

**Wednesday 20 June 2012 – Morning**

**GCSE TWENTY FIRST CENTURY SCIENCE  
BIOLOGY A**

**A222/02** Unit 2: 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:** 40 minutes



Candidate forename		Candidate surname	
Centre number		Candidate number	

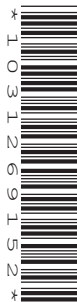
**MODIFIED LANGUAGE**

**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 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 **42**.
- This document consists of **16** pages. Any blank pages are indicated.



Answer **all** the questions.

- 1 Maria is playing tennis.

She feels hot.



- (a) Maria's internal body temperature stays the same, even though it is very hot outside.

- (i) What is this process called?

answer ..... [1]

- (ii) Maria gains heat from the energy released by her muscles.

What must happen to Maria's heat **loss** and heat **gain** to keep her body temperature the same?

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

- (b) Describe how Maria's body detects the external temperature and the temperature of the blood.

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

[Total: 5]

2 Sam drinks lots of water.



(a) One way Sam can gain water is to drink. Name **two** other ways in which Sam can gain water.

1 .....

2 ..... [1]

(b) Sam drinks far more water than he needs.

His body now contains too much water.

What will happen in Sam's kidneys?

Put ticks (✓) in the correct boxes to complete the table.

Process	Decreases	Increases	Stays the same
Reabsorption of sugar			
Reabsorption of water			
Excretion of urea			

[2]

(c) The concentration of urine is controlled by the hormone ADH.

Which part of the body releases ADH into the bloodstream?

answer ..... [1]

[Total: 4]

**3** This question is about control systems.

**(a)** Artificial control systems are designed to allow astronauts to survive during a space mission.

There must be the correct oxygen level in an astronaut's space suit.

Some of the equipment linked to the astronaut's suit acts like parts of the body.

Draw a straight line from each **function** of the equipment to the **part of the body** to which it corresponds.

Function	Part of the body
detects any change in oxygen levels	the brain
processes information about oxygen levels	receptors
adds more or less oxygen	effectors

[1]

**(b)** Negative feedback takes place in artificial and body control systems.

What is negative feedback?

.....

.....

.....

..... [3]

[Total: 4]

4 This question is about human cells.

(a) Complete the table.

Write the **name** of the part of the human cell ...

... where DNA is found.	
... where proteins are made.	

[1]

(b) What are the features of DNA?

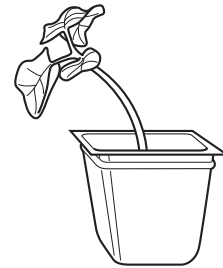
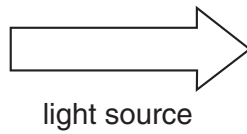
Complete the table by putting a tick (✓) in the correct box in each row.

The DNA molecule ...	True	False
... has a double helix shape.		
... is found in chromosomes.		
... is made from four strands.		
... contains five different types of bases.		
... has bases which always pair up in the same way.		

[2]

[Total: 3]

**5** Plant seedlings form new shoots and roots.



**(a)** Plant shoots grow towards a light source.

Explain how auxin brings about this directional growth.

.....

.....

.....

..... [3]

**(b)** What name is given to any plant tissue which can make new cells?

answer ..... [1]

