

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

A222/02

Unit 2: Modules B4 B5 B6 (Higher Tier)

**Wednesday 22 June 2011
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	
-----------------------	--	----------------------	--

Centre number						Candidate number				
---------------	--	--	--	--	--	------------------	--	--	--	--

INSTRUCTIONS TO CANDIDATES

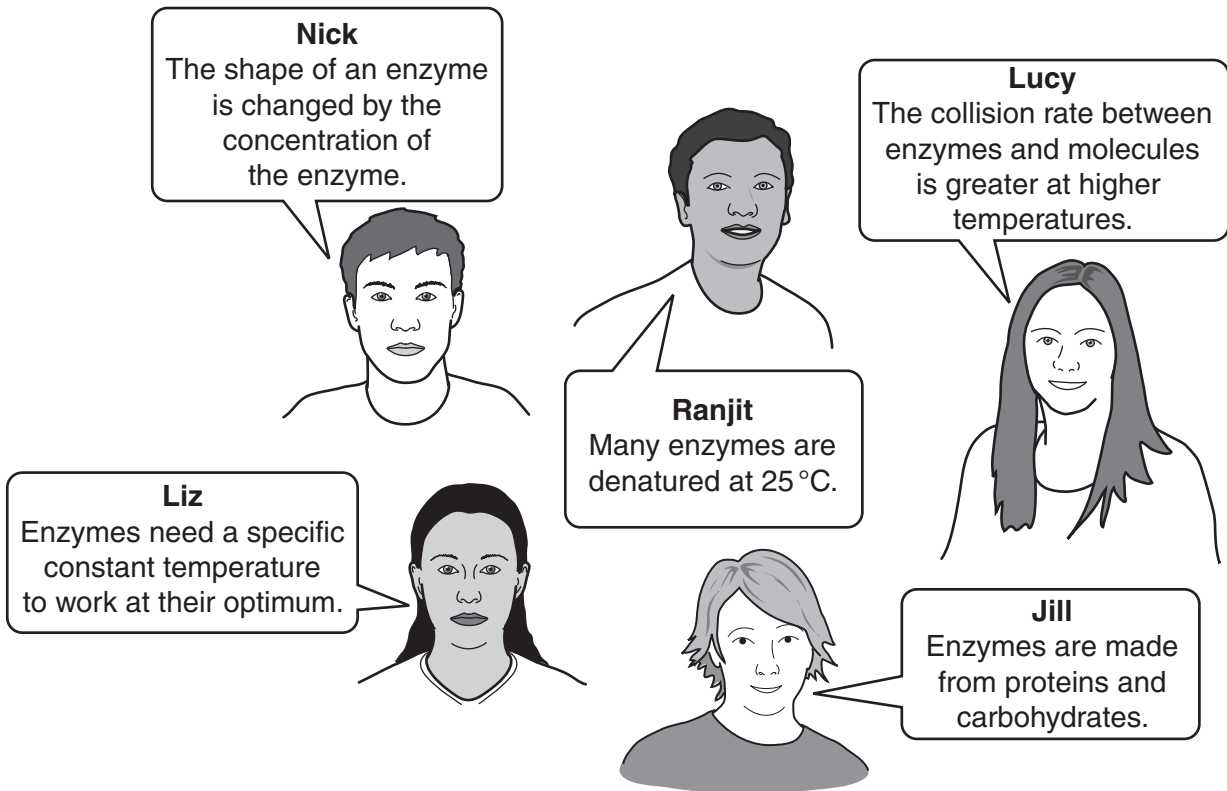
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer 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).
- Answer **all** the questions.
- 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 **12** pages. Any blank pages are indicated.

1 Maria is studying **enzymes** in a lesson.

(a) She works with a group of friends and asks them to describe the properties of enzymes.



Which two friends give the best answers?

names and [2]

(b) Maria reads about the **lock and key** model.

It describes how an enzyme works.

Explain the lock and key model.

.....

.....

.....

..... [3]

[Total: 5]

2 (a) A patient has problems with his kidneys.

A doctor tests the patient's **urine** and records the results in a table.

composition of patient's urine	present
glucose	✓
salts	✓
urea	✓
water	✓

Which one of the four components of the patient's urine should normally be **absent**?

answer [1]

(b) The patient produces the hormone **ADH**.

Where in the patient's body is ADH released?

Put a (ring) around the correct answer.

cerebral cortex

hypothalamus

pituitary gland

kidney

medulla

[1]

(c) Drinking alcohol affects urine production.

