OCR
Oxford Cambridge and RSA

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Friday 9 June 2017 – Morning

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 *

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 **20** pages. Any blank pages are indicated.

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Answer **all** the questions.

1 The statements below describe the structure of DNA and its role in the cell.

Put a (ring) around the correct choice to complete each sentence.

DNA has a **single** / **double** / **triple** helix structure.

The strands of DNA are made up of **two** / **three** / **four** different bases.

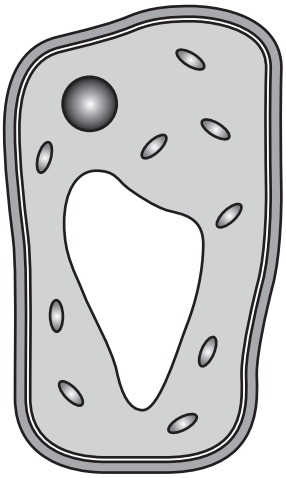
The order of the bases is important as it is the genetic code for the production of **genes** / **glucose** / **proteins**.

DNA in the form of chromosomes is found in the **cell membrane** / **cytoplasm** / **nucleus** of the cell.

[3]

[Total: 3]

2 Mohan has been asked to identify the cell in the diagram.



(a) Mohan decides it is a plant cell and not an animal cell.

Explain why Mohan is correct.

.....

.....

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

(b) **(i)** Stem cells are unspecialised cells.
At what stage in an embryo's development do stem cells start to become specialised?

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

after the 4 cell stage	☐
after the 8 cell stage	☐
after the 10 cell stage	☐
after the 12 cell stage	☐

[1]

(ii) Stem cells have the potential to produce cells needed to replace damaged tissues, such as skin for burns victims.

Give **one** source of stem cells.

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

(c) When a cell specialises which of the following happens to the genes?

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

all genes are switched off	☐
all genes are switched on	☐
many genes are switched off	☐
many genes are lost	☐

[1]

(d) What is the name given to a group of specialised cells?

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

[Total: 7]

3 Sophie is a keen gardener.

She takes cuttings from her favourite plant.

She knows that rooting powder helps the growth of new roots.

She decides to investigate which rooting powder makes roots grow best.

Sophie tests two different rooting powders and uses a control experiment.

Her results are shown below.

Condition	Number of roots			Mean number of roots
	Plant 1	Plant 2	Plant 3	
No rooting powder	4	3	5	4
Rooting powder A	6	7	8	7
Rooting powder B	6	5	4	5

Use the data to make **two** conclusions about root growth. Describe the variables Sophie would need to control to get valid results and explain why.

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

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

[Total: 6]

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4 John has a suspected brain tumour.

His doctor decides to take a biopsy.

In a biopsy a small amount of brain tissue is removed.

His doctor tells John that after the biopsy he may find he is unable to remember some words.

(a) (i) Define the term memory.

.....

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

(ii) Name the part of the brain responsible for language.

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

(iii) John agrees to have the biopsy even though he may lose some of his memory.

Explain why John is willing to take this risk.

.....

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

(iv) A tumour is a mass of cells caused by rapid cell division.

Name the type of cell division that will cause the formation of a tumour.

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

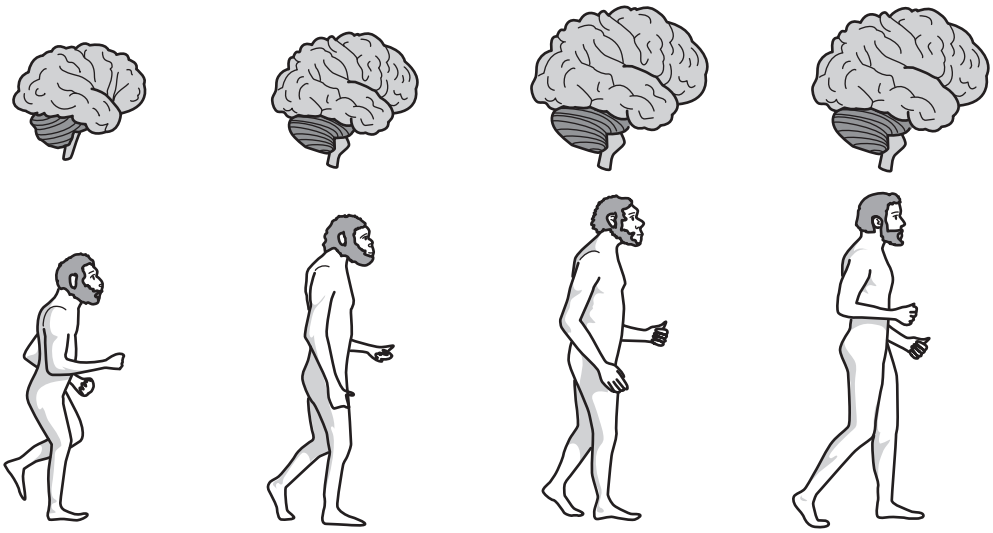
(b) John's friend Judith is learning to play the piano.

