OCR
Oxford Cambridge and RSA

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Monday 6 November 2017 – Afternoon

GCSE TWENTY FIRST CENTURY SCIENCE BIOLOGY A / ADDITIONAL SCIENCE A

A162/01 Modules B4 B5 B6 (Foundation 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

* A 1 6 2 0 1 *

* 2 7 4 8 3 9 9 7 3 1 *

Candidate forename		Candidate surname	

Centre number						Candidate number				

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.

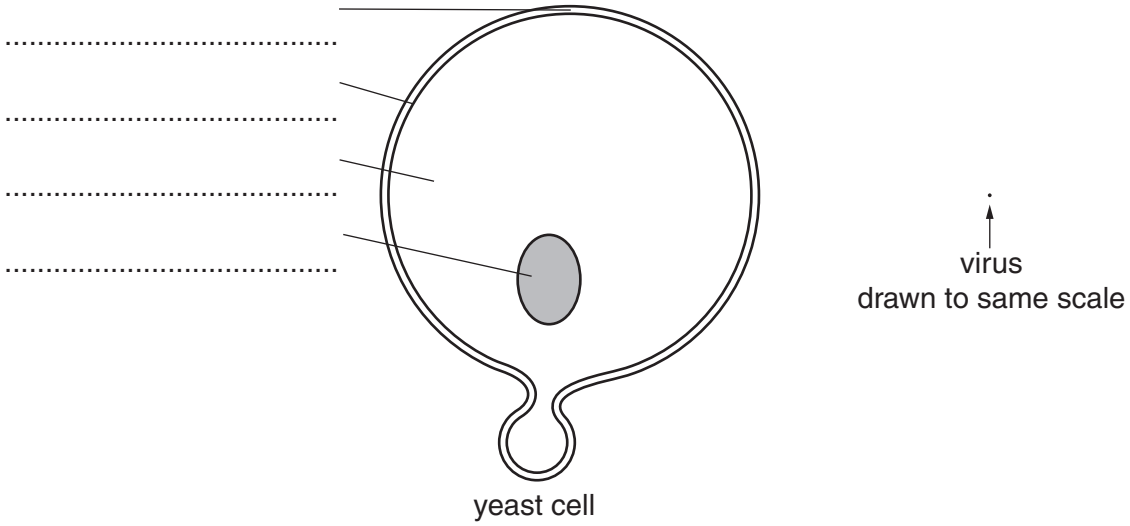
INFORMATION FOR CANDIDATES

- The 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 A student draws a yeast cell that she sees through a microscope.

The diagram also shows a virus drawn to the same scale for comparison.



(a) Complete the diagram above by adding labels.

Use words from this list.

nucleus **cytoplasm** **cell wall** **cell membrane**

[2]

(b) Complete the student's diagram by drawing a **mitochondrion** in the yeast cell. **[2]**

(c) Draw straight lines to join the names of the **structures** to the **job** that they do.

One has been done for you.

structure	**job**
nucleus	Where enzymes are made.
cytoplasm	Contains the genetic code.
cell wall	Where aerobic respiration takes place.
cell membrane	Allows some chemicals to pass through but not others.
mitochondria	Protects and holds the cell together.

[3]

(d) The actual width of the yeast cell is 0.005 mm.

(i) Use a ruler to measure the maximum width in mm of the yeast cell in the diagram.

width of yeast cell in diagram = ... mm **[1]**

(ii) Calculate the magnification of the student's diagram.

Use this equation.

$$\text{magnification} = \frac{\text{width of yeast cell in diagram}}{\text{actual width of yeast cell}}$$

magnification of student's diagram = ... **[2]**

(e) Estimate the size of the virus compared to the yeast cell.

Put a (ring) around the best answer.

double **one half** **one tenth** **one thousandth**

[1]

(f) Viruses were not discovered until a long time after yeast cells.

A student makes a list of possible reasons why.

Only **one** reason can be concluded from the data in the diagram.

Put a tick (✓) in the box next to this correct reason.

There are fewer viruses than yeast cells. ☐

Viruses were too small for the simple microscopes to see. ☐

Viruses cause diseases such as influenza. ☐

Viruses invade cells of living organisms. ☐

[1]

[Total: 12]

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2 The rate of photosynthesis in plants varies.

Describe all the factors that affect the rate of photosynthesis in plants.

Explain why these factors can affect the rate.

