

Monday 6 November 2017 – Afternoon

**GCSE TWENTY FIRST CENTURY SCIENCE
BIOLOGY A / ADDITIONAL SCIENCE A**

A162/02 Modules B4 B5 B6 (Higher Tier)

Candidates answer on the Question Paper.
A calculator may be used for this paper.

OCR supplied materials:

None

Other materials required:

- Pencil
- Ruler (cm/mm)

Duration: 1 hour



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the barcodes.

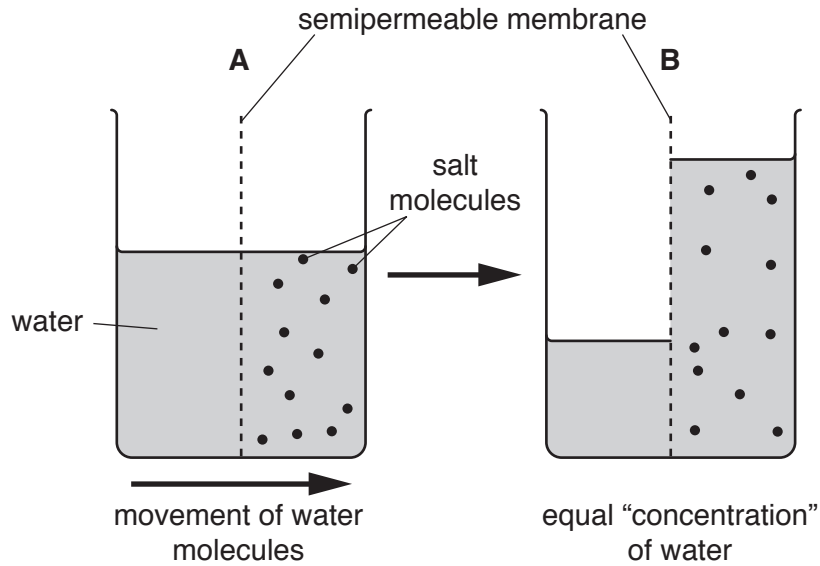
INFORMATION FOR CANDIDATES

- Your quality of written communication is assessed in questions marked with a pencil (✎).
- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- This document consists of **16** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Jenny is a student. She is surfing the internet.

She discovers this diagram.



(a) Write down the name of the **process** that is shown in the diagram.

..... [1]

(b) Use the diagram above to explain how the process works.

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..... [4]

(c) Jenny thinks the diagram could be improved.

Evaluate the diagram and suggest how Jenny could improve it to accurately represent the process.

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..... [2]

(d) Suggest how Jenny and her classmates could check that the process works as shown in the diagram.

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..... [2]

[Total: 9]

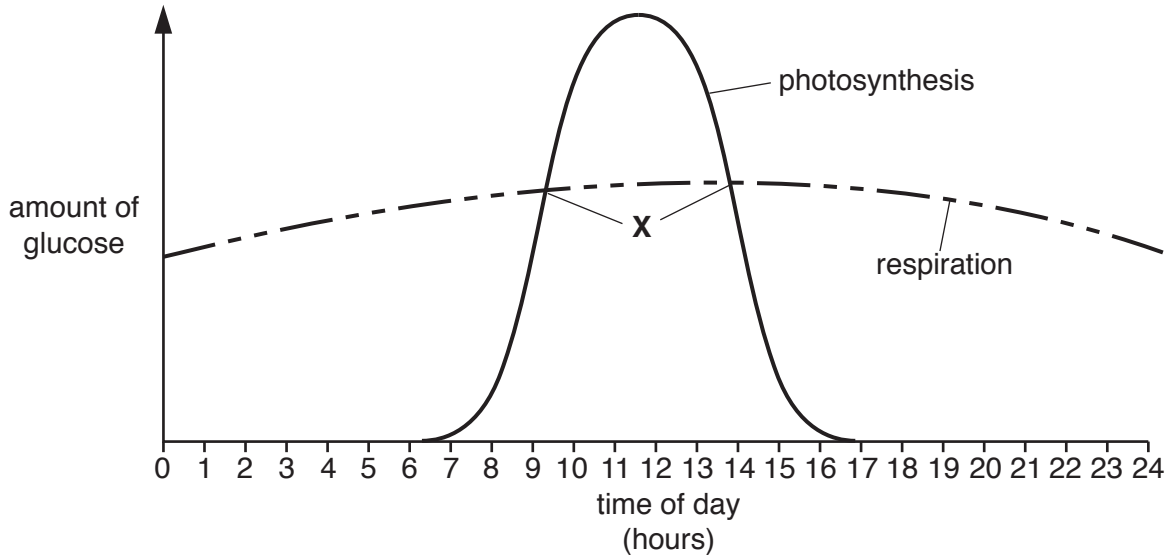
PLEASE DO NOT WRITE ON THIS PAGE

3 Green plants carry out both photosynthesis and respiration.

The graph shows some data for a plant.

It shows:

- how much glucose is being used by respiration
- how much glucose is being produced by photosynthesis.



