Write your name here

Surname	Other names

Edexcel Certificate
Edexcel International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Biology

Unit: KBI0/4BI0
Science (Double Award) KSC0/4SC0
Paper: 1B

Tuesday 15 May 2012 – Morning
Time: 2 hours

Paper Reference
KBI0/1B 4BI0/1B
KSC0/1B 4SC0/1B

You must have:
Ruler
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 120.
- 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 ▶

P40132A

1/1/1/

P 4 0 1 3 2 A 0 1 2 4

PEARSON

Answer ALL questions.

1 (a) Although plants and animals have many different features, they also have some features in common.

The table lists some features.

In each box, place a tick (✓) if the feature is present or a cross (✗) if the feature is absent. One has been done for you.

(4)

Feature	Plants	Animals
can move from place to place	✗	✓
can carry out photosynthesis		
are multicellular		
have cells with cell walls		
store carbohydrate as glycogen		

(b) Organisms that cause disease are known as pathogens.

Give **two** groups of organisms that include pathogens.

(2)

1 .....

2 .....

(Total for Question 1 = 6 marks)

2 The box shows the names of three blood vessels.

aorta	capillary	vena cava

(a) The table gives information about these blood vessels.

Complete the table by writing the name of the correct blood vessel in each empty box.

(2)

Name of blood vessel	Diameter of the lumen in mm	Thickness of the vessel wall in mm
	30.0	1.5
	0.006	0.001
	25.0	2.0

(b) (i) Which of these blood vessels carries blood containing the most oxygen?

(1)

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(ii) Which of these blood vessels carries blood at the lowest pressure?

(1)

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(iii) Which of these blood vessels is most suited for gas exchange?

Explain your answer.

(2)

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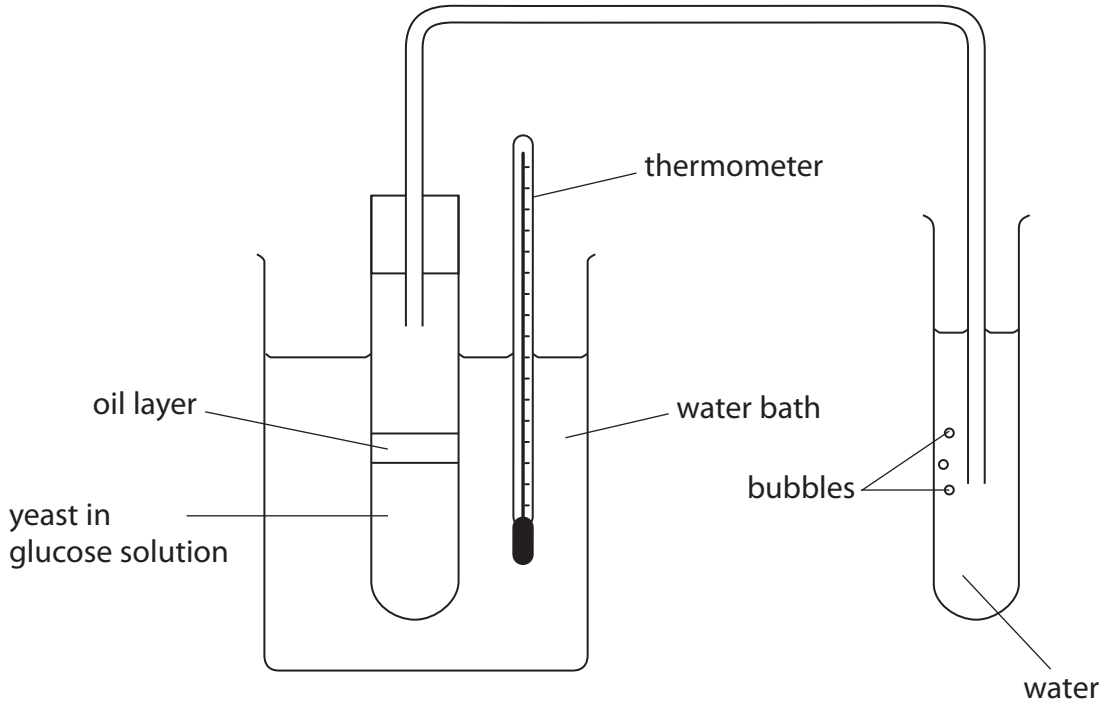
(Total for Question 2 = 6 marks)

3 John wanted to investigate the effect of temperature on the rate of carbon dioxide production by yeast.

He set up this apparatus.



