powder which is added to water to make a liquid drink. The label on the packet claims that the food provides a complete balanced diet.

- (a) What is meant by the term **balanced diet**?

(2)

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- (b) A pregnant woman decides that this food does not provide her with a complete balanced diet.

Use the information on the packet to give two reasons why the pregnant woman may be right.

(2)

1

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2

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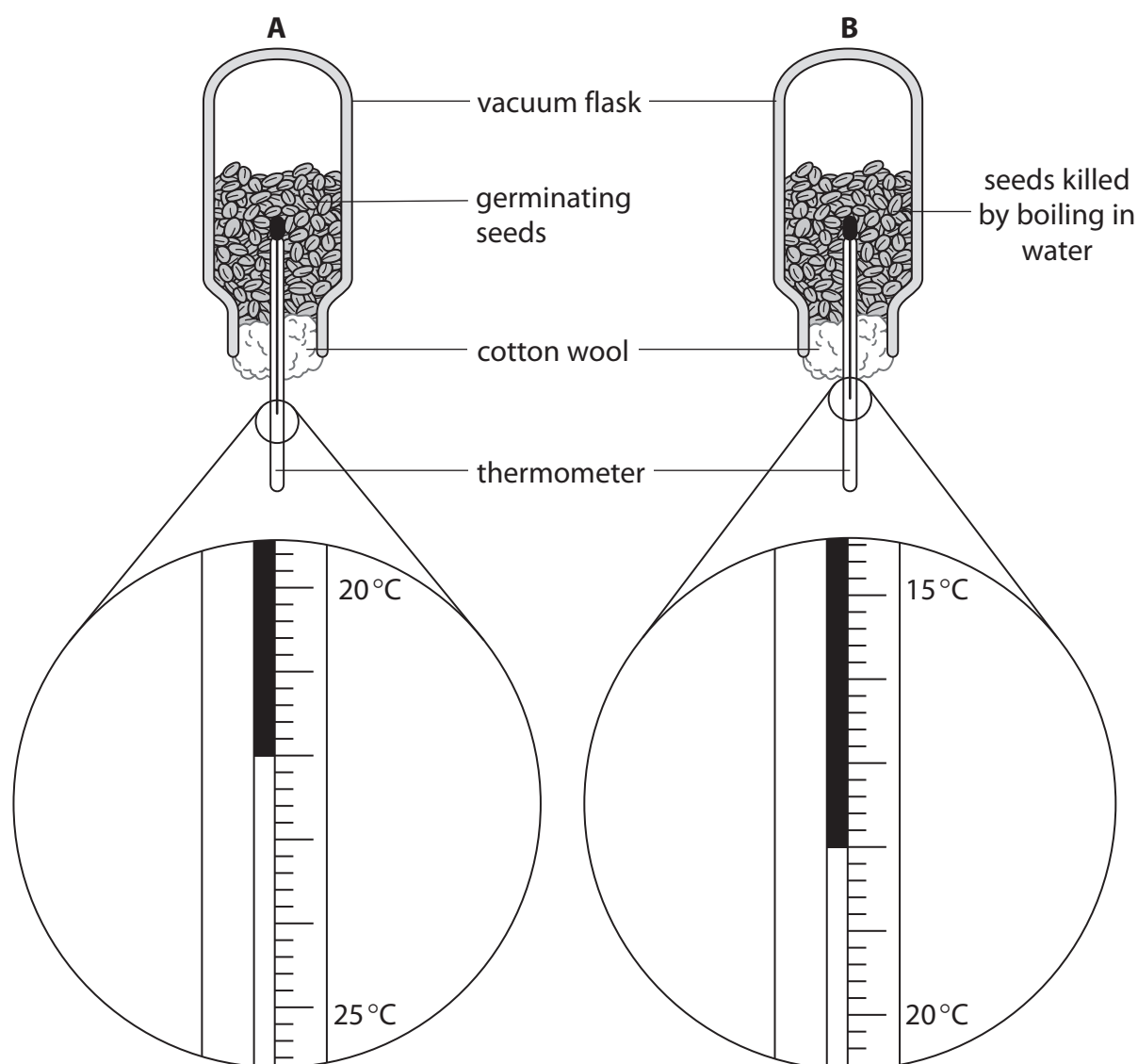
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(Total for Question 2 = 4 marks)



3 The diagram shows the apparatus used in a seed germination experiment.



(a) The two samples of seeds started at the same temperature of 18°C.

