OCR
RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION
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

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.

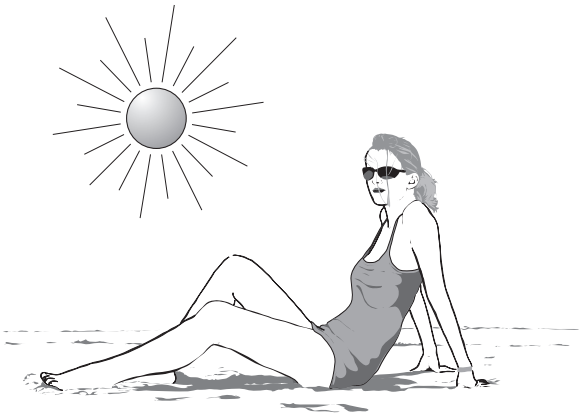
FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	**5**	
2	**5**	
3	**5**	
4	**5**	
5	**4**	
6	**4**	
7	**5**	
8	**5**	
9	**4**	
TOTAL	**42**	

Answer **all** the questions.

1 **(a)** Rachel is on holiday.

She is lying in the sun.

It is hot.



Rachel's body reacts to the heat in a number of stages.

The stages are in the wrong order.

A Sweat glands produce more sweat.

B The brain triggers the sweat glands to become active.

C The brain processes information from the receptors.

D Temperature receptors in the skin detect the external temperature.

Write a letter **A**, **B**, **C** or **D** in each box to show the correct order of the stages.

The first box has been done for you.

D			

[2]

(b) What is the purpose of sweating?

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

evaporates and cools the skin	☐
dries up and heats the skin	☐
keeps the skin clean	☐

[1]

(c) Rachel should avoid getting heat stroke when lying in the sun.

Complete the sentences about **heat stroke**.

Choose words from this list.

decreases **food** **heat**

increases **stays the same** **water**

Heat stroke can develop when the body temperature …… .

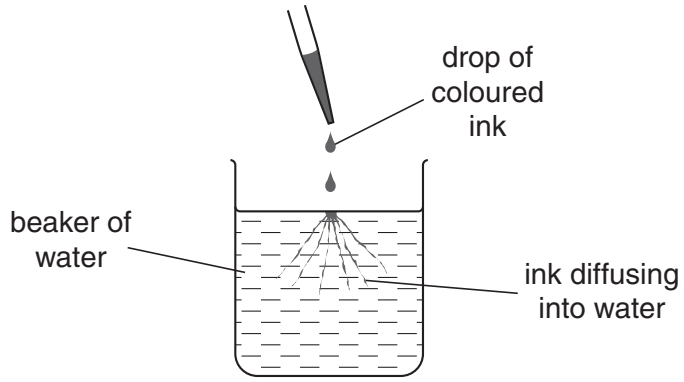
The body suffers from a lack of …… .

[2]

[Total: 5]

2 **(a)** Andy carries out a simple experiment to show diffusion.

He adds a drop of coloured ink to a beaker of water and watches what happens.



Complete the sentences.

Choose words from this list.

active **high** **low** **passive**

Diffusion is the …… movement of molecules from a region of their …… concentration to a region of their …… concentration.

[2]

(b) Osmosis is a type of diffusion.

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

Osmosis is the movement of…

…solute molecules. ☐

…water molecules. ☐

…molecules across a completely permeable membrane. ☐

…molecules across a partially permeable membrane. ☐

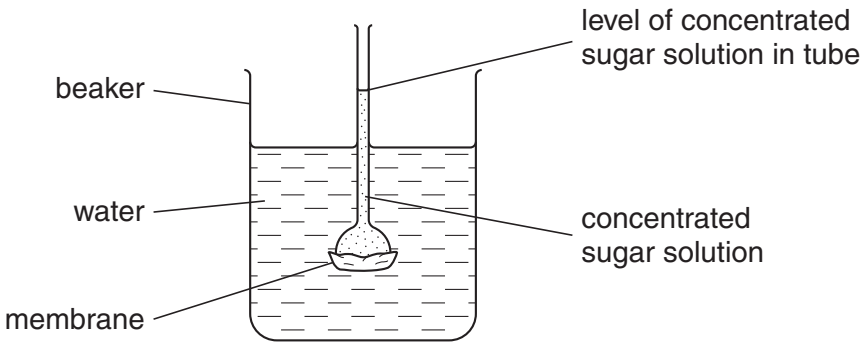
…molecules from a concentrated to a dilute solution. ☐

…molecules from a dilute to a concentrated solution. ☐

[2]

(c) Andy sets up another experiment.

