OCR
RECOGNISING ACHIEVEMENT

H

GENERAL CERTIFICATE OF SECONDARY EDUCATION

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)

Wednesday 21 January 2009
Afternoon

Duration: 40 minutes

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

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, however additional paper may be used if necessary.

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 **20** pages. Any blank pages are indicated.

FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	**9**	
2	**6**	
3	**4**	
4	**4**	
5	**3**	
6	**4**	
7	**6**	
8	**6**	
TOTAL	**42**	

Answer **all** the questions.

1 This question is about maintaining water balance in the body.

(a) How do we **gain** our water?

Put a (ring) around the **three** correct answers.

breathing

drinking

excreting urine

exercising

feeding

respiring

[2]

(b) Urine is produced by the body.

The concentration of urine is affected by the concentration of the blood plasma.

Which **three** factors may change the concentration of the blood plasma?

Put a tick (✓) in the box next to each of the **three** correct answers.

amount of oxygen in the blood	☐
amount of salt eaten	☐
drinking alcohol	☐
external rainfall	☐
external temperature	☐
being male or female	☐

[3]

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

Draw a straight line to link ADH to its **site of secretion** and another straight line to link ADH to its **site of activity**.

site of secretion		site of activity
cerebral cortex		bladder
hypothalamus	**ADH**	brain
pituitary gland		kidney

[2]

(d) The drug, Ecstasy, has an effect on urine production.

Five people were asked to describe what happens.

Which **two** people gave the correct descriptions?

answer ..... and ..... **[2]**

[Total: 9]

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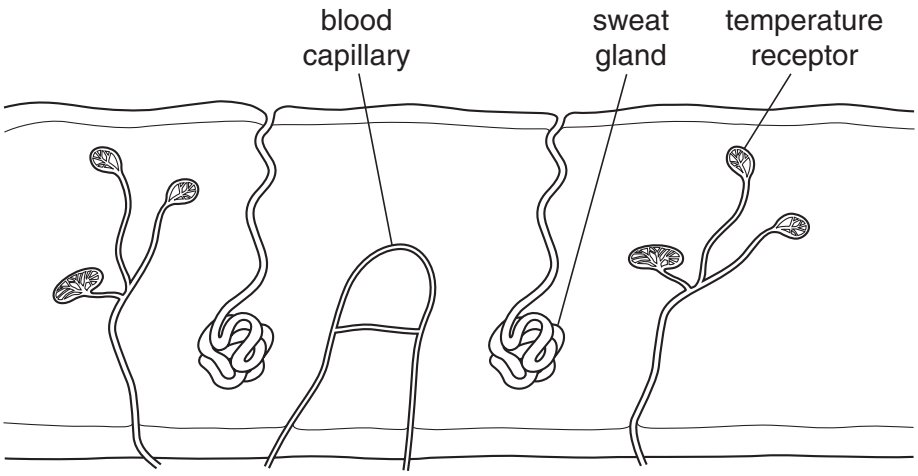
2 **(a)** The human skin contains a number of different receptors and effectors.



Temperature receptors detect the external temperature.

Sweat glands and blood vessels leading to capillaries are both effectors.

(i) Which region of the body receives and processes impulses from the temperature receptors?

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

cerebral cortex

hypothalamus

pituitary gland

spinal cord

[1]

(ii) The body reacts to an **increased** body temperature.

Put a tick (✓) in the box next to each of the **three** true statements.

As body temperature increases…

…blood vessels move closer to the surface of the skin. ☐

…blood vessels supplying the capillaries vasoconstrict. ☐

…temperature receptors are stimulated. ☐

…the skin becomes red. ☐

…the sweat glands produce more sweat. ☐

…shivering takes place. ☐

[2]

(b) Heat stroke is the result of an uncontrolled increase in body temperature.

A series of stages take place in the body.

They are in the wrong order.

A body becomes dehydrated

B exposure to very hot temperatures

C reduced sweating

D increased sweating

E further increase of core body temperature

(i) Put the stages in the correct order.

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

The last stage has been done for you.

				E

[2]

(ii) What are the symptoms of heat stroke?

