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**Wednesday 20 June 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** Kidneys play an important role in the body.

Kidneys remove waste molecules from the body and balance levels of other chemicals in the blood.

**(a)** What happens to salt, urea and water in the kidneys?

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

	Salt	Urea	Water
Filtered out of the blood			
Reabsorbed back into the blood			

[2]

**(b)** Urine production is affected by drinking alcohol.

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

The type of urine produced when a person drinks alcohol is ...

... more concentrated.	
... more dilute.	
... not affected.	

Drinking alcohol causes the volume of urine to ...

... decrease.	
... increase.	
... stay the same.	

[2]

[Total: 4]

2 This question is about enzymes.

(a) What is an enzyme?

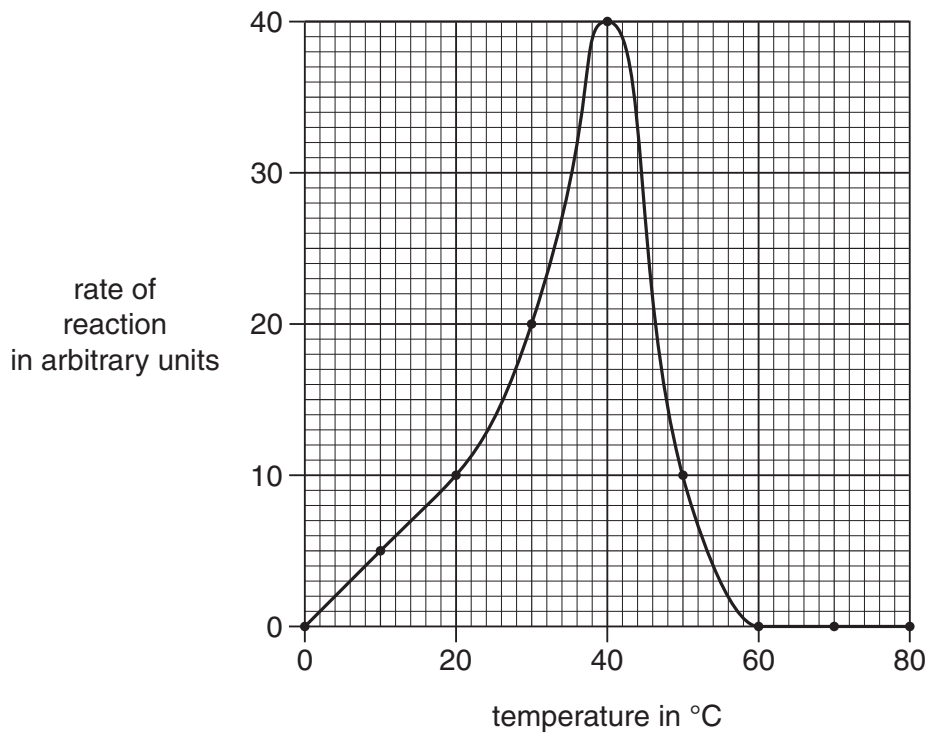
.....  
 .....  
 ..... [2]

(b) The **lock and key model** is used to explain how enzymes work.

Use this model to explain why an enzyme only works with a particular molecule.

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

(c) The graph shows the effect of temperature on the rate of a reaction involving an enzyme from the human body.



(i) What is the rate of the reaction when the temperature is 30°C?

rate of reaction = ..... arbitrary units [1]

- (ii) What happens to the **collision rate** and the **rate of reaction** as the temperature increases from 10 °C to 20 °C?

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

	Becomes faster	Slows down	Stays the same
Collision rate			
Rate of reaction			

[2]

- (iii) What happens to the enzyme at temperatures over 60 °C?

..... [1]

[Total: 8]

3 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 constant?

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

(b) Describe how the external temperature and the temperature of the blood are detected by Maria’s body.

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

[Total: 5]

4 Mr Andrews has grown a miniature tree.



During growth, the cells in this tree have specialised to form different types.

The tree grew from a seedling and all the cells contain the same genes.

**(a)** How does cell specialisation take place?

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

All the genes in every tree cell remain active.

All the genes in every tree cell become inactive.

Some of the genes in every tree cell remain active.

The number of genes in every tree cell changes.

[1]

(b) Mr Andrews decides to grow new trees from cuttings taken from his miniature tree.

Mr Andrews dips the cut surface of a tiny branch of the tree into a powder.

The powder helps the tiny branch to grow new roots.

What must the powder contain to promote root growth?

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

- enzymes**      **genes**      **hormones**      **sugars**

[1]

(c) The cuttings show **phototropism** in the presence of light from one direction.

