

Friday 5 June 2015 – 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. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

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 Coral reefs are found in tropical seas.

They are made by living organisms called reef-building corals.

Reef-building corals have a symbiotic relationship with microscopic algae. Algae are single-celled plants.

In a symbiotic relationship both organisms **benefit** from each other.

Algae can photosynthesise.

(a) During photosynthesis, the algae make glucose.

(i) Algae can convert glucose into other substances.

Name **two** of these substances.

1

2

[2]

(ii) Some of the glucose is passed from the algae to the coral.

Suggest what the algae gain in return.

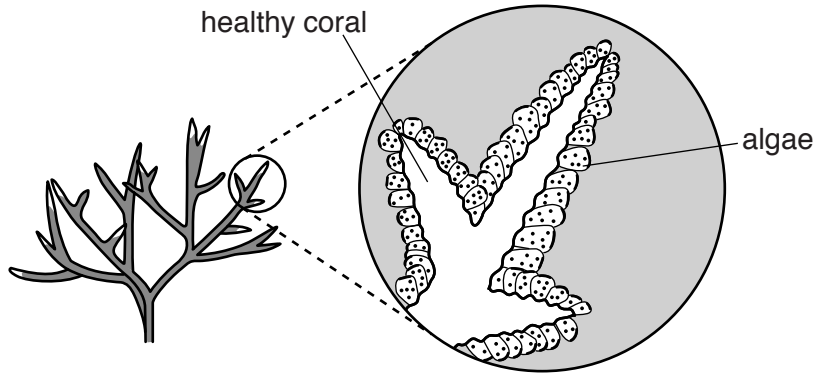
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..... [2]

(b) Scientists have found that some algae in coral are dying.

This is thought to be caused by increases or decreases in sea temperature.



Photosynthesis is controlled by enzymes.

Explain how changes in sea temperature can result in the algae dying.



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

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[6]

(c) Some scientists think that temperature changes are killing the algae.

Other scientists think that increased UV light could be the cause.

How would scientists show whether UV light or temperature change is the cause of the algae dying in their natural habitat?

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..... [3]

(d) Scientists publish their findings in peer-reviewed journals.

Which statements about peer review are correct?

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

Peer review is when the public evaluate the data.

Peer review is when scientists evaluate the data of other scientists.

Peer review is when both the public and scientists evaluate the data.

Peer review allows the public to keep up to date with the latest findings.

Peer review gives greater confidence in the findings.

Peer review means the scientists get paid.

[2]

[Total: 15]

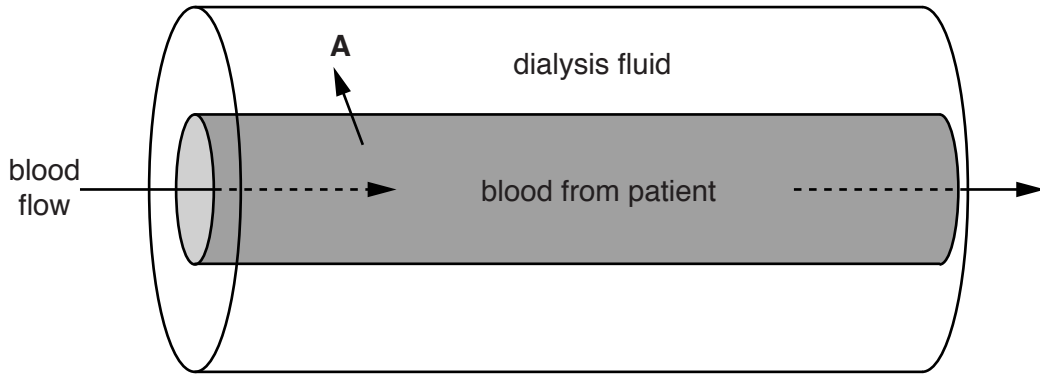
2 The kidneys remove waste products, such as urea, from the blood.

People with kidney failure cannot remove the urea from their blood.

These people need dialysis treatment.

During dialysis, blood from a patient passes through a dialysis machine.