The diagram shows the temperature reading on each thermometer after 48 hours.

(i) Complete the table to show the temperature of flask A and flask B.

(1)

Temperature in °C	
Flask A	Flask B

- (ii) Give a biological explanation for the difference in the temperature of flask A compared to flask B.

(2)

- (b) The seeds in both flasks were washed in disinfectant before being put into the flasks.

Suggest why this was done.

(1)

- (c) The cotton wool kept the thermometers in place and prevented the seeds from falling out of the flasks.

Suggest why cotton wool was used rather than a rubber bung.

(1)

- (d) The seeds used in the experiment were from the same species.

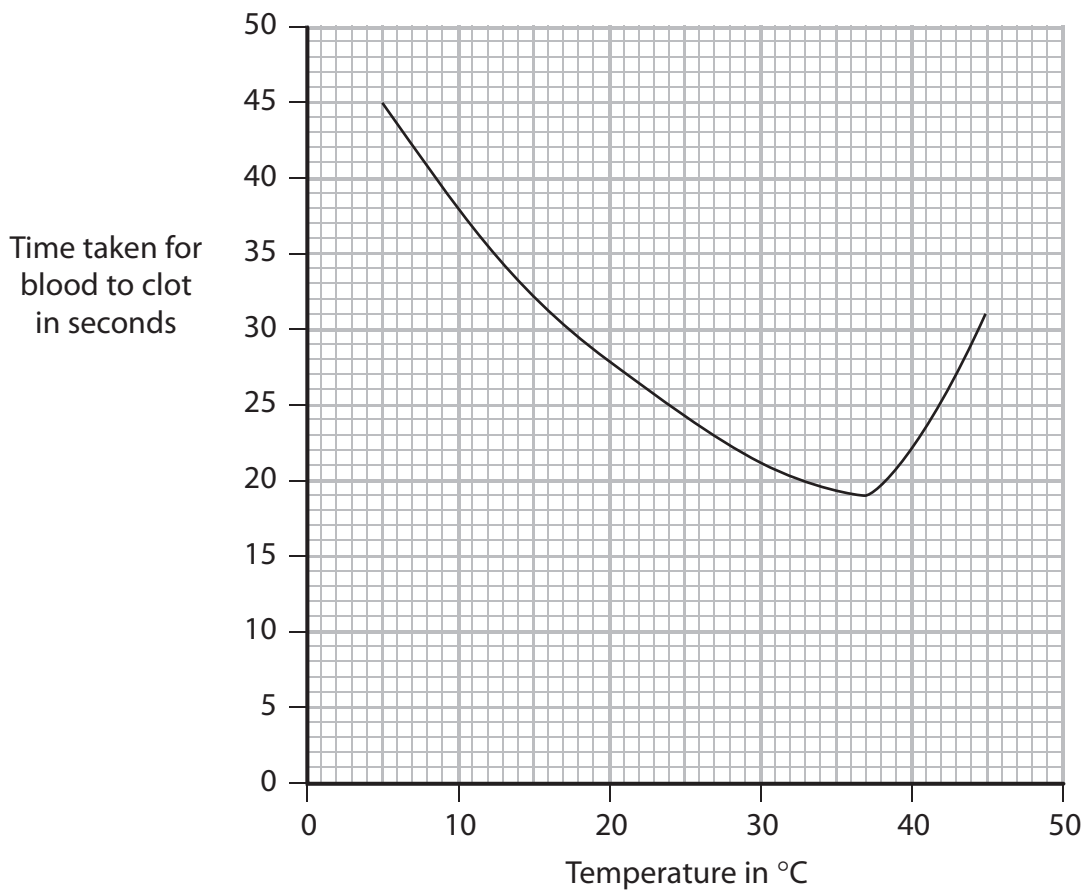
Suggest **one** other variable that needs to be controlled in this experiment.

(1)

(Total for Question 3 = 6 marks)



- 4 The graph shows the time taken for samples of blood to clot at different temperatures.



- (a) When blood clots, an enzyme converts a soluble plasma protein into an insoluble plasma protein.

Use the information in the graph to suggest the optimum temperature for this enzyme.

