

**GENERAL CERTIFICATE OF SECONDARY EDUCATION  
TWENTY FIRST CENTURY SCIENCE  
BIOLOGY A**

**A222/01**

Unit 2: Modules B4 B5 B6 (Foundation Tier)

**Tuesday 22 June 2010  
Morning**

**Duration: 40 minutes**

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)



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**INSTRUCTIONS TO CANDIDATES**

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- 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).

**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 This question is about enzymes.

(a) What are enzymes?

In your answer you should include

- what type of chemical they are
- what they do.

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

(b) Enzymes and some molecules fit together.

Which model is used to explain this?

Put a (ring) around the correct answer.

**enzyme and molecule model**

**lock and key model**

**puzzle shape model**

[1]

(c) The frequency of collisions between an enzyme and other molecules can increase.

(i) Which factor can cause this increase?

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

light

pH

temperature

[1]

(ii) Complete this sentence.

When the frequency of collisions increases, the rate of reaction will .....  
 [1]

[Total: 5]

2 Blood flows through the kidneys.

(a) As the blood flows through the kidneys, chemicals are filtered out of the blood.

Some of these chemicals are **completely reabsorbed** back into the blood.

Some are **partly reabsorbed** by the body.

Others are **not reabsorbed**.

Put one tick (✓) in the **correct box** for each chemical.

chemical	completely reabsorbed	partly reabsorbed	not reabsorbed
water			
sugar			
urea			

[3]

(b) How does drinking alcohol affect water balance in the body?

In your answer write about the effects on:

- the volume of urine produced
- the concentration of urine produced
- the water level in the body.

.....

.....

.....

..... [3]

[Total: 6]

3 Andy goes out in cold weather.



(a) Andy's internal body temperature stays at 37°C.

This is an example of homeostasis.

(i) What is **homeostasis**?

..... [1]

(ii) What should happen to energy **gain** and energy **loss** to keep Andy's body temperature at 37°C?

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

(b) Complete the sentences about body temperature.

Choose words from this list.

- brain
- effectors
- neurons
- receptors
- skin
- spinal cord

The external temperature is detected by the .....

in the .....

The temperature of the blood is detected in the .....

[3]

(c) Andy's muscles produce heat.

Which process in Andy's muscles produces heat?

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

**breathing**

**diffusion**

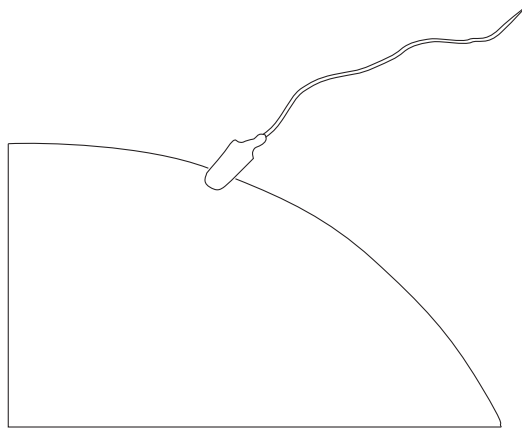
**digestion**

**respiration**

[1]

[Total: 6]

4 This question is about dividing cells.



(a) A sperm and an egg fuse together to form a zygote.

The zygote then divides to form an embryo.

The cells in the embryo go through a number of stages called the **cell cycle**.

Complete the sentences about the cell cycle.

Choose words from this list.

**decreases**

**DNA**

**hormone**

**increases**

**protein**

**stays the same**

As each cell grows, the number of organelles .....

The chromosomes are copied by separating the strands of ..... [2]

(b) Most human cells have 46 chromosomes.

How many chromosomes does a sperm cell contain?

Put a (ring) around the correct answer.

2      23      46      69      92

[1]

[Total: 3]

- 5 The General Sherman tree in Sequoia National Park in the USA is the largest tree in the world.



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

All the cells in the tree 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 cell remain active.

All the genes in every cell become inactive.

Only some of the genes in each cell remain active.

The number of genes in each cell changes.

[1]

- (b) It is possible to grow new trees from **cuttings** taken from this large tree.

Cut stems are dipped into a powder to grow new roots.

What should this powder contain?

Put a ring around the correct answer.

**enzymes**

**fertiliser**

**genes**

**hormones**

[1]

(c) Which two features are found in both plants and animals?

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

Both plants and animals ...

... have specialised cells.

... have tissues including xylem and phloem.

... grow in height and width all through their lives.

... have cells that make specific proteins that they need.