Judith is finding it difficult to play her favourite piece of music.

Suggest how Judith could improve.

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

(c) The pictures below show the evolution of the human brain.



Homo habilis | *Homo erectus* | *Homo sapiens neanderthalensis* | *Homo sapiens sapiens*

Describe how the brain evolved to give early humans a better chance of survival.

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

[Total: 8]

5 Read the passage below about digestion.

> The secretion of gastric juice is a reflex response.
>
> The sight and smell of food causes nerve impulses to be sent to the stomach.
>
> The impulses cause the release of gastric juices from glands in the stomach.

Use the passage to identify:

(a) (i) a receptor for this reflex response.

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

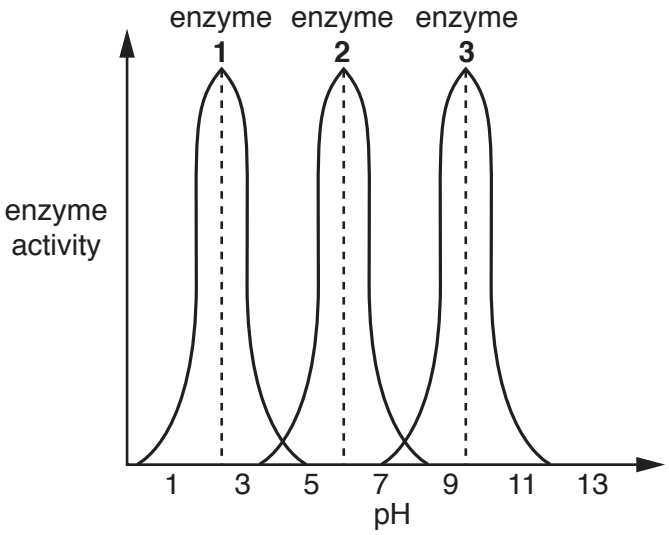
(ii) the effector for this reflex response.

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

Gastric juice contains enzymes.

These enzymes work best in acidic conditions.

The activity of **three** enzymes is shown on the graph.



(b) Identify which of the three enzymes is **most** likely to be found in the stomach.

Explain your answer.

Enzyme .....

Explanation .....

.....

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

(c) The hormone gastrin also causes the release of gastric juice.

Gastrin is produced by glands in the small intestine.

How does gastrin travel to the stomach?

Put a (ring) around the correct choice.

urine **blood** **nerves** **water**

[1]

(d) Zollinger-Ellison syndrome is a condition where the body produces high levels of gastrin. A high level of gastrin causes too much gastric juice to be produced.

(i) A healthy person produces 10 units of gastrin per hour.

A person with Zollinger-Ellison syndrome produces 15 units of gastrin per hour.

Work out the percentage increase in gastrin produced by a person with Zollinger-Ellison syndrome compared to a healthy person.

Show your working.

percentage increase = ... % **[2]**

(ii) The average person produces 3000 ml of gastric juice in 24 hours.

Estimate how much gastric juice will be produced per minute.

Show your working.

gastric juice produced = ...ml per minute **[2]**

(iii) The average person does not produce the same amount of gastric juice every minute over 24 hours.

Explain why not.

.....

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

(e) Zollinger-Ellison syndrome is caused by a tumour.

There are two treatment options for people with Zollinger-Ellison syndrome.