(1)

- (b) Explain why blood takes longer to clot at 20°C than it does at 30°C.

(2)



(c) Use your knowledge of enzymes to explain why blood is slow to clot at 45 °C.

(2)

(d) The coronary artery supplies blood to heart muscle cells. A heart attack may occur if the coronary artery is blocked by a blood clot.

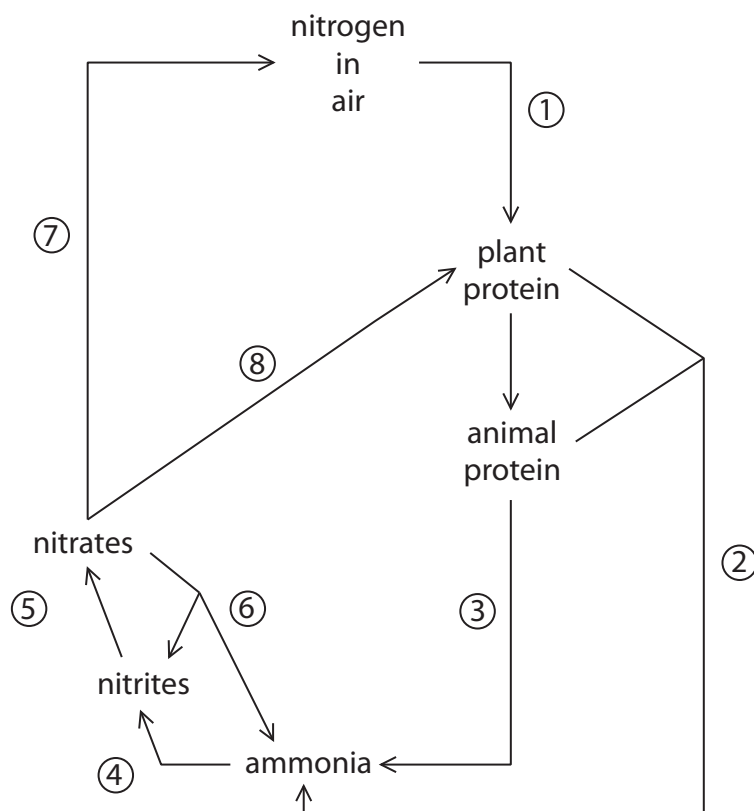
Suggest what happens in heart muscle cells when the coronary artery is blocked.

(4)

(Total for Question 4 = 9 marks)



5 The diagram shows the nitrogen cycle. Different stages have been numbered 1 to 8.



(a) The table lists the stages involved in the nitrogen cycle.

Complete the table by giving the correct number, or numbers, corresponding to each stage.

The first one has been done for you.

(4)

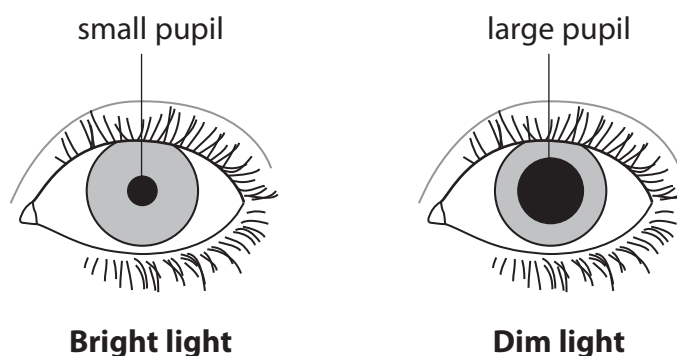
Stage	Number
absorption	8
denitrification	
nitrogen fixation	
excretion	
decomposition	

(b) Explain how nitrates are absorbed into plants at stage 8.

(3)

(Total for Question 5 = 7 marks)

- 6 The diagram shows the difference in the pupil diameter of the eye in bright light and after moving into dim light. The difference is caused by a reflex action.



- (a) The table gives descriptions of parts of the reflex arc involved with the reflex action.

Complete the table by naming each part.

One has been done for you.

(3)

Description of part	Name
contains light receptor cells	
neurone that sends impulses into the brain	
microscopic gap between neurones	
contains muscle effector cells	iris

(b) Explain how the lens changes when you view a near object.