Explain how phototropism increases a plant's chance of survival.

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

[Total: 4]

5 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]



6 Jake and Leo are identical twins.

They were formed from identical cells from the same zygote.



(a) Which type of cell division took place in the zygote to produce the identical cells?

answer ..... [1]

(b) The identical cells developed to form separate embryos.

The cells in all embryos go through a number of stages, called the **cell cycle**.

(i) Complete the sentences about the cell cycle.

Use words from this list.

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

**cells**

**grow**

**organs**

**separate**

**organelles**

**break down**

**stay the same**

During cell growth the number of ..... increases in a cell.

The DNA strands ..... and new strands form alongside them.

The copies of the chromosomes ..... during mitosis.

The cell then divides and the two new cells start to ..... again.

[4]

(ii) Jake and Leo produce gametes called sperm cells.

Gametes are formed by **meiosis**.

Each twin has 46 chromosomes in each of their body cells.

How many chromosomes are found in each gamete?

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

- 23      46      69      92

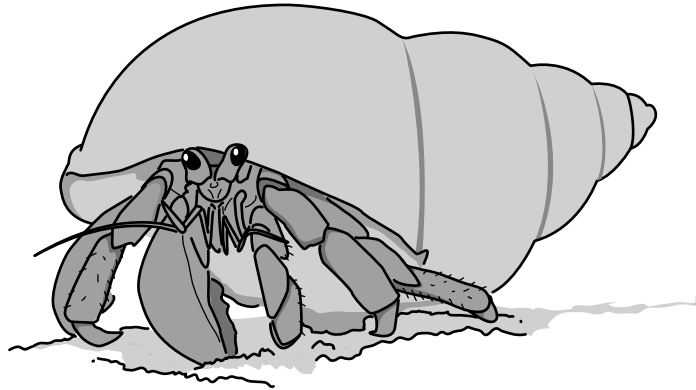
[1]

(iii) Explain why having this number of chromosomes in the gametes is important.

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

[Total: 8]

7 The hermit crab lives in an empty snail shell.



Simple reflexes help the crab to survive.

(a) The hermit crab quickly withdraws back into its shell when a shadow appears over it.

How does this response improve the hermit crab's chance of survival?

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

It helps it ...

... to find a mate.

... to keep warm.

... to find more food.

... to hide from a predator.

... to get more oxygen for respiration.

[1]

(b) The Central Nervous System (CNS) of a hermit crab does not have the structures found in a human CNS.

Suggest two structures that are found in humans but **not** in the hermit crab.

Put rings around the **two** correct answers.

**brain**

**neurons**

**effectors**

**spinal cord**

**muscle cells**

**receptor cells**

(c) Humans show some simple reflexes.

Which of the following is an example of a simple reflex?

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

learning how to ride a bicycle

remembering your telephone number

writing a letter

reducing the size of your pupils when a bright light is shone into your eyes

[1]

[Total: 3]

8 Toby and Amanda are in an orchestra rehearsal for their next performance.

Toby is finding it difficult to remember the music.



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

answer ..... [1]

(b) Toby asks Amanda about memory.

She states four ideas.

Which of Amanda's ideas is correct?

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

Memory is ...

... always long-term.

... feeling disappointed.

... responding to a stimulus.

... the storage and retrieval of information.

[1]

(c) Amanda does her best to help Toby to remember the music.

She tells Toby that he will eventually learn the music when the orchestra rehearses more.

What changes will take place in Toby's brain as he learns the music?

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

Some neuron pathways in Toby's brain ...

... become simple reflex arcs.

... transmit impulses more slowly.

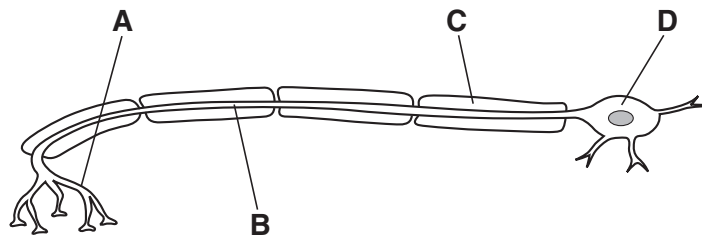
... transmit impulses more quickly.

... become more likely to transmit impulses than others.

[1]

[Total: 3]

9 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) The fatty sheath of the motor neuron may be damaged.

Suggest how this will affect the neuron.

.....

.....

..... [2]

(c) What is the name of the gap between two neurons?

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

**junction      link      relay      synapse**

[1]

[Total: 4]

**END OF QUESTION PAPER**

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