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

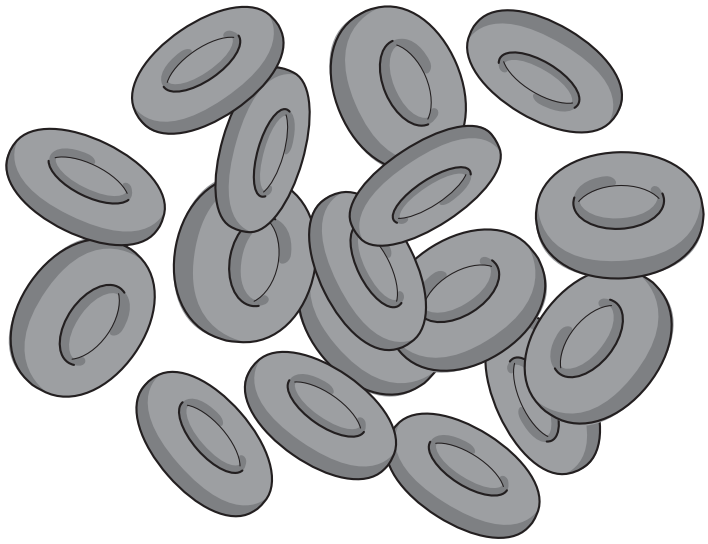
confusion	☐
dizziness	☐
feeling hungry	☐
hot, dry skin	☐
increased urine production	☐

[1]

[Total: 6]

3 Red blood cells can carry oxygen around the body.

This is because they are filled with a **protein** called haemoglobin.



(a) (i) Where are proteins made in cells?

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

cell membrane **cell wall** **cytoplasm** **nucleus** **vacuole**

[1]

(ii) Each mature red blood cell loses its nucleus.

How does this affect the production of new haemoglobin in these cells?

Put a tick (✓) in the **correct** box.

The production of new haemoglobin…

…increases. ☐

…stays the same. ☐

…stops. ☐

[1]

(b) The genetic code in the nucleus is made from DNA.

Complete the sentence.

Put a (ring) around the **correct** word in each list.

The DNA molecule contains	two	different	bases.
	three		genes.
	four		proteins.

[2]

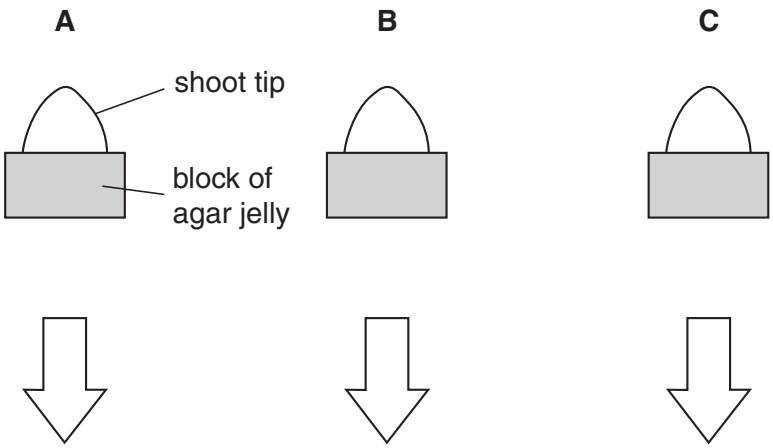
[Total: 4]

4 **(a)** Sara is studying growth in plants.

She follows three steps under different conditions, **A**, **B** and **C**.

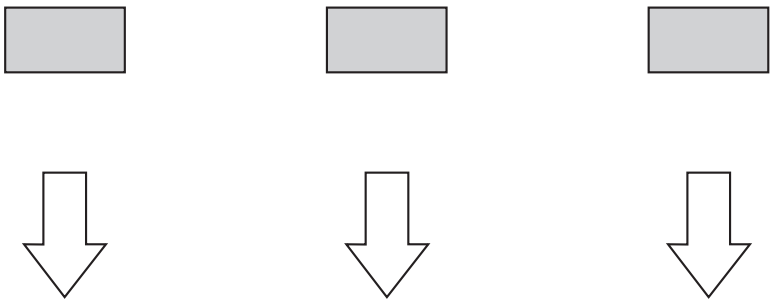
Step 1

She cuts the tips off three growing shoots and puts them onto blocks of agar jelly.