(4)

(Total for Question 6 = 7 marks)



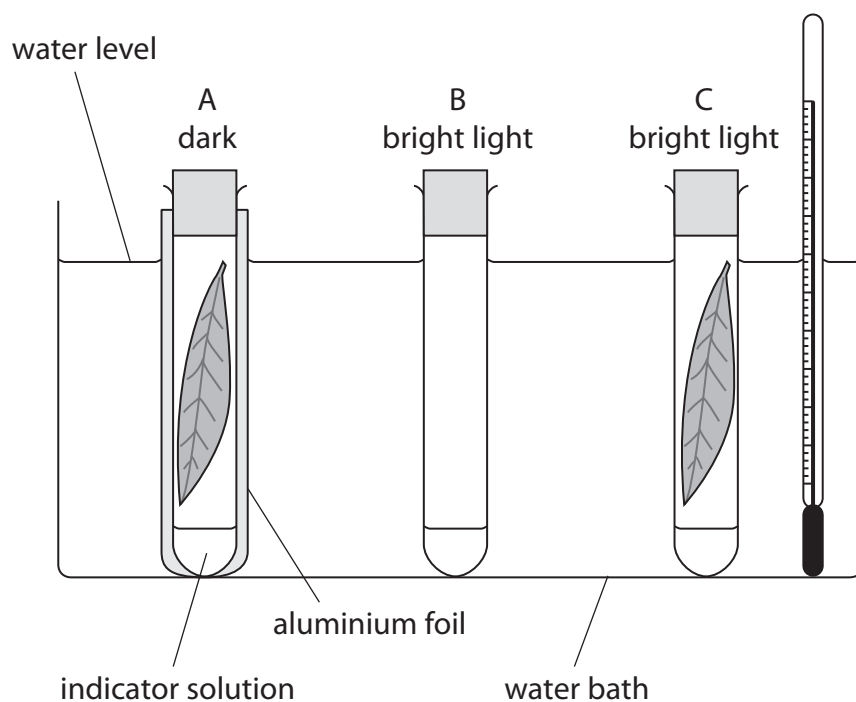
- 7 Caroline investigated how light affected photosynthesis by looking at changes in carbon dioxide levels.

She placed 2 cm³ of orange hydrogen carbonate indicator solution into three test tubes.

She put a leaf in two of the test tubes, which were then firmly sealed with a bung. These leaves were similar in size and were taken from the same plant. She wrapped one of the test tubes in foil to prevent light entering.

The third test tube was firmly sealed with a bung but was without a leaf.

She left the three test tubes in the conditions shown in the diagram for two hours. They were then shaken gently and the leaves were removed.



Hydrogen carbonate indicator solution is orange in normal air.

It changes colour to red as the carbon dioxide level decreases.

It changes to yellow as the carbon dioxide level increases.

The colour of the indicator solution in each test tube was recorded.

Her results are shown in the table.

Test tube	Colour of indicator solution at start	Colour of indicator solution at end
A	orange	yellow
B	orange	orange
C	orange	red

(a) Explain the colour change observed in test tube C.

(3)

(b) Explain the purpose of test tube B.

(1)

(c) Caroline set up a fourth test tube that contained a leaf and was exposed to dim light.

After two hours the colour of the indicator solution in this test tube remained orange.

Explain why.

(2)



(d) Caroline carried out another experiment to investigate the effect that light intensity has on the rate of photosynthesis in a water plant.

(i) Suggest how she could change her independent variable.

(1)

(ii) Suggest how she could measure her dependent variable.

(1)

(iii) Suggest how she could ensure that her results were reliable.

(2)

(Total for Question 7 = 10 marks)



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8 Human blood group is an example of a phenotype determined by alleles that show codominance.

The table shows the different blood groups and their genotypes.

Blood group	Genotypes
A	$I^A I^A$ or $I^A I^O$
B	$I^B I^B$ or $I^B I^O$
AB	$I^A I^B$
O	$I^O I^O$

(a) Explain what is meant by the term **codominance**.

(1)

.....

.....

- (b) A man with blood group A married a woman with blood group B. They had four children, each with a different blood group.

Use a genetic diagram to show this cross.

(3)

Genotypes of the parents

Gametes

Genotypes of the offspring

(Total for Question 8 = 4 marks)

TOTAL FOR PAPER = 60 MARKS

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