(a) Explain what is happening in the plants at the points on the graph labelled with an X.

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..... [2]

(b) Two students look at the graph.

Amelia
The maximum rate of photosynthesis is higher than respiration so this plant will survive.

Joshua
I am not sure that this is true. I think this plant will run out of glucose and die.

Discuss which student is correct.

Use the information from the graph to help you to answer.

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..... [4]

(c) The amount of glucose used is a measure of the rate of respiration.

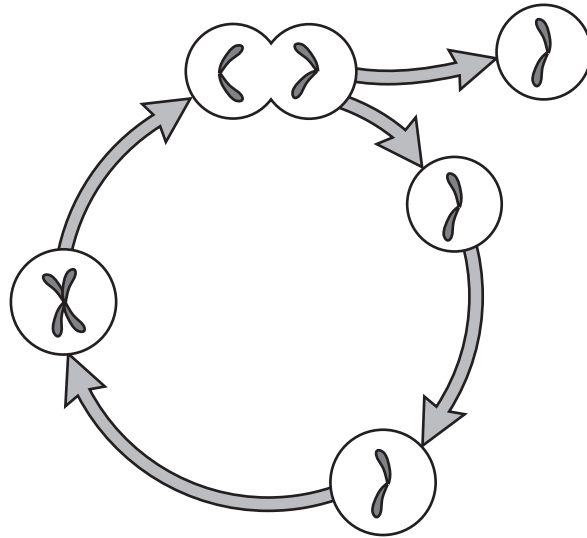
Suggest **two** other ways that the rate of respiration in a plant can be measured.

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..... [2]

[Total: 8]

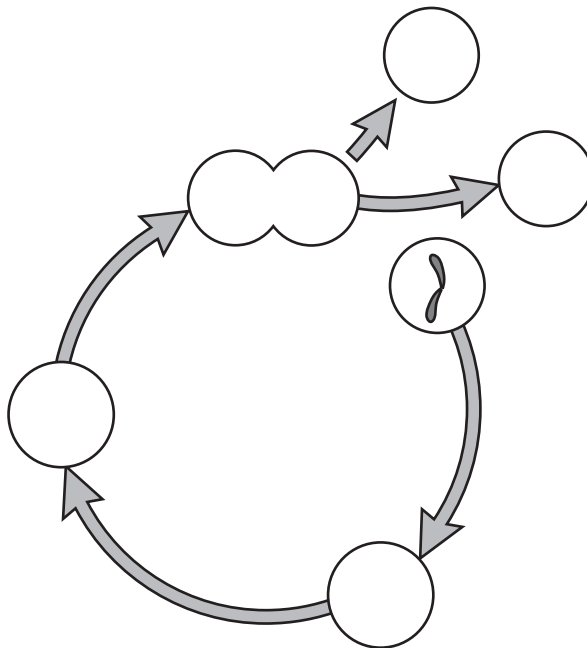
4 This question is about mitosis.

The diagram shows the cell cycle.



(a) Drugs such as colchicine can prevent copies of the chromosome from separating.

Complete the diagram to show what you think would happen during the cell cycle if the drug colchicine had been used.



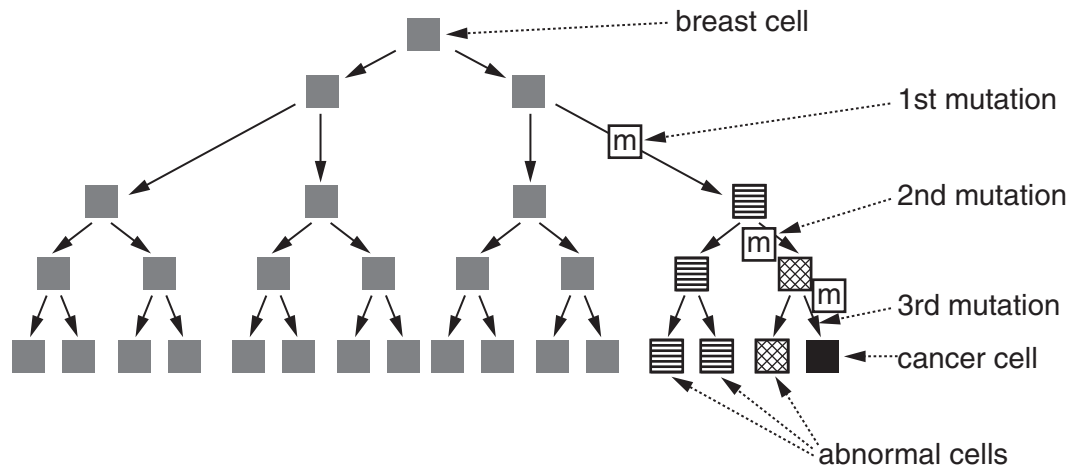
[2]

(b) Uncontrolled cell division can produce cancer.

Changes in the DNA during mitosis are called mutations.

Mutations in a breast cell can cause it to become cancerous.

