

**Tuesday 31 January 2012 – Morning**

**GCSE TWENTY FIRST CENTURY SCIENCE  
BIOLOGY A**

**A222/01** Unit 2: Modules B4 B5 B6 (Foundation Tier)

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

**Duration:** 40 minutes

**OCR supplied materials:**  
None

**Other materials required:**

- Pencil
- Ruler (cm/mm)



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 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 David is visiting a hot country.



- (a) David's body is kept at a constant internal temperature.

David gains heat and he loses heat.

Draw a straight line to link David's heat gain to the correct box.

David's heat gain

is greater than his heat loss

is equal to his heat loss

is less than his heat loss

[1]

(b) Complete the sentences about temperature change and the body.

Use words from this list.

Each word may be used once, more than once or not at all.

- blood
- effectors
- heart
- kidney
- receptors
- skin

The temperature in the air is detected by temperature .....  
in the .....

Temperature ..... in the brain detect the temperature  
of the .....

[2]

(c) David puts a cap soaked in water on his head.

Suggest how this helps him to control his body temperature.

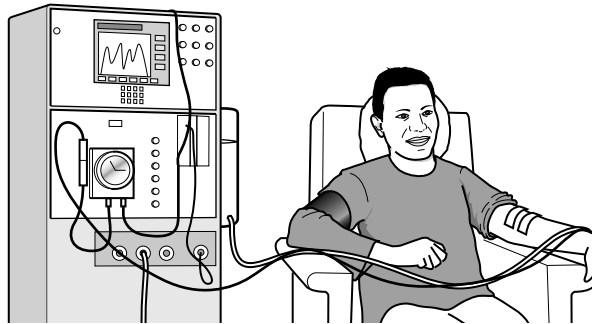
.....  
.....  
.....

[3]

[Total: 6]

2 Mr Armit has kidney problems.

He visits his local hospital so that his blood can be filtered by an artificial kidney machine.



(a) When Mr Armit is using the artificial kidney machine he drinks lots of water.

What are **two** other ways in which Mr Armit can **gain water**?

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

(b) Complete the sentences about the function of **healthy** kidneys.

Use words from this list.

**blood**

**enzymes**

**fully**

**not**

**partly**

**salt**

**starch**

**urine**

**water**

Kidneys filter molecules from the blood to form .....

Some molecules are reabsorbed back into the blood in different amounts.

Sugar is ..... reabsorbed.

The kidneys reabsorb as much water and ..... as the body needs.

[3]

[Total: 5]

3 Ruth wants to find out about osmosis in animal cells.

She already knows that animal cells are surrounded by a partially permeable membrane.

(a) Describe the process of osmosis.

.....

.....

.....

..... [2]

(b) Ruth puts some animal cells into three different beakers, **A**, **B** and **C**.

The three beakers contain

**A** pure water

**B** a salt solution that is the same concentration as the inside of the cells

**C** a salt solution that is more concentrated than the inside of the cells.

She uses a microscope to look at the cells before and after the experiment.

What will happen to the cells?

Put a tick (✓) in the correct box for each row.

		cells burst	cells shrink	cells stay the same
<b>A</b>	cells in pure water			
<b>B</b>	cells in a salt solution that is the same concentration as the inside of the cells			
<b>C</b>	cells in a salt solution that is more concentrated than the inside of the cells			

[2]

[Total: 4]

4 This question is about the **cell cycle**.

The main processes of cell growth and mitosis take place in the cell cycle.

(a) Each of the following events, **A**, **B**, **C** and **D**, takes place during either cell growth or mitosis.

- A** the cell divides
- B** the chromosomes are copied
- C** copies of the chromosomes separate
- D** numbers of organelles increase

Write the letters **A**, **B**, **C** and **D** in the correct boxes.

cell growth	mitosis

[2]

(b) A group of 12 cells are studied using a microscope.

50% of the cells undergo mitosis and form new cells.

What is the total number of cells present at the end of mitosis?

Put a (ring) around the correct answer.

**6            12            16            18            36**

[1]

(c) What type of cell is produced by **meiosis**?

Put a (ring) around the correct answer.

**gametes            neurons            skin cells            stem cells**

[1]

(d) Cells produced by meiosis contain **half** the chromosome number of the parent cell.

Why is this important?

.....

.....

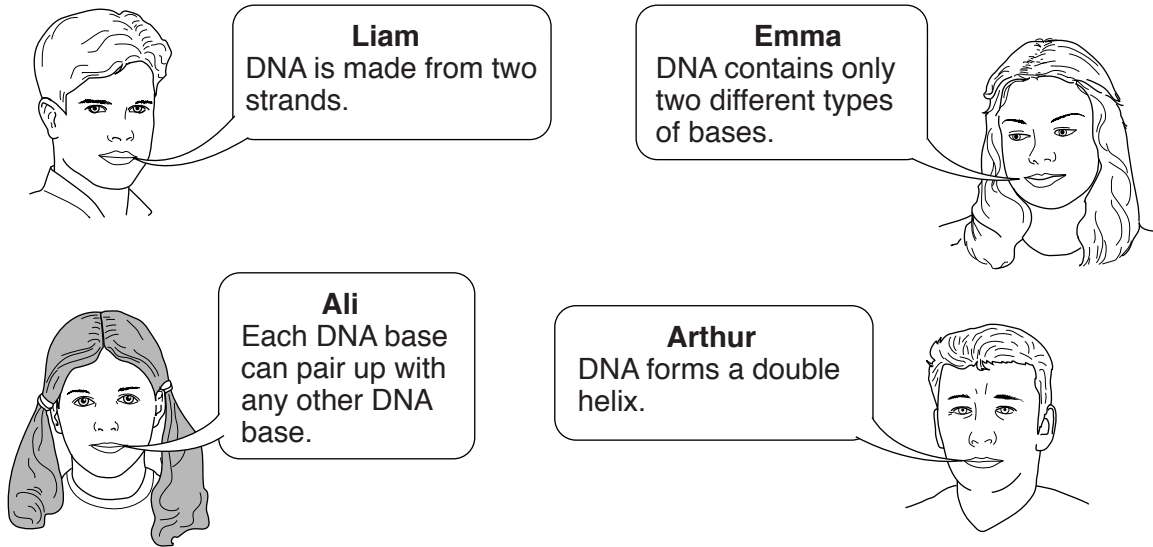
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.....