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

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..... **[6]**

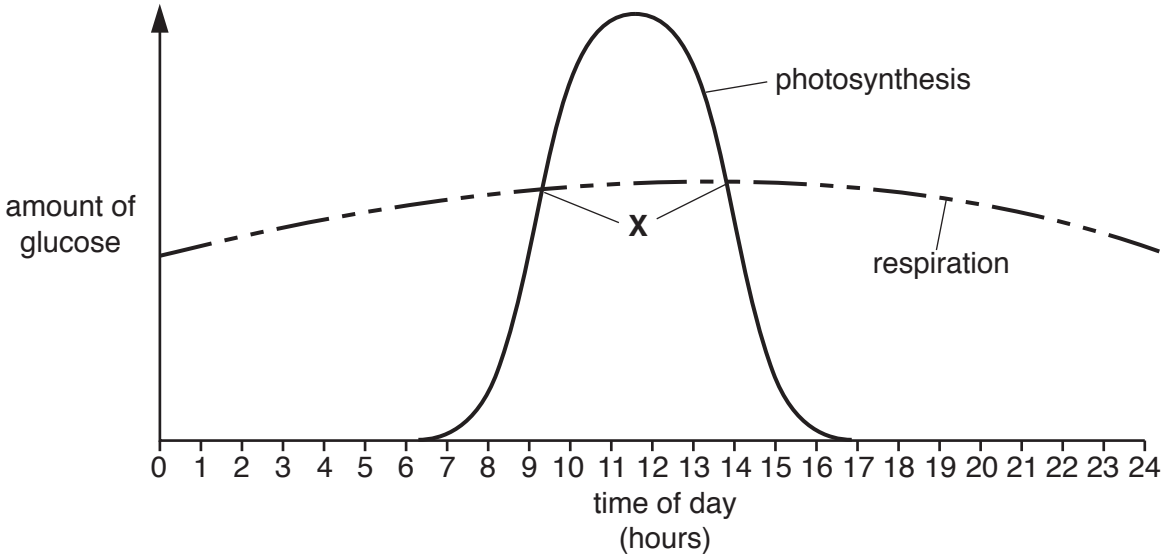
[Total: 6]

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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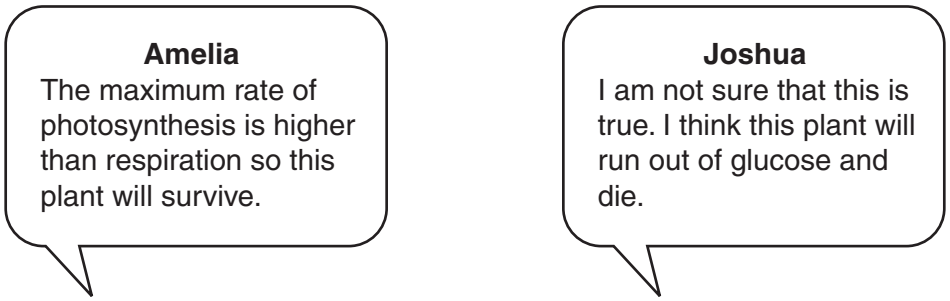
..... **[2]**

(b) Two students look at the graph.



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 Organisms produce new cells by cell division.

A scientist called Theodore Boveri made the link between the behaviour of chromosomes during cell division, and the rules of inheritance.

(a) Which scientific skills were needed by Boveri to make his conclusion?

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

Getting lots of qualifications from different universities.	☐
Producing an explanation that accounts for observations.	☐
Using creative thinking to develop an explanation.	☐
Explaining his work to other people.	☐
Earning enough money to fund the research.	☐

[2]

(b) Not everyone agreed with Boveri's conclusion.

Mary
I will believe it when another scientist repeats Boveri's experiments.

Sanjit
I agree with Boveri but I will change my mind if another scientist proves him wrong.

Stefan
Boveri did not assess the risks of his experiments.

Susan
Boveri's data may be interpreted in more than one way.

(i) Who is suggesting a plausible reason why scientists may disagree?

..... **[1]**

(ii) Which two people are talking about peer review?

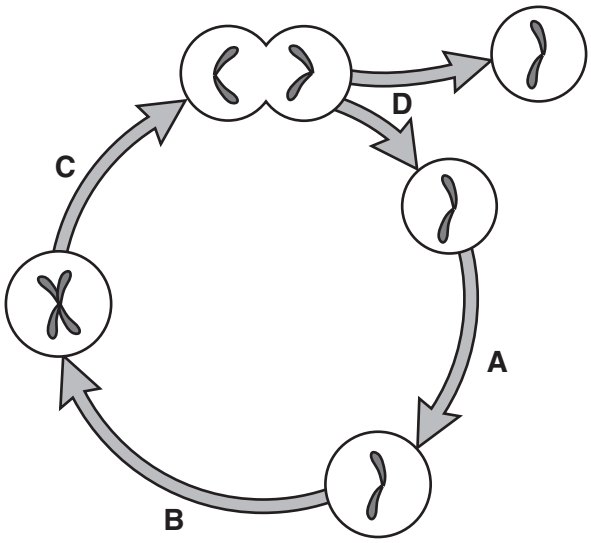
..... and ..... **[1]**

(iii) Who is talking about the consequence of new data that does **not** support Boveri's conclusion?