(a) The oil layer prevents the entry of air into the glucose solution.

Explain why this is necessary.

(2)

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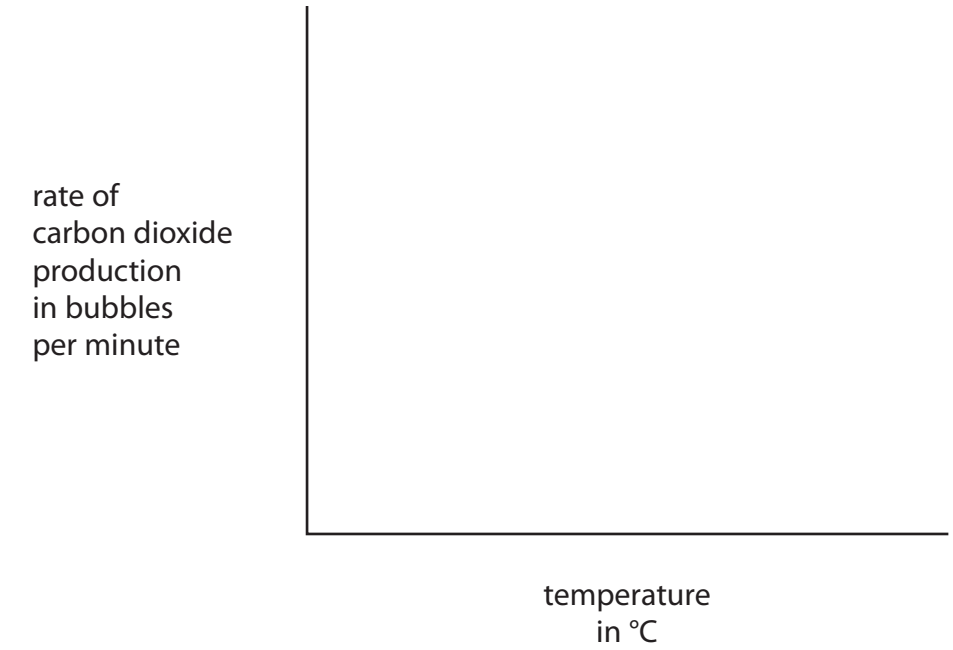
(b) John varied the temperature of the water bath between 15 °C and 65 °C. He measured the rate of carbon dioxide production by counting the number of bubbles per minute.

(i) Sketch the shape of the graph that John would obtain on the axes below.

(3)



(ii) Give the dependent variable in this experiment.

(1)

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(iii) Give the independent variable in this experiment.

(1)

.....

(c) Give **two** variables that John would need to keep the same in his experiment.

(2)

1 .....

2 .....

(d) Suggest **one** way that John could improve the reliability of his experiment.

(1)

(e) Suggest how John could improve the accuracy of his measurement of the rate of carbon dioxide production.

(1)

(f) Yeast is used to produce beer.

Write the word equation for the respiration of yeast that occurs during the production of beer.

(3)

(Total for Question 3 = 14 marks)

4 (a) The table lists some structures that provide a large surface area for the diffusion of substances.

Complete the table by naming the organ in which each structure is found.
The first one has been done for you.

(3)

Structure	Organ
spongy mesophyll	leaf
alveolus	
nephron	
villus	

(b) What is meant by the term **diffusion**?

(2)

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(c) The nephron is involved in the removal of substances from the blood.

Describe how substances are removed from the blood into the nephron.

(2)

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(Total for Question 4 = 7 marks)

5 Crop plants are often grown in glasshouses where conditions can be carefully controlled. This is done in order to get the greatest crop yield.

(a) Explain how the following factors could affect crop yield.

(i) Increasing the temperature of the glasshouse

(3)

(ii) Providing a supply of fertiliser to the crop plants

(3)

(b) Sometimes a farmer needs to control an insect pest that might damage his crops.