The membrane allows water molecules to pass through but not sugar molecules.



What will happen to the **level** of concentrated sugar solution in the tube?

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

becomes higher **becomes lower** **stays the same**

[1]

[Total: 5]

3 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]

[Total: 5]

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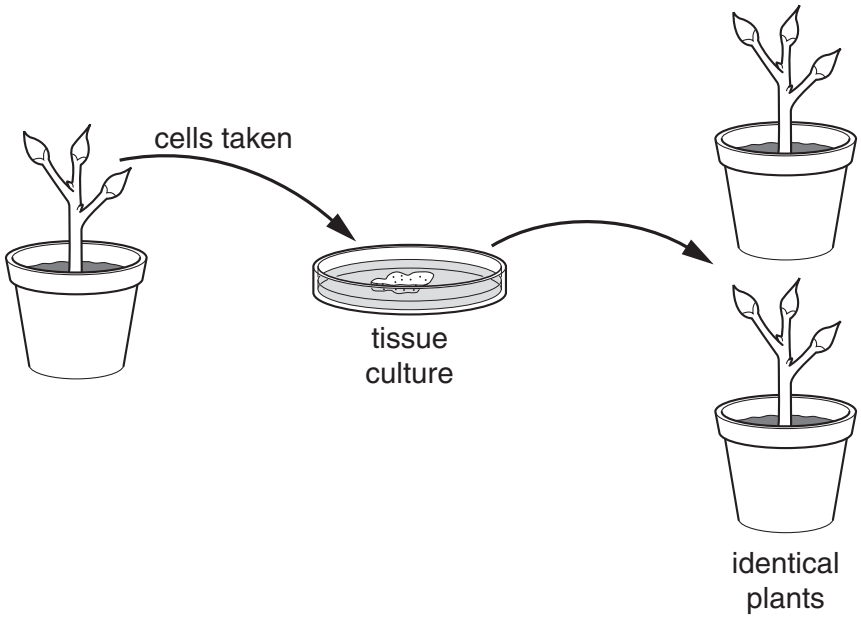
4 **(a)** James takes some cells from a plant.

He grows the cells in a dish of nutrients.

This is called tissue culture.

The cells from the tissue culture produce identical plants.



(i) What process is taking place in cells of the tissue culture to produce new cells that are identical to each other?

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

fertilisation **meiosis** **mitosis**

[1]

(ii) What happens to the number of organelles in cells during growth before they divide?

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

decreases **increases** **stays the same**

[1]

(b) James grows some geranium plants until they produce flowers.

He examines one of the flowers and finds some gametes.

A gamete is a sex cell which contains chromosomes from a parent.

Flowering plants make gametes for sexual reproduction.

(i) What happens to the chromosome number when the flower produces its gametes?

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

The chromosome number in the gamete is…

…doubled. ☐

…halved. ☐

…the same. ☐

…tripled. ☐

[1]

(ii) A male gamete from one flower can join with a female gamete from another flower.

What is the name of the cell formed **immediately** after they join?

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

embryo **fruit** **seed** **xylem** **zygote**

[1]

(iii) James finds out that the chromosome number in each gamete is 14.

How many chromosomes will be found in the cell formed after the gametes have joined together?