The diagram shows a section of the dialysis machine.



(a) Arrow **A** shows the movement of urea out of the blood into the dialysis fluid as it passes through the dialysis machine.

The dialysis fluid is changed regularly so that the concentration of urea is kept very low.

Suggest why this is important.

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..... [3]

(b) The amount of blood flowing through the machine is 600 ml in each minute.

Calculate how much blood, in litres, will flow through the machine in 2 hours.

Show your working.

answer =litres [2]

- (c) It is important that the concentration of blood plasma is balanced.

Which **two** statements explain why this is important?

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

If the concentration of the blood plasma decreases, water will move into the red blood cells and they will burst.

The concentration of the blood plasma will not affect blood cells.

If the concentration of the blood plasma rises, water will move out of the red blood cells and they will burst.

Water moves from a dilute solution to a concentrated solution across a partially permeable membrane.

When water moves into red blood cells, they swell but cannot burst.

[2]

- (d) Victoria investigates the effect of different salt concentrations on cells.

Victoria weighs five pieces of potato.

She places one piece of potato into each of five different concentrations of salt solution.

After 20 minutes, she removes the pieces of potato and weighs each of them again.

Her results are shown in the table.

Concentration of the salt solution (mol)	Starting mass (g)	Final mass (g)	Difference in mass (g)	Percentage change in mass (%)
0.1	2.2	2.5	+0.3	
0.2	2.4	2.5	+0.1	+4.17
0.3	3.0	3.1	+0.1	+3.33
0.4	2.1	1.9	-0.1	-4.76
0.5	2.4	2.2	-0.2	-8.33

- (i) Calculate the percentage change for the piece of potato placed in the 0.1 mol salt solution.

Show your working.

Give your answer to two decimal places.

percentage change = % [2]

- (ii) It is better to calculate the percentage change in mass rather than just using the difference in mass.

Explain why.

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..... [2]

- (iii) What conclusion can Victoria make?

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

Potato pieces in concentrations ...

- ... greater than 0.4 mol lose mass.
- ... lower than 0.3 mol do not change mass.
- ... lower than 0.2 mol lose mass.
- ... greater than 0.1 mol do not change mass.

[1]

- (iv) The data in the table can be used to work out the concentration of the cells in the potato pieces.

Use the data to give the range of concentration of the cells.

Range = (mol) to (mol) [2]

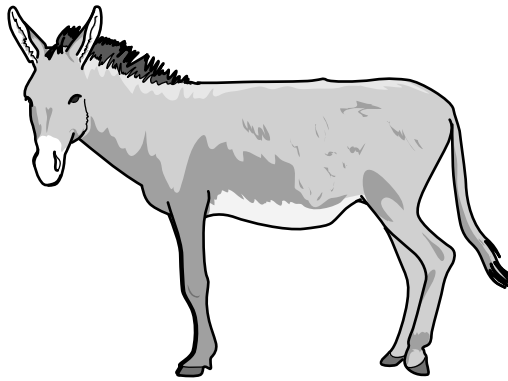
- (e) Victoria wants to improve the quality of her data and to improve her confidence in the conclusions.

Suggest **three** improvements she could make to her procedure.

1
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2
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3
..... [3]

[Total: 17]

3 The offspring of a male donkey and a female horse is called a mule.



A horse has **64** chromosomes in each body cell. A donkey has **62** chromosomes in each body cell.

(a) Complete the boxes below to show how many chromosomes would be found in the gametes (sex cells) in these two species.

	Female horse	Male donkey
Gametes		

[1]

(b) Name the type of cell division that produces gametes.

..... [1]

(c) Most mules are infertile.