He can do this by using either biological control or a chemical pesticide.

(i) Describe **one** example of the use of biological control.

(2)

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(ii) Give **three** advantages of using biological control instead of a chemical pesticide.

(3)

1 .....

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2 .....

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3 .....

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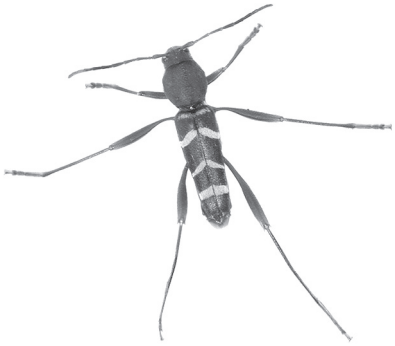
(Total for Question 5 = 11 marks)

6 The photographs show an adult insect called an ash borer and an adult insect called a wasp.



ash borer

wasp

Ash borers reproduce by laying eggs which develop into maggots. The maggots eat their way into ash trees and feed on carbohydrates in the trees. This can kill the trees because the root cells lack the carbohydrate needed to release energy for the absorption of mineral ions.

(a) (i) Suggest why the maggots need to feed on carbohydrate.

(1)

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(ii) Name and describe the process used by root cells to absorb mineral ions.

(2)

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(iii) Describe how magnesium ions are used to help trees to grow.

(2)

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(b) Wasps defend themselves from predators by using a sting. This means that predators avoid attacking wasps.

Ash borers look very similar to wasps.

Use your knowledge of natural selection to explain why ash borers have evolved to look like wasps.

(4)

(Total for Question 6 = 9 marks)

7 Achondroplasia is an inherited condition in humans. Adults with achondroplasia are much shorter than average height.

This condition is controlled by a gene with two alleles. The dominant allele (**A**) codes for shorter than average height and the recessive allele (**a**) codes for average height.

(a) Two parents both had achondroplasia. They had a child who grew up to be of average height.

Use a genetic diagram to show:

- the genotype of each parent
- the gametes they produced
- the genotypes of all the possible offspring
- the phenotypes of all the possible offspring

(4)

(b) The parents had a second child.

State the probability that this child grew up to be of average height.

(1)

(c) Achondroplasia is caused by a dominant allele.

(i) Explain what is meant by the term **dominant allele**.

(2)

(ii) Suggest why the number of people with achondroplasia is low, even though it is a dominant condition.

(2)