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

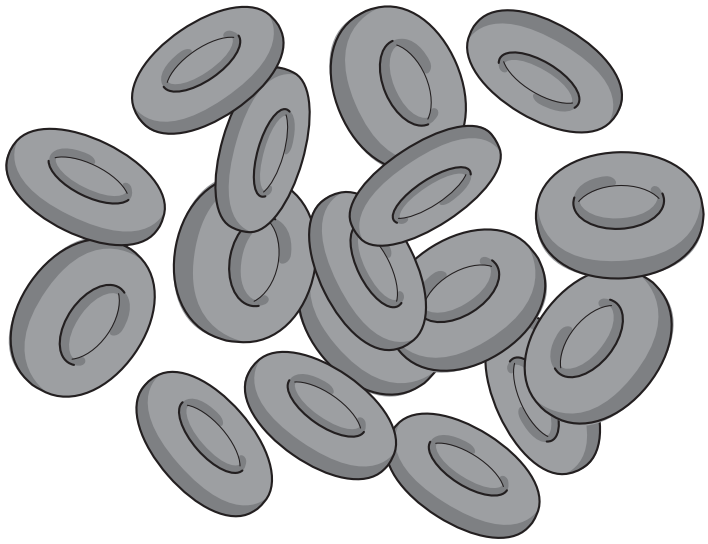
7 **14** **21** **28**

[1]

[Total: 5]

5 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 box next to the **correct** answer.

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.

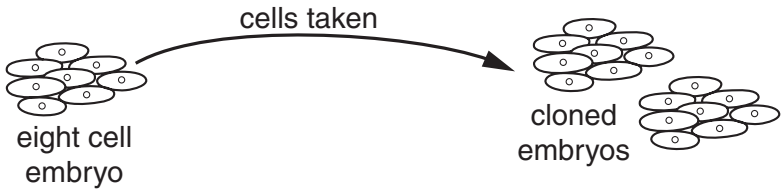
[2]

[Total: 4]

6 Ruth works in a research laboratory.

She takes cells from embryos at the 'eight cell' stage.

She uses these cells to produce cloned embryos.



(a) Why must Ruth **not** use cells from embryos after the 'eight cell' stage to make clones?

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

The cells are already specialised. ☐

The cells are too small. ☐

The cells have stopped growing. ☐

[1]

(b) Cells may be very different to each other but they have the **same genes**.

How can this happen?

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

The cells contain…

…genes that are all active. ☐

…genes that are all inactive. ☐

…some active and some inactive genes. ☐

[1]

(c) Which one of these structures divides by mitosis to form an embryo?

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

brain **egg** **muscle** **sperm** **zygote**

[1]

(d) Both plants and animals grow.

Which feature of growth is shared by both plants and animals?

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

Both plants and animals…

…continue to grow in height and width throughout their lives. ☐

…have some cells which continue to divide by mitosis. ☐

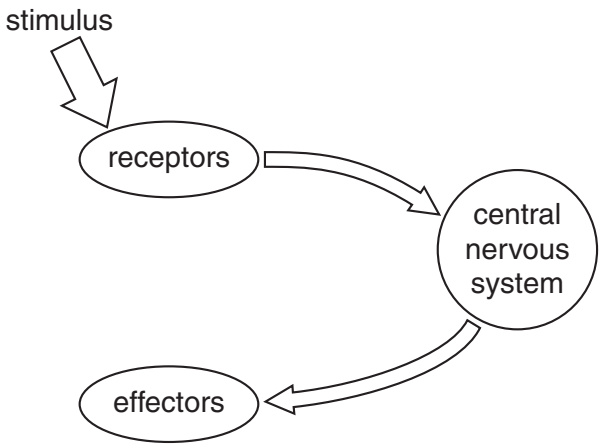
…have only specialised cells. ☐

[1]

[Total: 4]

7 **(a)** This question is about the central nervous system (CNS) in animals.

Receptors and effectors are connected to the central nervous system.



(i) What connects the central nervous system to the receptors and effectors?

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

backbone

blood vessels

brain

peripheral nervous system

[1]

(ii) Which cells are effectors?

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

bone cells

red blood cells

muscle cells

[1]

(b) (i) Nerve cells are called neurons.

There are different types of neurons.

What is the function of sensory neurons?

