

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

4483/02

BIOLOGY

**BIOLOGY 3
HIGHER TIER**

A.M. TUESDAY, 14 May 2013

1 hour

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	9	
2.	6	
3.	3	
4.	6	
5.	6	
6.	7	
7.	9	
8.	8	
9.	6	
Total	60	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication used in your answer to question **4** and question **9**.

Answer all questions.

1. The photograph below shows a tomato plant.



- (a) Some of the sugar made in photosynthesis is transported to the tomato fruits.

State the name of the tissue in plants that transports sugar.

[1]

.....

- (b) (i) Siân grows tomato plants. She decides to use a fertiliser called Topgrow. The label from a bottle of Topgrow is shown below.

TOPGROW FERTILISER	
CONCENTRATED NUTRIENT SOLUTION	
Dilution:	1 part Topgrow: 200 parts water
Contents of bottle:	500 cm ³

Using the instructions for use shown on the label, calculate the volume of diluted Topgrow that can be made from the contents of one bottle.

..... [2]

- (ii) Siân carried out a trial to find out the effect of using Topgrow on the tomato plants.
She used tap water only on half the plants and diluted Topgrow on the rest.

What else should Siân have done to make sure that the trial was a fair test? [2]
Give **two** suggestions.

I.

II.

- (iii) The table shows some of the results of the trial.

treatment	mean yield (mean mass of tomatoes per plant) (kg)	mean number of tomatoes per plant	mean mass per tomato (g)
tap water	4.8	40	120
Topgrow	5.2	65

- I. Complete the table above by calculating the mean mass per tomato (in g) for Topgrow. [1]

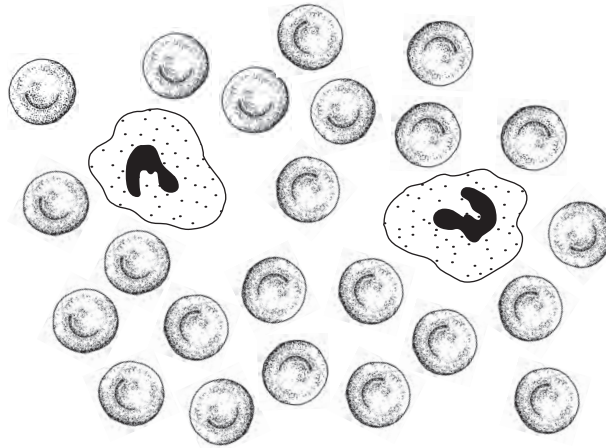
- II. Siân was pleased with the effect of Topgrow on yield. Suggest why Siân was still disappointed with the results. [1]

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- (c) Apart from nitrates, give the names of **two other** nutrients required for healthy plant growth.

..... and [2]

2. The diagram shows a blood smear as seen through a light microscope.



(a) Complete the table below about the different parts of the blood.

[4]

name of part	function
red cell
.....	produce antibodies
phagocyte
platelets

(b) Explain why the centre of a red blood cell appears paler than the surrounding cytoplasm when seen through a light microscope. [2]

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6

- 3. The photograph shows part of a factory used for the large scale production of a protein called mycoprotein.



The production of protein in a factory has several advantages over traditional methods such as farming cattle. For example:

- production is relatively rapid
- over a long period of time, production may be cheaper

State **three other** advantages of producing protein in a factory over the farming of cattle. [3]

I.

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II.

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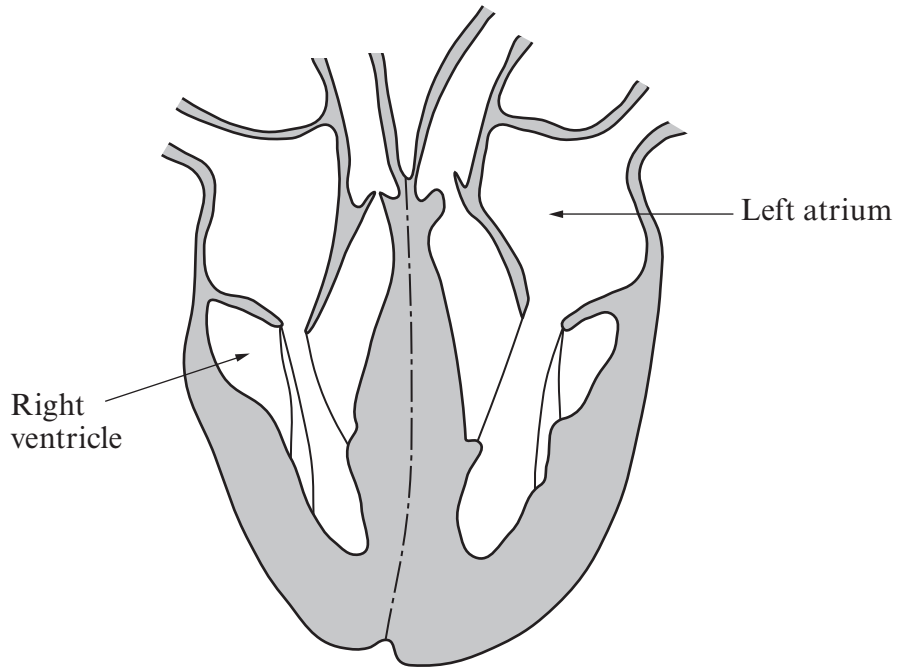
III.