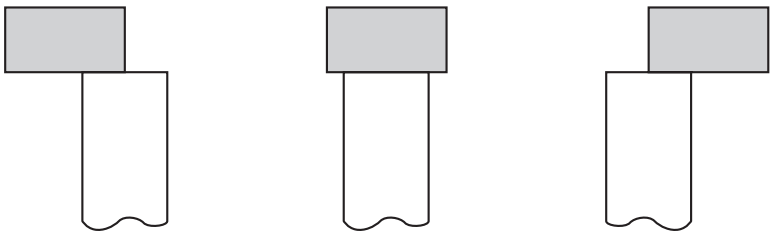
Step 2

She removes the tip from each block of agar jelly.



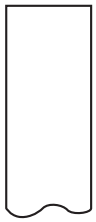
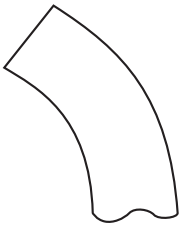
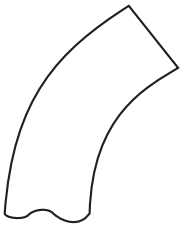
Step 3

She then places each block of agar jelly onto three shoots which have already had their tips removed.



The shoots are left to grow and Sara examines the direction of growth.

(i) Put the correct letter **A**, **B** or **C** in the box next to each shoot.

shoot appearance	letter
	
	
	

[1]

(ii) Sara's friends discuss the results.

Which **two** friends' ideas, when put together, correctly explain the results?

answer ..... and ..... **[2]**

(b) Sara finds that she can obtain similar growth patterns when giving shoots light from one direction.

This response is called **phototropism**.

Phototropism increases a plant's chance of survival.

Complete the sentence.

Choose the **correct** word from this list.

photoperiodism

photosynthesis

reproduction

respiration

This increased chance of survival is due to an increased rate of …… .

[1]

[Total: 4]

5 This question is about the development of cells in mammals and plants.

(a) Embryos of mammals develop by mitosis.

Which single cell divides by mitosis to produce an embryo?

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

egg cell

oviduct cell

sperm cell

testes cell

zygote cell

[1]

(b) During mammalian cloning the nucleus from a body cell can be inserted into an 'empty' egg cell.

This modified cell can then be made to divide.

It has the potential to produce different types of tissues.

(i) What happens to the genes in the nucleus of the modified cell during this process?

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

all genes become activated	☐
all genes become inactive	☐
some inactive genes are reactivated	☐
some genes are lost	☐

[1]

(ii) It is also possible to cause unspecialised **plant** cells to develop into a range of other tissues and organs.

A change in which of these factors may cause this to happen?

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

enzymes **hormones** **oxygen** **water**

[1]

[Total: 3]

6 **(a)** Stuart is a doctor studying the cerebral cortex of the brain.

One of Stuart's patients has damage to her cerebral cortex.

Which **two** processes are **most directly** affected by this damage?

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

The patient's ability to…

…blink in bright light. ☐

…feel a pin prick on her skin. ☐

…move her hand away from a hot surface. ☐

…remember things. ☐

…speak. ☐

[2]

(b) What is the best way in which Stuart could find the **exact part** of the cerebral cortex which was damaged?

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

Stuart is likely to…

…apply an electrical charge to parts of the brain. ☐

…record the pulse rate. ☐

…look at images from an MRI scanner. ☐

…take the core body temperature. ☐

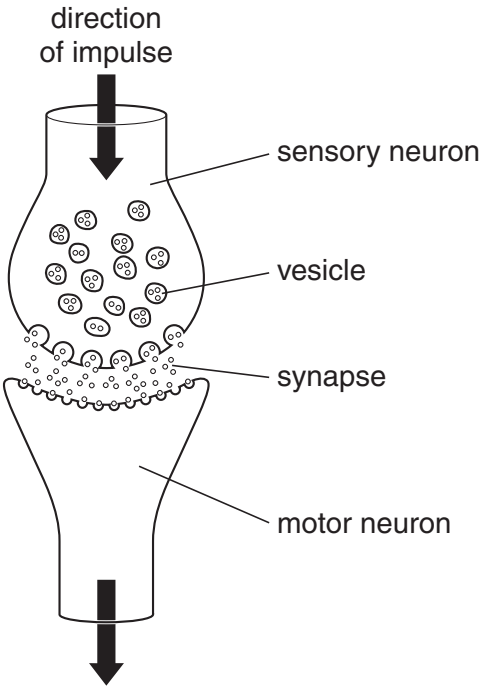
…take a urine sample. ☐

[2]

[Total: 4]

7 Synapses are gaps between neurons.

(a) The diagram shows a synapse between a sensory and motor neuron.