The diagram shows what can happen when breast cells divide.



(i) What conclusions can you make about the **abnormal** cells in the diagram?

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..... [3]

(ii) A single cancer cell can divide into two cancer cells every 8 hours.
 How long would it take for one cancer cell to produce a group of 64 cancer cells?
 Show your working.

..... [2]

(iii) To increase the chance of successful treatment, cancer needs to be discovered early.
 Use the information from **part (ii)** to explain why.

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..... [2]

(c) Scientists do lots of research into cell division.

(i) Government regulations are much stricter when scientists experiment on embryos, than when they experiment on single body cells.

Suggest and explain why.

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..... [2]

(ii) Some people agree with experimenting on embryos.

Other people do not.

Suggest why some people agree and others do not.

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(iii) Science cannot answer all of society's questions.

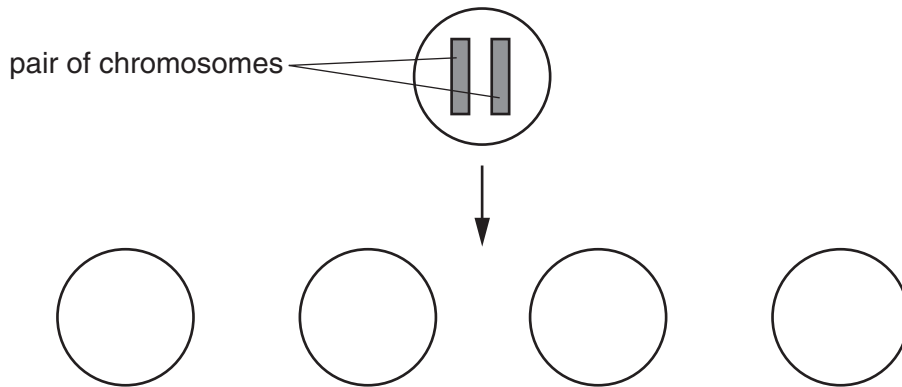
Put ticks (✓) in the boxes next to the **three** questions that **can** possibly be answered by science.

- Should research be carried out on human embryos?
- How do chromosomes separate during meiosis?
- Is it wrong to use stem cells from adults?
- How many weeks after fertilisation is it wrong to experiment on embryos?
- What level of risk should a scientist take before stopping an experiment?
- How do different drugs affect cell division?
- Why can stem cells develop into any other types of tissue?

[2]

(d) Meiosis is a different kind of cell division to mitosis.

(i) Complete the diagram of the nuclei to show the chromosomes after a cell has divided by **meiosis**.



[1]

(ii) Describe **two** ways in which meiosis is different from mitosis.

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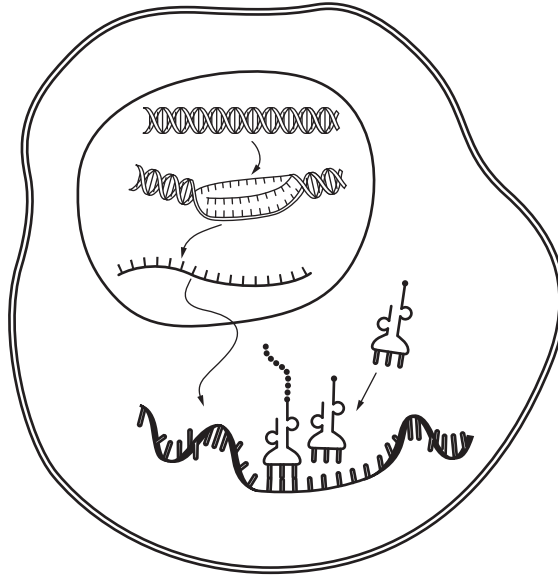
[Total: 18]

5 DNA codes for making proteins.

A student draws this diagram.

Use the diagram to explain how DNA causes the production of proteins.

You may label the diagram to help your answer.



The quality of written communication will be assessed in your answer.

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..... [6]

[Total: 6]

6 Stefan is studying how we learn.

(a) Which of these statements describe how learning is able to take place?

Put ticks (✓) in the boxes next to the **two** correct answers.

Some pathways in the brain become more likely to transmit impulses than others.

The cells in the brain grow new types of neurons as learning takes place.

Some synapses are removed.

New neuron pathways form.

A different type of neurotransmitter is produced.

[2]

(b) Stefan knows that we are more likely to remember information if:

- it is repeated
- it has a pattern
- there is a strong stimulus associated with it.

Describe one example for each of the three bullet points in aiding learning.

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..... [3]

(c) Stefan reads about language development in feral children.

Stefan wants to do experiments to research this topic.

Explain the problems of experimenting on this topic.

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..... [2]

[Total: 7]

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).

A large area of lined paper for writing. It features a vertical solid line on the left side, creating a margin. The rest of the page is filled with horizontal dotted lines, providing space for writing answers.

A large area of the page is reserved for writing, featuring a vertical solid line on the left side and horizontal dotted lines extending across the page.



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