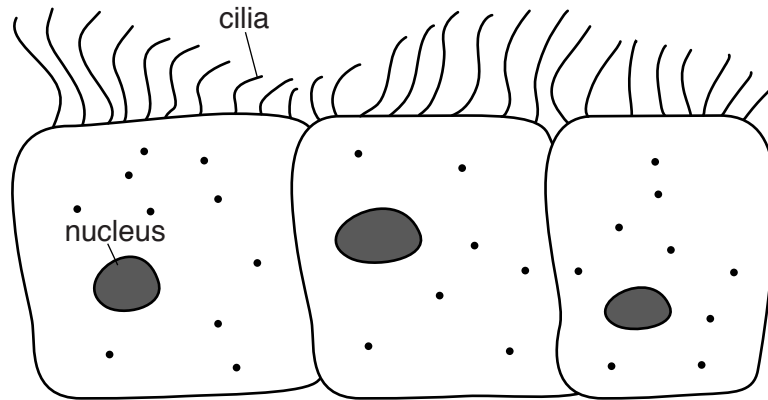
This means that they cannot reproduce.

Use information about chromosome numbers to suggest why.

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..... [2]

[Total: 4]

4 Some specialised cells have cilia.



Cilia are made from proteins.

Cilia are only made by certain cells.

Explain how the proteins in cilia are made and what prevents these proteins being made by all cells.



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

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..... [6]

[Total: 6]

5 Serotonin is a transmitter substance used in synaptic transmission.

Depression is caused by a lack of serotonin.

Antidepressants are drugs prescribed by doctors to treat depression.

Fiona has depression and is prescribed an antidepressant drug.

(a) Describe what happens at a synapse and suggest how the antidepressant affects the synapse.

You may use a labelled diagram in your answer.



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

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..... [6]

(b) The table gives information about drugs **A**, **B**, **C** and **D** that are used to treat depression.

Drug	Information
A	Some people respond to this drug better than other drugs. Do not take if you have high blood pressure.
B	Causes fewer side effects than other drugs. Overdose not likely to be fatal. Do not take if you have epilepsy, diabetes or a kidney disease.
C	Unpleasant side effects. Do not take if you have liver disease or heart disease.
D	Need to avoid red wine. Can lead to high blood pressure.

Use the information in the table to suggest what a doctor needs to consider when prescribing an antidepressant for Fiona.

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..... [2]

[Total: 8]

6 Oxana was a feral child.

From the age of three, she lived with dogs.

At the age of eight she was found living in the wild. She could hardly speak.

(a) (i) What is the name of the part of the brain associated with language?

..... [1]

(ii) Oxana learned how to speak.

Some children who were once feral may never learn to speak.

Suggest why.

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..... [1]

(b) Scientists use MRI scans and electrical stimulation of the brain to discover more about the brain.

Some people are concerned about the use of electrical stimulation of the brain but not the use of MRI scanners.

Suggest why.

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..... [2]

[Total: 4]

7 Jean grows geranium plants. Her favourite plant has purple flowers.

She takes a cutting from her favourite plant.

After 10 days, roots start to develop.

(a) Explain why Jean takes a cutting from the geranium and does not grow the plant from a seed.

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..... [3]

(b) Name the plant cells that divide to form unspecialised cells.

..... [1]

(c) As Jean's cutting grows, unspecialised cells become specialised.

These specialised cells form different tissues and organs.

Give **one** example of a plant tissue and **one** example of a plant organ.

Tissue

Organ

[2]

[Total: 6]

END OF QUESTION PAPER

14
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ERRATUM NOTICE

Friday 5 June 2015 – Afternoon

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

A162/02 Modules B4 B5 B6 (Higher Tier)

**FOR THE ATTENTION OF
THE EXAMINATIONS OFFICER**

To be opened on the day of the exam

Instructions to Invigilators:

Before the start of the examination, please read out to candidates the following notice (please read out this notice **twice** to ensure understanding):

Please turn to **page 6, question 2(d)** of the Question Paper and look at the **results table**, the third column titled '**Final mass (g)**'.

The final mass for 0.4 mol salt solution (row 4) currently states 1.9: this is incorrect.

The final mass for 0.4 mol salt solution (row 4) should read 2.0.

Please amend your copy of the question paper by crossing out 1.9 in the final mass (g) column and changing it to 2.0.

Any enquiry about this notice should be referred to the Customer Contact Centre on 01223 553 998 or general.qualifications@ocr.org.uk