(i) The table describes the steps taking place at the synapse.

The steps are in the wrong order.

letter	step
A	synapse chemicals diffuse across the gap
B	synapse chemicals reabsorbed into the vesicles
C	vesicles release the synapse chemicals
D	synapse chemicals bind to receptor molecules
E	impulse arrives at the synapse

Put the steps in the correct order.

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

The first step has been done for you.

E				

[3]

(ii) Which part of the synapse contains the **receptor molecules**?

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

The receptor molecules are found on the membrane of…

…the fatty sheath. ☐

…the motor neuron. ☐

…the sensory neuron. ☐

…a vesicle. ☐

[1]

(b) Ecstasy has a mood-enhancing effect by changing the transmission of impulses across synapses.

Complete the sentences.

Choose words from this list.

brain **decrease** **increase**

peripheral nervous system **spinal cord** **stay the same**

Ecstasy mainly blocks sites of synapses in the …… .

These sites are where the chemical serotonin is removed.

The concentration of serotonin in the gap between the neurons will …… .

[2]

[Total: 6]

8 Gemma is driving her car.

She is stopped by a policeman because the road ahead is closed.

The policeman describes a different route to her.

(a) Gemma listens to the policeman and remembers the details of the different route.

Which **two** parts of Gemma's nervous system have been **directly** involved in remembering this new route?

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

ears

eyes

cerebral cortex

hypothalamus

pituitary gland

[2]

(b) What is the most likely way in which Gemma tries to remember the new route?

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

Gemma tries to remember the new route…

…by thinking about the appearance of the policeman. ☐

…by repeating the instructions. ☐

…by remembering the old route. ☐

…by the pattern of left and right-hand turns. ☐

…by thinking about how the voice of the policeman sounded. ☐

[1]

(c) Gemma found the new route harder to follow than her old route.

Why can Gemma remember the old route more easily than the new route?

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

She remembers the old route more easily because…

…the old route uses more fuel. ☐

…she knows that she turns left when she smells the sweet factory. ☐

…she travels at different times each day. ☐

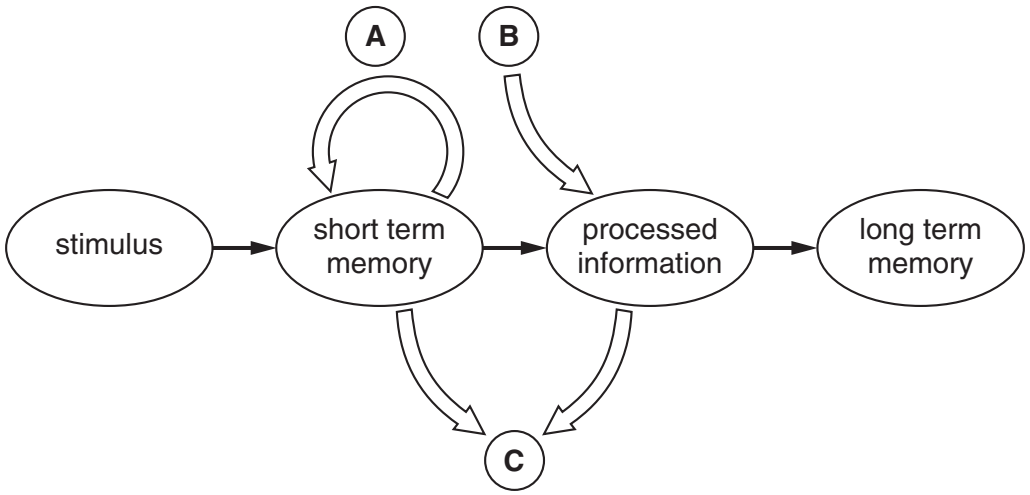
…she needs to turn left and right many more times. ☐

[1]

(d) Gemma learnt the original route a number of years ago.

There are various models used to describe the way in which we develop our memory.

The diagram shows one model.



What do the three parts of the model, **A**, **B** and **C**, represent?

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

secondary stimulus	
information rehearsed	
information lost	

[2]

[Total: 6]

END OF QUESTION PAPER

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