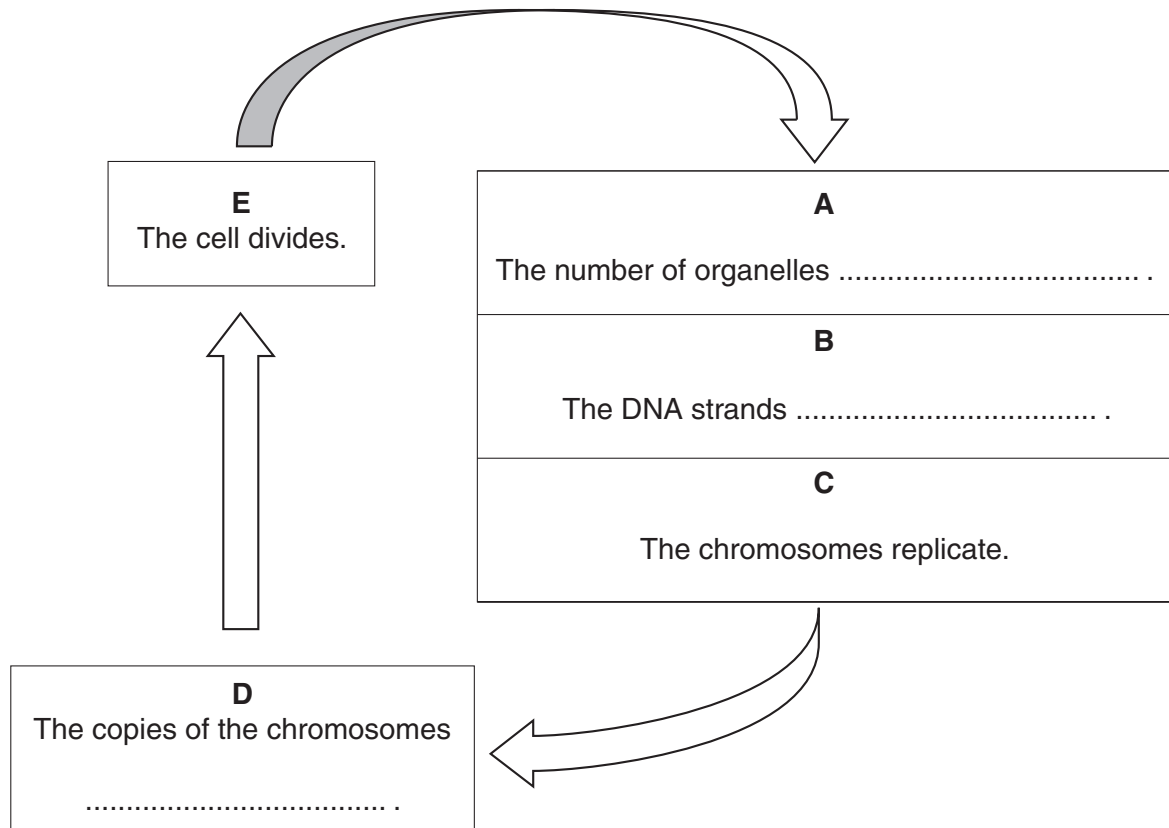
**[Total: 4]**

6 During fertilisation gametes fuse to form a zygote.

(a) The zygote grows to form an embryo.

Each cell in the embryo goes through the **cell cycle**.

(i) Complete the diagram of the cell cycle.



[3]

(ii) Which letters represent mitosis? Choose from **A**, **B**, **C**, **D** and **E**.

..... [1]

(b) As embryos develop cells become specialised.

What happens to the genes as embryo cells undergo specialisation?

Put a tick (✓) in the correct box next to each statement to show if it is **true** or **false**.

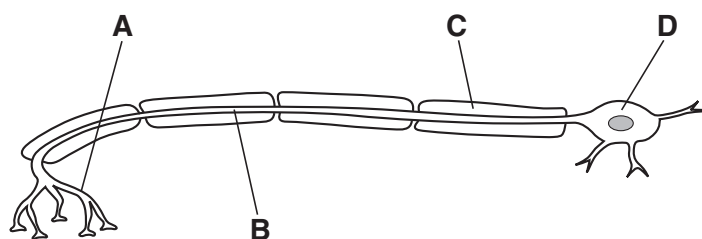
	<b>True</b>	<b>False</b>
The cells contain the same genes.		
All of the genes are active.		
Each cell makes only the specific proteins it needs.		

[1]

[Total: 5]



7 The diagram shows a motor neuron.



(a) Which part of the neuron is the **axon** and which part is the **fatty sheath**?

Write the correct letter, **A**, **B**, **C** or **D**, in the box next to each part.

axon	
fatty sheath	

[1]

(b) A scientist is investigating the speed of nerve impulses.