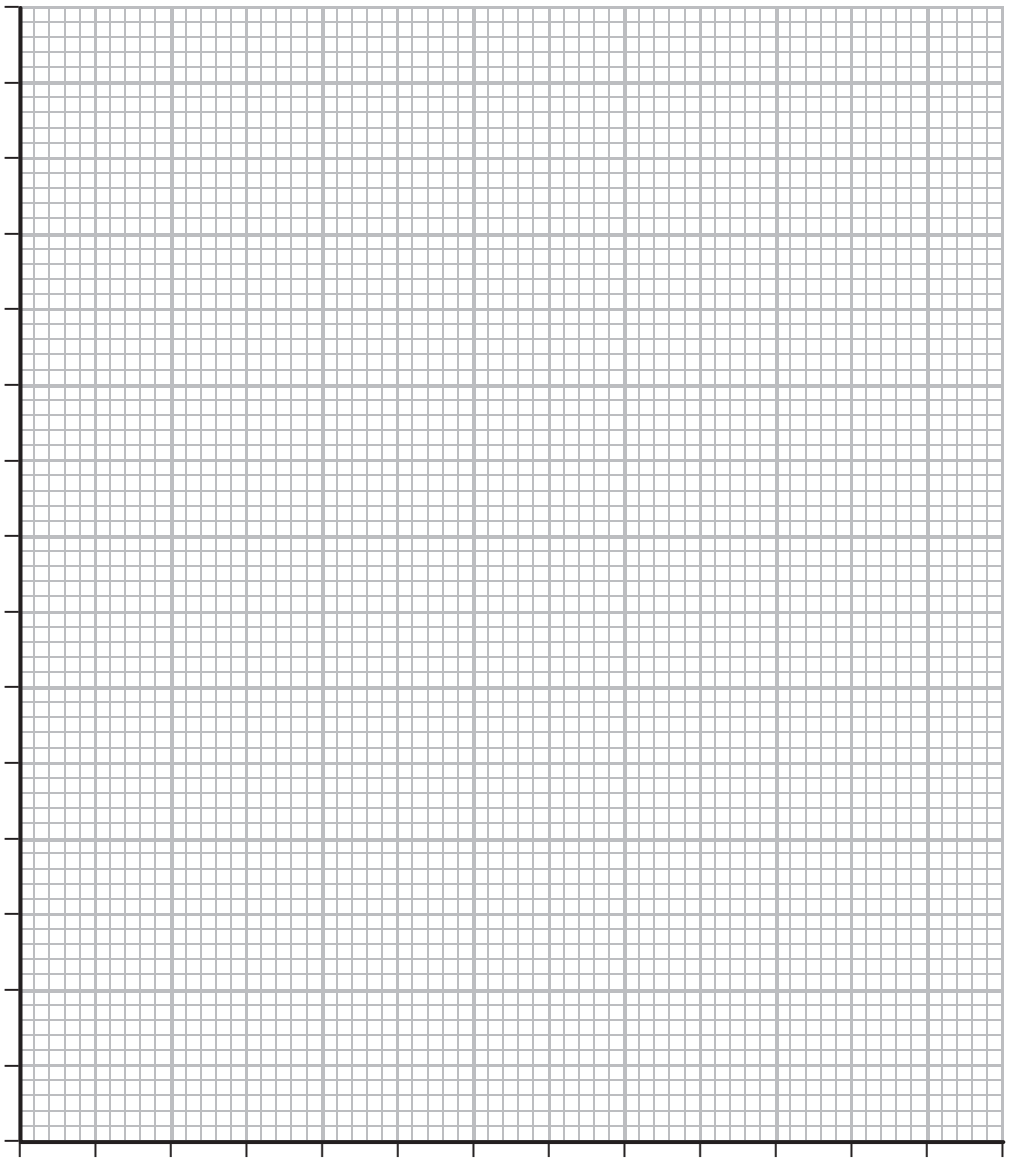
(Total for Question 7 = 9 marks)

8 The data show the mean temperature in central England during thirteen periods of 25 years. The midpoint of each period is shown.

Midpoint of period	Mean temperature in °C
1695	8.63
1720	9.33
1745	9.10
1770	9.17
1795	9.03
1820	9.13
1845	9.08
1870	9.19
1895	9.08
1920	9.31
1945	9.58
1970	9.49
1995	10.05

(a) Plot the data on the grid, using straight lines to join the points.

(6)



(b) Between which two neighbouring periods was the change in mean temperature the greatest?

(1)

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(c) Some scientists think that the release of greenhouse gases has contributed to these changes in temperature.

(i) Name a greenhouse gas.

(1)

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(ii) What is meant by the term **greenhouse gas**?

(1)

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(iii) Suggest how human activities could be responsible for the change in temperature between 1970 and 1995.

(3)

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(Total for Question 8 = 12 marks)

9 Plants and animals can reproduce asexually and sexually.

(a) Give an example of a way that plants can reproduce asexually.

(1)

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(b) Complete the table showing features of sexual reproduction in plants and animals.

(3)

Feature	Sexual reproduction in plants	Sexual reproduction in animals
male gametes	pollen nucleus	
site of fertilisation		

(c) Suggest why the number and size of human male gametes differs from the number and size of human female gametes.

(2)

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(Total for Question 9 = 6 marks)

10 During photosynthesis, plants absorb carbon dioxide through their leaves.

(a) Describe how the structure of a leaf is adapted to absorb carbon dioxide.

(3)

(b) Write the balanced chemical equation for photosynthesis.

(2)

(c) A simple controlled experiment can be carried out to show that a plant leaf produces starch when exposed to light.

(i) At the start of the experiment, all of the starch should be removed from the leaf.

Suggest how this could be done.

(1)

(ii) Describe the control you would set up in this experiment.

(1)

(iii) Describe how you would test a leaf for starch.