[2]

[Total: 6]

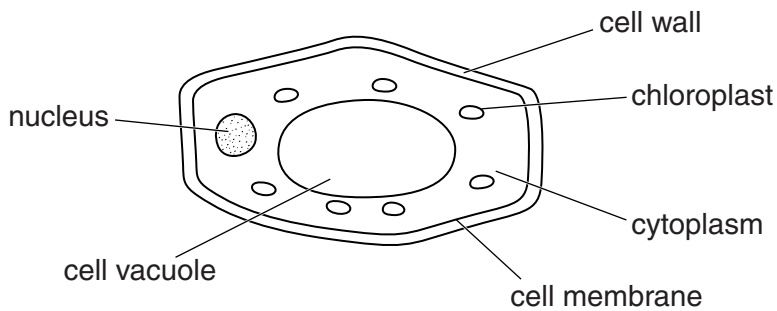
5 A group of students are talking about DNA.



(a) Which **two** students give correct statements?

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

(b) Liam draws a plant cell.



Complete the sentences using labels from Liam's drawing.

Protein production happens in the .....

The genetic code is stored in the .....

[1]

[Total: 2]

6 A plant scientist is studying an apple tree.



(a) The scientist collects a seed from the apple tree and grows a seedling.

All of the cells in the seedling are produced from the same fertilised cell.

The cells specialise to do certain jobs.

(i) Which statements about cell specialisation are correct?

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

Each specialised cell only produces the specific proteins it needs.

Many of the genes in a specialised cell are not active.

New genes are produced during cell specialisation.

Some of the genes are lost as each cell becomes more specialised.

Specialised cells in the same seedling contain different genes.

The specialised cells only contain half the number of genes needed.

[2]



(ii) Complete the sentences about the development of cells.

Use words from this list.

**alive**

**grow**

**respire**

**specialised**

**unspecialised**

Unlike animal cells, some plant cells remain ..... and can develop into any type of plant cell.

Unlike animals, most plants continue to ..... throughout their lives.

[1]

(b) The scientist's seedling is kept on a bench near a window.

The seedling grows towards the light.

(i) What is this process called?

..... [1]

(ii) Describe how the process of growing towards light is an advantage to the plant.

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

[Total: 7]

7 Mice are very quick to respond to changes in their environment.

This is due to their nervous system.



(a) Draw straight lines to link each **structure** of the nervous system to its **function**.

structure	function
receptor	carries impulses from receptors to the CNS
sensory neuron	detects the stimulus
central nervous system (CNS)	carries impulses from the CNS to the effector
motor neuron	coordinates the mouse's response

[2]

(b) Which part of the nervous system connects the central nervous system (CNS) to the rest of the body?

Put a **ring** around the correct answer.

**brain**      **spinal cord**      **peripheral nervous system**      **synapse**

[1]

(c) Motor neurons have an axon.

(i) What is the correct description of an axon?

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

**An axon is a ...**

... special type of cell membrane.

... large cell body containing a nucleus.

... long fibre of cytoplasm surrounded by a cell membrane.

[1]

(ii) Some diseases destroy the fatty sheath around motor neurons.

This results in

- slower responses
- impulses not reaching the correct effectors.

Explain why these symptoms occur.

.....

.....

..... [2]

[Total: 6]

8 Charles is a neuroscientist.

He studies the functions of the human brain.



(a) Charles uses **electrical stimulation** to study the cerebral cortex in living patients.

State **one** other way of studying the cerebral cortex in these patients.

..... [1]

(b) The cerebral cortex is the site of memory.

Some people suffer from loss of memory.

(i) What will be affected by **memory loss**?

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

The function of the spinal cord.

The storage and retrieval of information.

The activity of effectors, such as sweat glands.

The ability to carry out simple reflexes, such as blinking in bright light.

[1]

(ii) As well as memory, the cerebral cortex has other functions.

Put a **ring** around the **two** correct functions.

**intelligence**

**language development**

**reflex actions**

**temperature control**

**water balance**

[1]

[Total: 3]

9 Humans have large brains containing billions of neurons.

(a) Complete the sentences about the development of complex behaviour in humans.

Use words from this list.

**brain**

**forgetting**

**impulses**

**learning**

**patterns**

**peripheral nervous system**

**a reflex**

**repetition**

**sensors**

**spinal cord**

During development, the interaction between humans and their environment results in neuron pathways forming in the .....

In humans, ..... is the result of experience where certain neuron pathways become more likely to transmit ..... than others.

Some skills are learnt through .....

[2]

(b) Some actions can be learned.

Which of these actions are learned?

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

Jumping in response to a sudden, loud noise.

Maintaining a constant body temperature.

Quickly moving your hand from a sharp object.

Reducing the size of the pupils in the eyes.

Remembering a telephone number.

Speaking a language.

[1]

[Total: 3]

**END OF QUESTION PAPER**

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