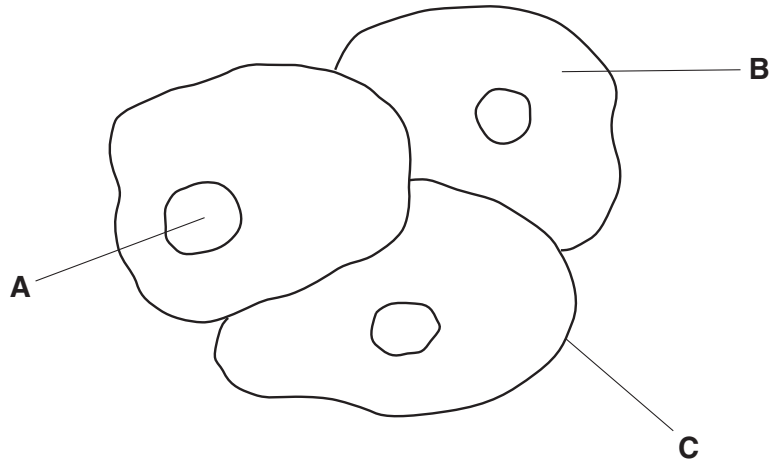
[1]

[Total: 3]



6 Alan uses a microscope to study cells.

He looks at some human cheek cells.



(a) Complete the table to match each **description** with the correct **label**.

Write the correct letter, **A**, **B** or **C**, in each row.

description	label
where the genetic code is found	
where proteins are made	

[1]

(b) The growth and development of each cell is controlled by its DNA.

What are the features of DNA?

Put a ring around the correct answer in each row.

DNA feature				
number of strands	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
number of different types of bases	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
arrangement of bases between the strands	<b>single</b>	<b>pairs</b>	<b>triplets</b>	<b>fours</b>
shape of molecule	<b>circular</b>	<b>cubic</b>	<b>helix</b>	<b>zig-zag</b>

[3]

[Total: 4]

7 Ellie is learning French at school.

She is trying to remember the French word for 'please'.

(a) Which part of Ellie's body is responsible for memory?

Put a (ring) around the correct answer.

**brain**

**effectors**

**spinal cord**

[1]

(b) What is memory?

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

Memory is the ...

... ability to link together previous experiences.

... response to a stimulus.

... storage and retrieval of information.

... transmission of impulses across a synapse.

[1]

(c) What does Ellie's verbal memory consist of?

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

long-term memory only

short-term and long-term memory

short-term memory only

neither long-term nor short-term memory

[1]

(d) Ellie will remember her French words by the process of **learning**.

Complete the sentences about learning and neuron pathways.

Choose words from this list.

**bones**

**brain**

**kidneys**

**new**

**old**

**similar**

During human development neuron pathways form in the .....

Learning causes some pathways to be used more often.

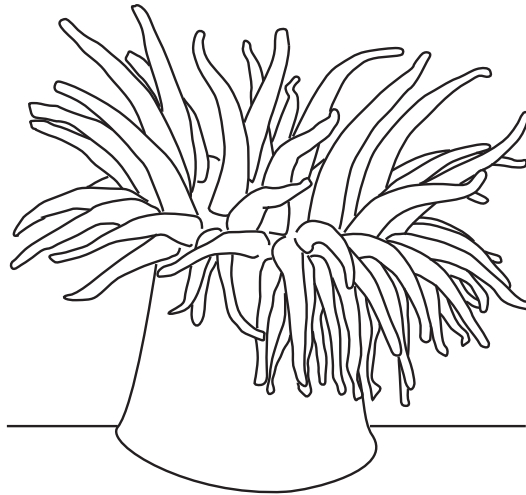
The number of potential pathways formed allows the human to adapt to

..... situations.

[1]

[Total: 4]

8 The sea anemone is an animal which lives in rock pools.



It is attached to the rocks.

It survives by using simple reflexes.

(a) The sea anemone pulls its tentacles into its body when a shadow appears over the rock pool.

How does this help it to survive?

.....

.....

..... [1]

(b) Simple reflexes are also found in human babies.



Describe **two** examples of simple reflexes in newborn babies.

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

(c) Human babies have a central nervous system.

The sea anemone does not have a central nervous system.

Which two structures are found in the central nervous system?

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

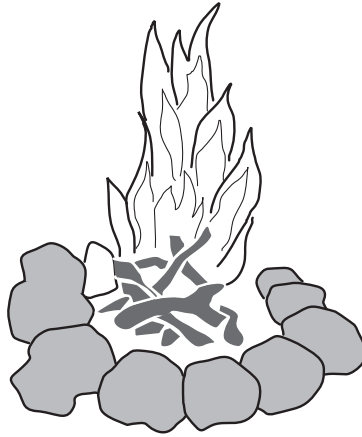
- brain
- effectors
- muscles
- receptors
- spinal cord

[2]

[Total: 5]

9 Tom is enjoying his camping holiday.

He sits by a camp fire.



(a) Complete the sentences.

Choose words from this list.

**effectors**

**heat**

**light**

**motor**

**receptors**

**sensory**

**sound**

Tom can see the flames of the fire.

The receptor cells in the retina of the eye are stimulated by .....

Impulses are carried from the eye to the brain by ..... neurons.

**[1]**

(b) A spark from the fire lands on his hand.

Tom jumps.

He then decides to move farther away from the fire.

Use this example to explain the difference between voluntary and involuntary responses.

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

(c) Some neurons have long fibres called axons.

(i) What surrounds the axon?

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

- chloroplast
- membrane
- vacuole
- cell wall

[1]

(ii) The axon of some neurons is also surrounded by a fatty sheath.

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

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

[Total: 6]

**END OF QUESTION PAPER**

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