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

Sensory neurons carry impulses from the…

…CNS to the effectors. ☐

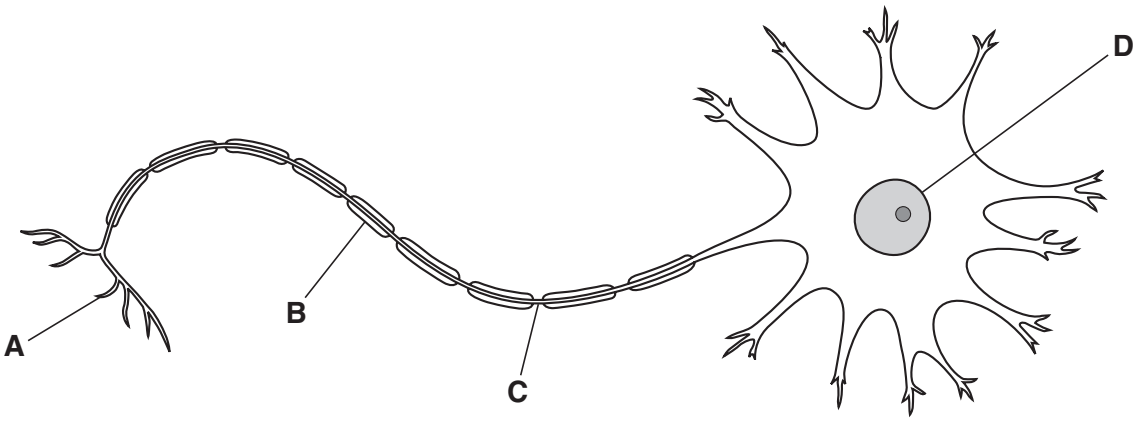
…CNS to the receptors. ☐

…effectors to the CNS. ☐

…receptors to the CNS. ☐

[1]

(ii) The drawing shows the structure of a motor neuron.



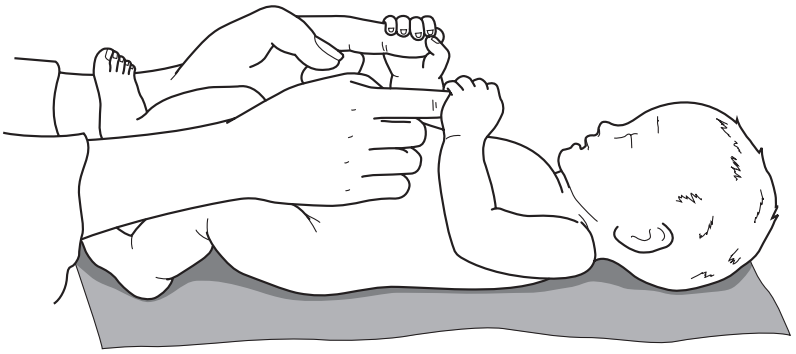
Write the correct letter **A**, **B**, **C** or **D** in the box next to each structure.

structure	letter
axon	
fatty sheath	
nucleus	

[2]

[Total: 5]

8 Jo is a newborn baby.



A nurse is testing Jo's reflex actions.

The nurse puts her fingers onto Jo's hands.

Jo grasps the nurse's fingers.

(a) Which type of reflex action and response is shown by Jo?

Draw **one** straight line to link the correct **reflex action** to the correct **response**.

reflex action	**response**
complex	involuntary
simple	voluntary

[1]

(b) As Jo's brain develops she will respond to many more things in her environment.

(i) What will happen to the neuron pathways in her brain as it develops?

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

new pathways form ☐

the pathways are broken down ☐

the pathways do not change ☐

[1]

(ii) What are these neuron pathways in Jo's brain carrying?

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

blood ☐

impulses ☐

food ☐

oxygen ☐

[1]

(c) Synapses are tiny gaps between the neurons in Jo's brain.

The speed at which synapses transmit information can change.

Which **two** people give correct reasons for this change?

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

[Total: 5]

9 **(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]

END OF QUESTION PAPER

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