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4. The diagram shows the human heart in section.



Describe and explain how blood in the right ventricle travels to the left atrium. [6 QWC]

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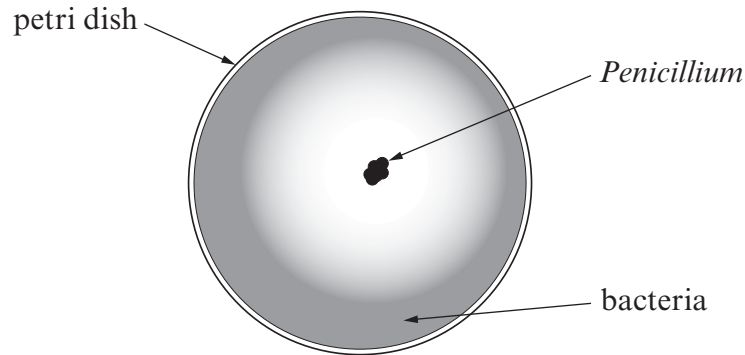
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- 5. In 1928, Alexander Fleming found a fungus called *Penicillium* in a petri dish containing a culture of bacteria growing on agar jelly. The diagram shows what he observed.



Fleming made two conclusions.

- 1. A chemical released from *Penicillium* was harming the bacteria.
- 2. The chemical was diffusing through the jelly.

- (a) What is the evidence in the diagram for each conclusion? [2]

Conclusion 1

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Conclusion 2

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- (b) The chemical found in *Penicillium* was extracted and is known as penicillin.

- (i) What name is given to types of drugs such as penicillin? [1]

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- (ii) Why has penicillin become less effective at killing bacteria in recent years? [2]

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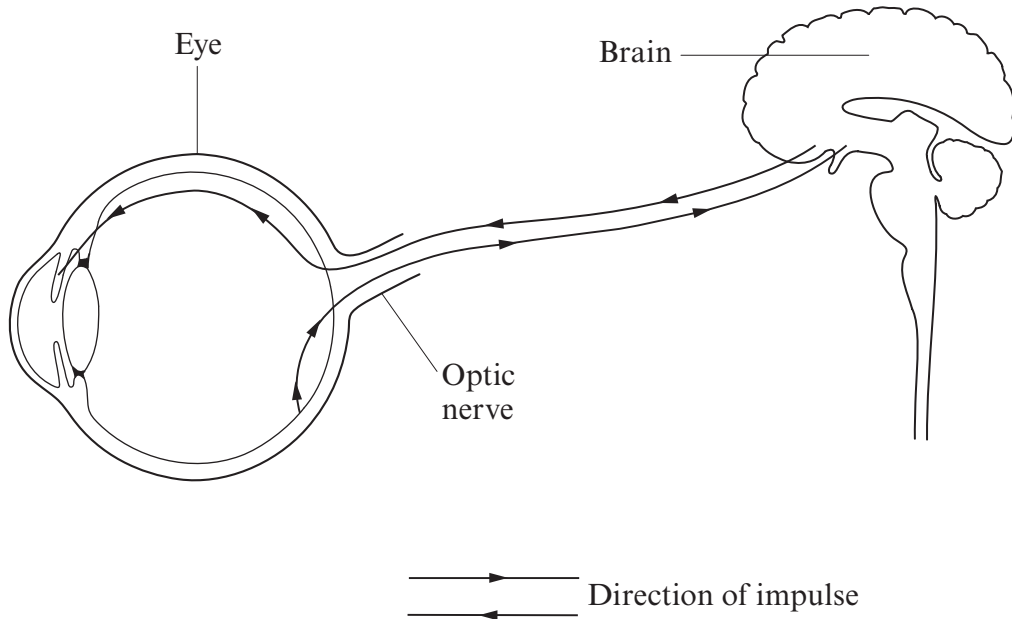
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- (c) MRSA has become a serious problem in hospitals. Describe **one** effective control measure used in hospital against MRSA. [1]

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6. The diagram shows the pathway taken by nerve impulses which help to bring about changes in the diameter of the pupil.