He records the speeds of impulses travelling along five different neurons.

	Neuron				
	1	2	3	4	5
Speed of nerve impulses in m/s	90	80	85	75	70

What is the average speed of the nerve impulses recorded?

Show your working.

answer ..... m/s [1]

- (c) The fatty sheath of the motor neuron may be damaged.

Suggest how damage to the fatty sheath will affect the neuron.

.....

.....

..... [2]

- (d) Which structure **receives** impulses from the motor neuron?

Put a ring around the correct answer.

**effector**

**receptor**

**retina**

**sensory neuron**

[1]

[Total: 5]

8 A **synapse** is a gap between adjacent neurons.

(a) A number of different steps take place at the synapse between two neurons.

The following steps are in the wrong order and one step is incorrect.

- A** Chemicals are released into the synapse.
- B** An impulse reaches the end of a neuron.
- C** Chemicals bind with receptor molecules on the second neuron membrane.
- D** Chemicals diffuse across the synapse.
- E** The impulse travels along the second neuron.
- F** The receptor molecules release chemicals.

Select the five correct statements and put them in the correct order.

Write the letters **A**, **B**, **C**, **D**, **E** or **F** in the boxes.

The first one has been done for you.

<b>B</b>				
----------	--	--	--	--

[2]

(b) Explain why the impulse can only travel in **one direction** across the synapse.

.....

.....

.....

..... [2]

(c) **Serotonin** is the chemical found in many brain synapses.

Complete the sentences about the effects of the drug **Ecstasy**.

Put a tick (✓) in the correct box to complete each sentence.

Ecstasy blocks the sites in the brain's synapses where serotonin is ...

... <b>produced</b> .	
... <b>removed</b> .	
... <b>secreted</b> .	

As a result, the serotonin concentration in the synapse ...

... <b>decreases</b> .	
... <b>increases</b> .	
... <b>stays the same</b> .	

[1]

[Total: 5]

9 Edward is a student.

He is studying for an examination.



(a) As part of his revision, Edward is trying to remember lots of facts.

(i) Write down the definition of **memory**.

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

(ii) Which part of the brain is most concerned with memory?

answer ..... [1]

(b) Edward asks his friends about how they revise for their exams.

He makes a list of their revision methods.

Put ticks (✓) in the boxes next to the methods which could help Edward to remember information.

I do my revision when on holiday because it is much nicer that way.

☐

I leave my learning until the morning of the exam so that there is no time to forget it.

☐

I don't bother to write notes because the facts are in my textbook.

☐

I look for patterns in what I am learning.

☐

I go over my school work time and time again.

☐

I colour-code my notes.

☐

[2]

(c) Edward asks four friends in his school to describe the link between learning and neuron pathways.



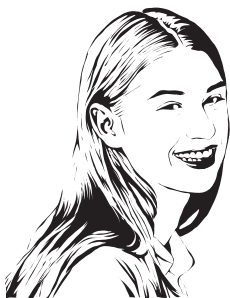
**Daniel**

Certain neuron pathways become more likely to transmit impulses than others.



**Emma**

During development, new neuron pathways are formed as a result of changes in the environment.



**Rachel**

Some pathways transmit impulses more quickly than others.



**Andy**

Some pathways stop working because the neurons no longer function.

Write down the names of the friends who give a **correct** answer.

..... [1]

(d) Some **feral children** do not develop language skills.

Which **two** of the following statements, **A**, **B**, **C**, **D**, **E**, **F** or **G**, when taken together, explain this?

- A** Language skills are inherited.
- B** Language skills are reflex actions.
- C** Memories can only form up to a certain age.
- D** A feral child has been without human contact for years.
- E** Feral children do not have neuron pathways in the brain.
- F** The sense organs in feral children do not develop properly.
- G** Some language skills cannot be acquired after a certain age.

statements ..... and ..... [2]

[Total: 7]

**END OF QUESTION PAPER**

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