Include the safety precautions you would take and the results you would expect to see.

(3)

(Total for Question 10 = 10 marks)

11 (a) Some nuclear power stations take in cold water from the sea and use it to cool their reactors. The warmed water is released back into the sea. This can cause thermal pollution because the increased water temperature has an effect on the concentration of dissolved oxygen.

The table shows the effect of water temperature on the concentration of dissolved oxygen.

Water temperature in °C	Concentration of oxygen in mg per litre
5	12.37
10	10.92
15	9.76
20	8.84

(i) Calculate the percentage change in concentration of oxygen when the water temperature rises from 10 °C to 15 °C. Show your working.

(2)

Answer = ...%

(ii) Use information from the table to explain why it would be unlikely for a fish farm to be situated near a power station.

(2)

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(b) The table lists some methods used to produce large numbers of fish on a fish farm.

Complete the table by stating how each method helps to increase fish production.

(3)

Method	How method increases fish production
adding antibiotics to the water	
using nets to cover tanks	
feeding small quantities of food frequently	

(c) Fish are a good source of protein in the human diet.

Describe what happens to fish protein in the gut of a human.

(5)

(Total for Question 11 = 12 marks)

12 One of the characteristics of living organisms is the ability to respond to a change in their surroundings.

In mammals, such as humans, responses are controlled by nervous or hormonal communication.

(a) ADH is an example of a hormone.

(i) Where is ADH produced?

(1)

(ii) Describe the effects of ADH in the body.

(3)

(b) Describe **two** ways in which nervous communication differs from hormonal communication.

(2)

1

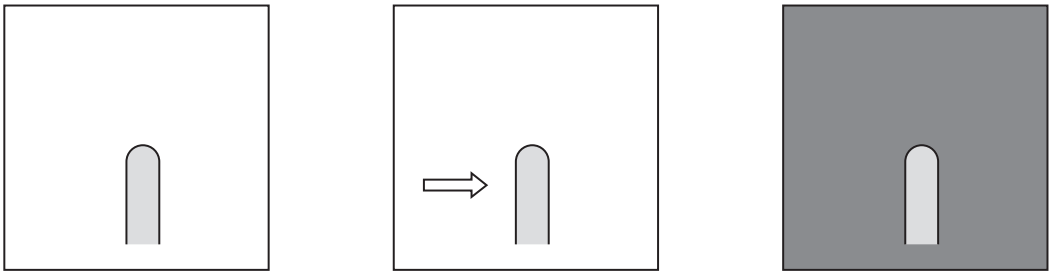
2

(c) Plants are also able to respond to their surroundings. The diagram shows young cereal shoots (coleoptiles) which are placed in different light conditions.

Complete the diagram to suggest how each of the shoots would appear after two days.

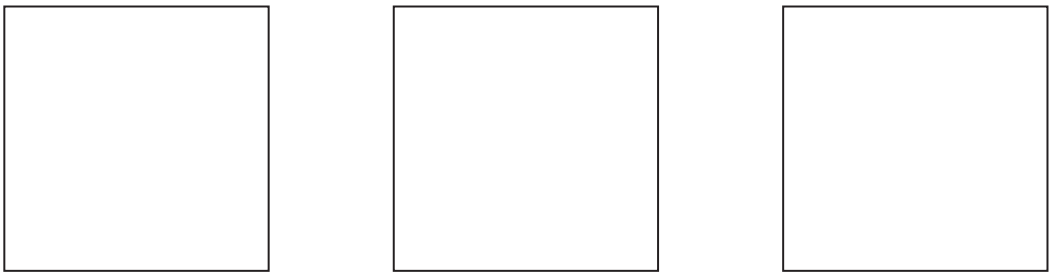
(3)

At start



light from all around | light from left side | darkness

After two days



(d) Plant roots also respond to external stimuli.

Describe the response of roots to gravity and explain how this response benefits the plant.

(3)

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(Total for Question 12 = 12 marks)

TURN OVER FOR QUESTION 13

13 Describe an investigation to find out if keeping chickens indoors increases their growth.

(6)

(Total for Question 13 = 6 marks)

TOTAL FOR PAPER = 120 MARKS