Describe **and** explain the effects of alcohol on urine production.

.....

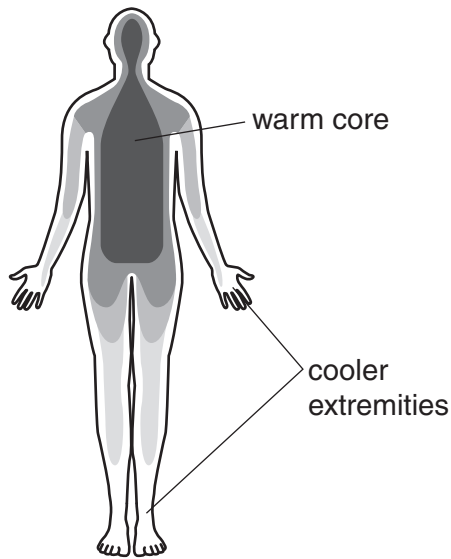
.....

.....

..... [3]

[Total: 5]

3 The extremities of the human body tend to be cooler than the core body temperature.



(a) Which part of the human brain contains receptors to detect the temperature of the blood?

..... [1]

(b) What happens if the core body temperature is **too low**?

Complete each sentence by putting a (ring) around the correct choice.

The blood vessels supplying skin capillaries **constrict/dilate/stay the same**.

The blood flow through the skin capillaries **increases/decreases/stays the same**.

Energy loss at the skin surface **increases/decreases/stays the same**. [2]

(c) The human body can also experience **heat stroke**.

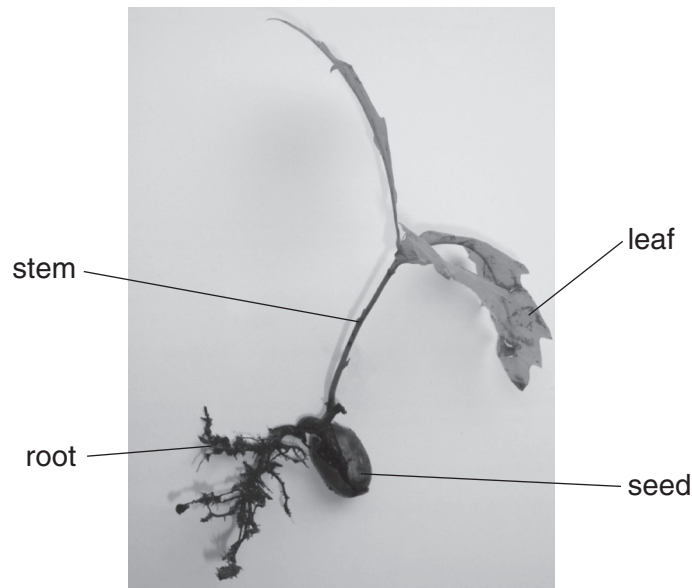
Explain what happens in the body during heat stroke.

.....

..... [2]

[Total: 5]

4 George finds an oak tree seedling growing in his garden.



(a) A tissue at the tip of the root and stem of the oak seedling contains unspecialised cells. These cells can continue to divide.

What is the name of this tissue?

answer [1]

(b) George lets the seedling grow into a young tree.

He takes a cutting from the young tree.

He cuts through one of the side-stems of the young tree and dips the cut end in a powder.

The powder contains **auxin**.

(i) What is auxin?

..... [1]

(ii) Why is auxin included in the powder?

..... [1]

(c) George plants his cutting in a pot of soil.

He puts the pot on a window ledge.

His cutting grows at an angle towards the light.

How does this directional growth response increase a plant's chance of survival?

.....

.....

..... [3]

[Total: 6]

5 Dogs have millions of body cells.

(a) Every nucleus in the body cells of a dog contains 78 chromosomes.

Read the statements about cell division in dogs.

Each statement refers to either **mitosis**, **meiosis**, **neither** or **both**.

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

You should have only **one tick** in each row.

	only mitosis	only meiosis	neither mitosis or meiosis	both mitosis and meiosis
The chromosome number in each new cell produced is 39.				
The new cells become sex cells or gametes.				
The nucleus is reformed in the cells produced.				
Two identical cells are produced.				
Takes place in muscle cells.				

[3]

(b) Why is it important that dog gametes contain **39** chromosomes?

.....

.....

..... [1]

[Total: 4]

6 The human body contains many specialised **tissues**.

(a) A human embryo has different stages of development.