(a) On the diagram above, use an arrow to label the motor neurone. [1]

(b) Name [3]

(i) the stimulus which causes a change in the diameter of the pupil,

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(ii) the receptor which receives the stimulus,

.....

(iii) the effector which causes the decrease in the diameter of the pupil.

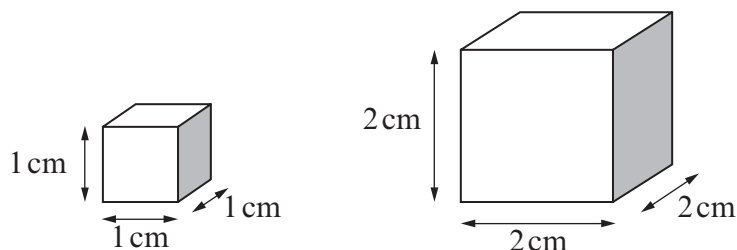
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(c) Describe how the decrease in diameter of the pupil demonstrates the three most important features of a reflex action. [3]

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7. An investigation was carried out to find the effect of surface area: volume ratio on the rate of absorption in plants. Cubes of potato were cut to the following sizes.



$$\text{Surface area} = 6 \text{ cm}^2$$

$$\text{Volume} = 1 \text{ cm}^3$$

$$\text{Surface area} = 24 \text{ cm}^2$$

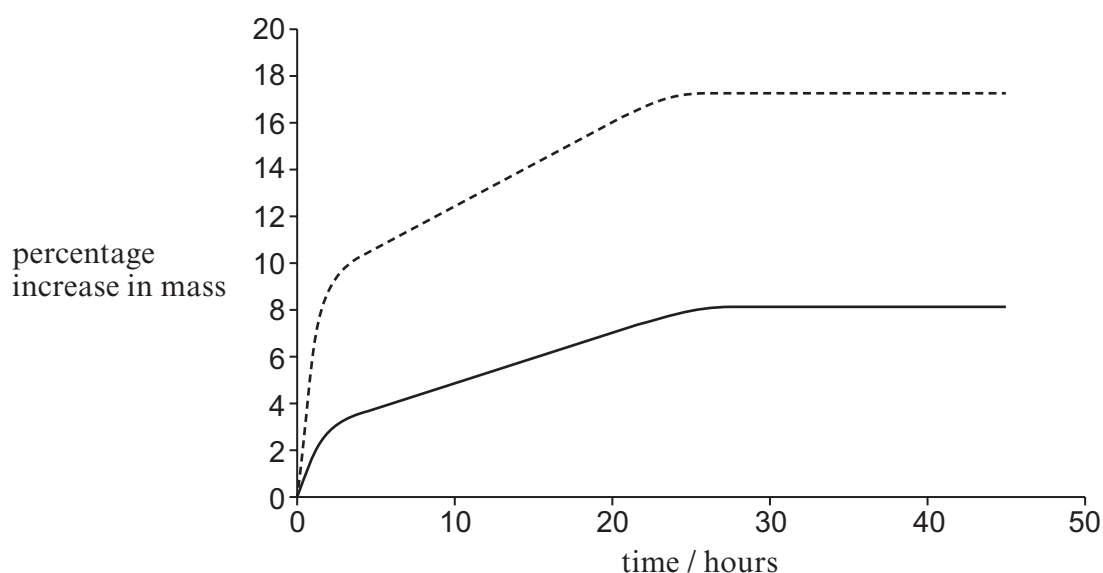
$$\text{Volume} = 8 \text{ cm}^3$$

The cubes were carefully blotted dry, weighed and their masses recorded.

One cube, $2 \text{ cm} \times 2 \text{ cm} \times 2 \text{ cm}$, was put into a beaker and completely covered with distilled water.

Eight cubes, each measuring $1 \text{ cm} \times 1 \text{ cm} \times 1 \text{ cm}$, were put into another beaker and completely covered with distilled water.