Option 1: They can be given drugs that will reduce the amount of gastrin produced.

Option 2: They can have the tumour removed.

Why is it better to remove the tumour than treat the symptoms with drugs?

.....

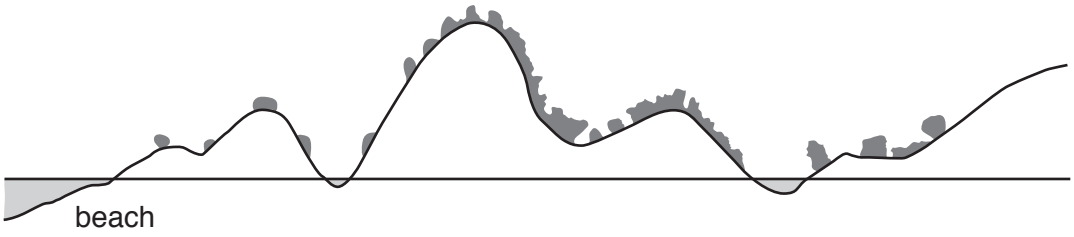
.....

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

[Total: 12]

6 Emilia is at the beach.

She walks through the sand dunes and notices that the types of plants in the dunes change the further she gets from the beach.



(a) Describe a field investigation that Emilia could carry out to show that her observations are correct.

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

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

(b) **(i)** Plants require water for photosynthesis.

Write down the name of the process which moves water into plant roots.

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

(ii) Complete the word equation for photosynthesis.

water + ... ⟶ glucose + ... **[2]**

[Total: 9]

7 **(a)** Blinking is an example of a human reflex response.

Describe the pathway of a reflex arc **and** explain why reflexes are important to humans.

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

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

(b) Write down **another** example of a simple reflex in humans.

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

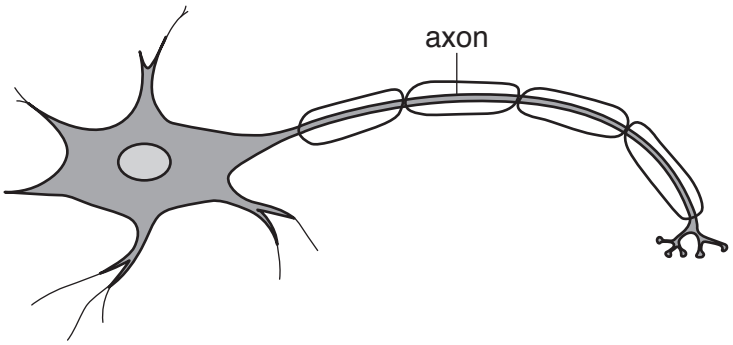
(c) Simple animals such as woodlice also have reflex responses.

How are these reflexes useful to these animals?

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

(d) The diagram below shows a neuron.

The axon is labelled.



The axon is surrounded by a fatty sheath.

Give **two** functions of the fatty sheath.

1 .....

2 .....

[2]

[Total: 10]

8 Frieda conducts an experiment on red blood cells taken from a sheep.

She puts 40 red blood cells into four different concentrations of salt solution **A**, **B**, **C** and **D**.

She observes what happens to the cells under a microscope.

Some of the cells burst, some cells remain intact and do **not** burst.

Frieda counts the number of cells that have **not** burst.

Frieda's results are shown in the table below.

Salt solution	Number of cells that have not burst				
	Test 1	Test 2	Test 3	Test 4	Mean
A	23	25	26	23	
B	12	15	27	17	17.75
C	4	6	4	4	3.75
D	0	2	3	1	2.00

(a) Calculate the mean number of cells that did not burst when placed in a salt solution **A**.

Give your answer to two decimal places.

Show your working.

mean = ... **[1]**

(b) Frieda thinks there is an outlier in her data.

Put a (ring) around the result in the table that you think is an outlier. **[1]**

(c) Which set of data **A**, **B**, **C** or **D** has the smallest range of results?

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

(d) When placed in a low salt concentration, water moves into the red blood cells causing them to burst.

Which salt solution **A**, **B**, **C** or **D** do you think has the lowest salt concentration?

Explain your answer.

.....

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

[Total: 5]

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).