Complete the sentence.

The embryo **begins** to show cell specialisation **after** the cell stage. [1]

(b) Which of the statements about a skin cell in a human are true?

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

A skin cell in a human...

... has some inactive genes.

... has more genes than a muscle cell.

... contains genes that code for nervous tissue.

... produces all the same proteins as a liver cell.

... contains copies of the same genes as a liver cell.

[2]

(c) The spinal cord also contains specialised cells.

The spinal cord can become damaged due to injury.

Scientists are researching ways to replace these damaged tissues in humans.

Complete the sentences about this research.

Embryonic stem cells can be used because they are

These cells divide to make identical copies.

These copies are called

However, embryonic stem cells are difficult to obtain.

In this research, adult body cells are used.

A number of specific are reactivated in the nucleus of the body cells to form the spinal cord tissue needed.

[2]

[Total: 5]

7 Impulses are transmitted within the brain in mammals.

What happens to the brain when a mammal develops and learns new skills?

Include in your answer ideas about

- neuron pathways
- transmission of impulses
- repetition.

.....

.....

..... [3]

[Total: 3]

8 There are different types of reflexes shown by animals.

(a) One type of reflex is a conditioned reflex.

Name **another** type of reflex and give an example.

type of reflex

example [1]

(b) A famous experiment was carried out by Pavlov to show a conditioned reflex.

- A dog was given food and the dog produced saliva.
- A bell was rung each time the dog was given food.
- This was repeated for several days.
- The bell was rung, without food being given, and the dog produced saliva.

The process involved a primary stimulus and a secondary stimulus.

Look at the statements about conditioned reflexes.

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

	true	false
The bell is used as a primary stimulus.	<input type="checkbox"/>	<input type="checkbox"/>
The final response does not have a direct connection to the primary stimulus.	<input type="checkbox"/>	<input type="checkbox"/>
The conditioned reflex is learned by introducing a secondary stimulus.	<input type="checkbox"/>	<input type="checkbox"/>

[2]

(c) Conditioned reflexes can be an advantage to animals.

Explain why.

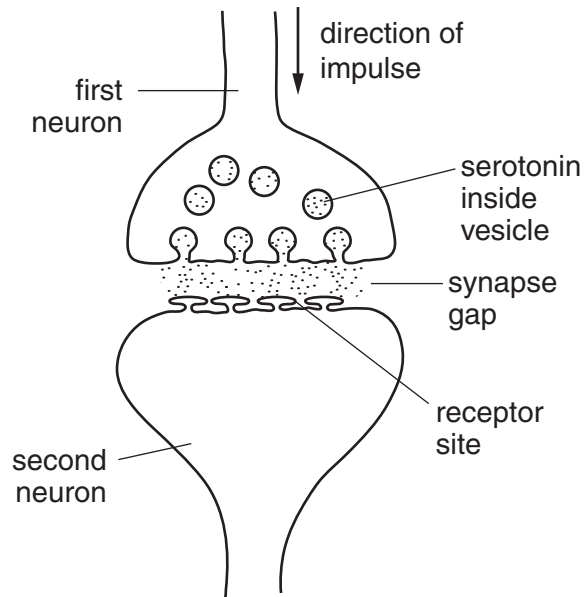
..... [1]

[Total: 4]

9 The human brain contains billions of synapses.

Many of the brain synapses produce the chemical **serotonin**.

Look at the diagram.



(a) A sequence of events take place at the synapse.

- A** serotonin is reabsorbed and put back into vesicles
- B** serotonin recognised by receptor sites
- C** impulse arrives at end of first neuron
- D** vesicles fuse with membrane
- E** serotonin released into the synapse gap
- F** impulse continues along the second neuron

Put the letters **A to F** in the boxes to show the correct sequence of events.

One has been done for you.

				F	
--	--	--	--	---	--

sequence of events at synapse

[2]

(b) Name the process by which serotonin crosses the synapse gap.

..... [1]

(c) Some people take the drug **Ecstasy**.

How does Ecstasy affect serotonin in the brain synapses?

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

Ecstasy ...

... breaks down serotonin.

... blocks the receptor sites on the second neuron preventing impulse transmission.

... increases the speed of serotonin removal from the synapse gap.

... binds to the sites where serotonin is removed from the synapse gap.

... causes the concentration of serotonin to increase in the synapse gap.

[2]

[Total: 5]

END OF QUESTION PAPER

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.