At regular intervals for a period of 45 hours, the cubes were removed from the beakers, blotted dry, reweighed and then replaced into fresh distilled water. The percentage increase in mass was measured for the eight cubes of side 1 cm and the one cube of side 2 cm. The results are shown in the graphs below.



key

----- 8 cubes of side $1 \text{ cm} \times 1 \text{ cm} \times 1 \text{ cm}$

————— 1 cube of side $2 \text{ cm} \times 2 \text{ cm} \times 2 \text{ cm}$

(a) State why **eight** cubes of sides, $1\text{ cm} \times 1\text{ cm} \times 1\text{ cm}$ were used in this investigation. [1]

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(b) (i) Name the process which caused the cubes to gain mass. [1]

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(ii) Describe the process by which the cubes of potato gained mass. [3]

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(iii) Use the evidence gained by the investigation to describe the importance of root hairs in the absorption of water from the soil. [3]

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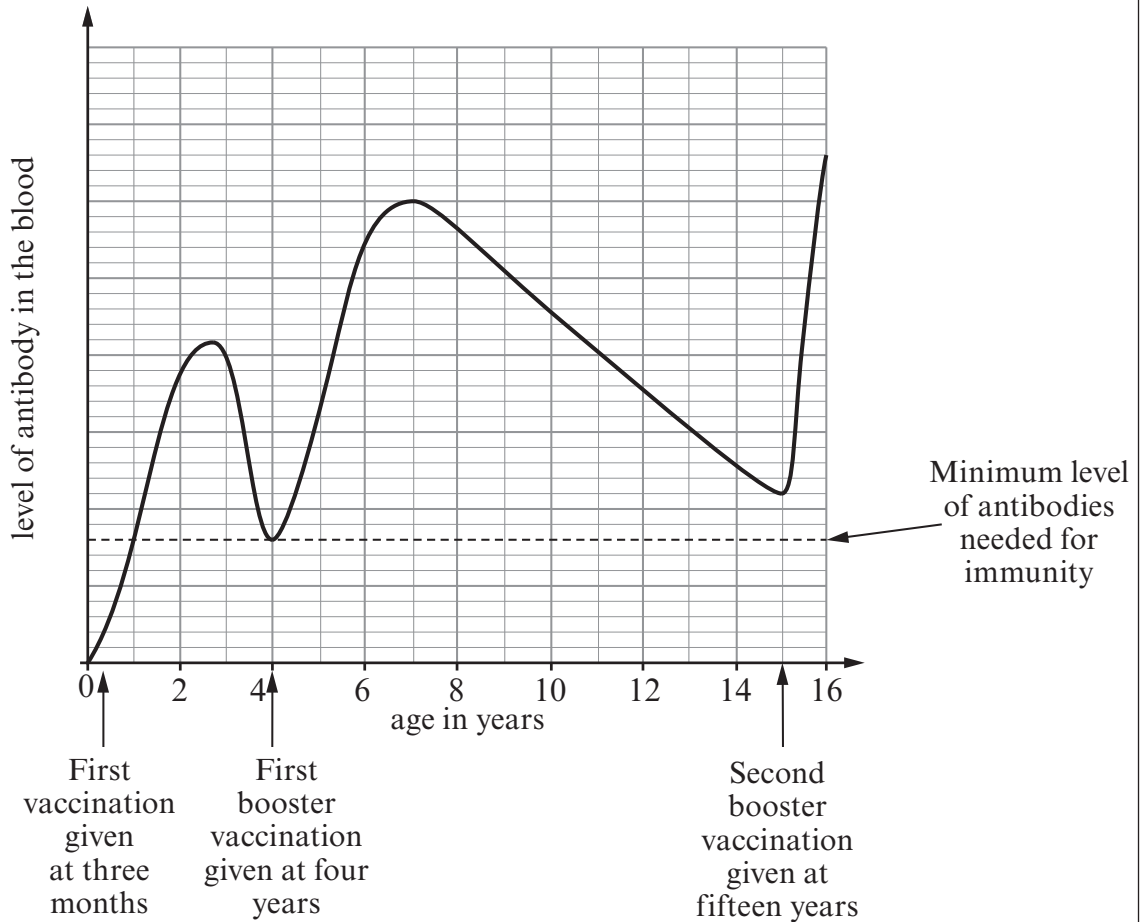
(c) Name the process by which mineral salts are absorbed into the roots of plants. [1]

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8. Immunity against Polio is created by a series of vaccinations. The first is given at age 3 months and it is followed by a series of ‘booster’ vaccinations.

The following graph gives information about these vaccinations.



- (a) Use the graph and your knowledge to
- (i) State the age range during which a person is most likely to suffer from Polio. [1]
-
- (ii) Describe how the immune system reacts to ‘booster’ vaccinations. [5]

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(b) Smallpox is caused by a virus. Due to worldwide vaccination it is now considered to be extinct.

(i) Name the 18th century English doctor who was the first to use vaccination to prevent smallpox in Britain. [1]

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(ii) Suggest why the flu virus has not become extinct even though vaccines are used to prevent it. [1]

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8

TURN OVER FOR QUESTION 9

9. Explain how anti-diuretic hormone (ADH) helps the kidneys regulate the water content of the blood. [6 QWC]

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