..... **[1]**

(c) Scientists now know a lot more about the behaviour of chromosomes during cell division.

The diagram shows the cell cycle.



Draw straight lines to join each **stage** of the cell cycle to its correct **description**.

stage	description
A	cell divides
B	chromosomes separate
C	chromosomes are copied
D	number of cell organelles increases

[3]

(d) Scientists now know that chromosomes contain DNA.

DNA has four different bases, **A**, **T**, **C** and **G**.

The bases code for the production of proteins.

Which of these statements about the bases are correct?

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

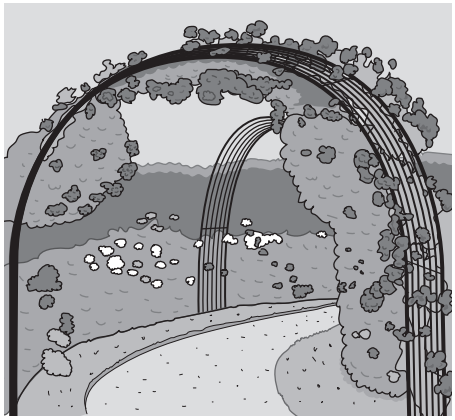
C pairs with **G**.	☐
It is the colour of the bases that codes for a protein.	☐
G never pairs with **A**.	☐
It is the order of the bases that codes for a protein.	☐
T always pairs with another **T**.	☐
It is the number of bases that codes for a protein.	☐
Each base can pair with any other base.	☐

[3]

[Total: 11]

5 Some plants are climbing plants.

They use other plants and structures for support and can grow very high.



Write about the position and job of **meristems** and why they are so active in climbing plants.

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

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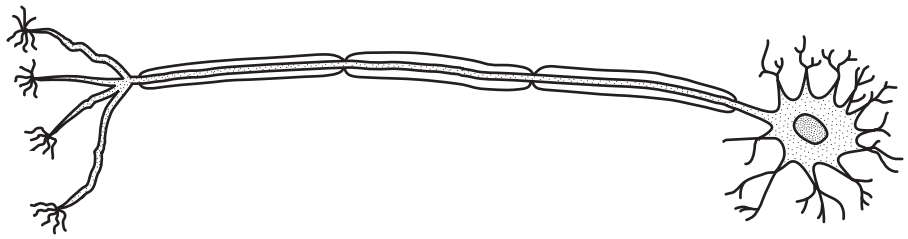
..... **[6]**

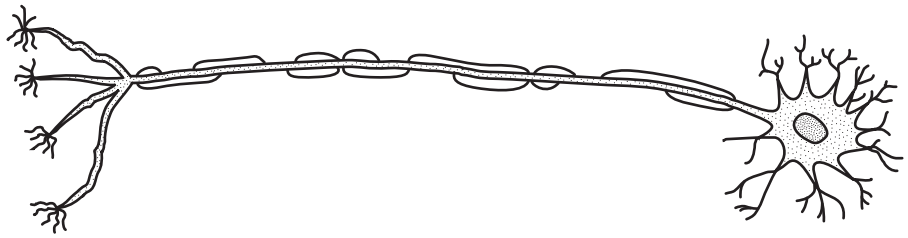
[Total: 6]

6 Jake has a disease that affects both his sensory and motor neurons.

This is a healthy motor neuron.



This is one of Jake's diseased motor neurons.



(a) (i) Which part of Jake's neuron has been damaged?

Put a (ring) around the correct answer in this list.

axon **cytoplasm** **fatty sheath** **nucleus**

[1]

(ii) Suggest why the damage will have an effect on the function of the neuron.

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..... **[2]**

(b) Use your answer from part **(a)** to predict **two** different symptoms that Jake may get with this disease.

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..... **[2]**

(c) Jake's doctor offers him a new type of drug treatment.

(i) His doctor tells him that no drug treatment is risk free.

Suggest why it is not possible for any treatment to be completely risk free.

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..... **[1]**

(ii) Jake needs to decide whether to have the new treatment.

What should Jake consider before making his decision?

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..... **[2]**

(iii) Suggest **three** ways that Jake could reduce the risk from the new treatment.

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..... **[3]**

[Total: 11]

7 Memory can be affected when injury occurs to the brain.

Explain what memory is and use a model to explain how memories may be formed. Suggest how injury could affect memory.

You may draw a labelled diagram as part of your answer.

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

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..... **[6]**

[Total: 6]

END OF QUESTION PAPER

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).