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Centre number						Candidate number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

A222/01

**TWENTY FIRST CENTURY SCIENCE
BIOLOGY A**

Unit 2: Modules B4 B5 B6 (Foundation Tier)

MONDAY 24 JANUARY 2011: Afternoon

DURATION: 40 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

**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)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- **Write your name, centre number and candidate number in the boxes on the first page. 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.**

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.**

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QUESTION 1 STARTS ON PAGE 4

Answer ALL the questions.

1 Kidneys are important organs.

They filter salt, sugar and water out of the blood.

The kidneys may then reabsorb these substances.

(a) Complete the table.

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

	kidneys reabsorb ALL of the substance	kidneys reabsorb as much of the substance as the body needs	kidneys do NOT reabsorb any of the substance
salt			
sugar			
water			

[2]

(b) The concentration of the urine is affected by the concentration of the blood plasma.

Which two factors may directly change the concentration of the blood plasma?

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

amount of oxygen in the blood

amount of salt in the blood

drinking fluids

the person's height

rainfall

[2]

[Total: 4]

2 A group of biology students uses animal cells to study diffusion.

(a) Describe the process of diffusion.

[2]

(b) The students find out that animal cells survive by using oxygen and dissolved food.

The animal cells produce carbon dioxide.

What is the direction of movement of these molecules?

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

	moves INTO the cell	moves OUT of the cell	NO overall movement
oxygen			
carbon dioxide			
dissolved food			

[1]

(c) The process of OSMOSIS also occurs in animal cells.

Complete the sentences about osmosis.

Use words from this list.

FREELY PERMEABLE

CONCENTRATED

DILUTE

NON-PERMEABLE

PARTIALLY PERMEABLE

SALT

SUGAR

WATER

Osmosis is the overall movement of

_____ **molecules.**

These molecules move from a

_____ **to a**

_____ **solution.**

The molecules move through a

_____ **membrane. [2]**

[Total: 5]

3 Lizzie is an astronaut.

She is doing a space walk.

Space is very cold.

(a) Lizzie's body maintains a constant internal temperature.

This is an example of which process?

Put a ring around the correct answer.

DENATURATION

HOMEOSTASIS

HYPOTHERMIA

RESPIRATION

[1]

(b) The temperature of the air inside Lizzie’s space suit is maintained at a constant level.

The temperature control system in a space suit is designed to work in a similar way to the body control system in humans.

Draw a straight line to link each PART OF THE SPACE SUIT CONTROL SYSTEM to the matching PART OF THE BODY CONTROL SYSTEM.

Then draw a straight line to link each PART OF THE BODY CONTROL SYSTEM to its FUNCTION.

**PART OF THE
SPACE SUIT
CONTROL
SYSTEM**

**temperature
probe**

**heating
system**

**control
circuit**

**PART OF
THE BODY
CONTROL
SYSTEM**

brain

effector

receptor

FUNCTION

**detects the
temperature**

**processing
centre**

**produces
the
response**

[2]

(c) Lizzie's space suit is not working properly.

(i) The air temperature inside her suit increases.

This causes a small increase in Lizzie's body temperature.

Write down what effect, if any, this has on the rate of reactions in Lizzie's body.

Explain your answer.

effect on rate _____

explanation _____

_____ **[3]**

(ii) Lizzie becomes dehydrated.

Put a ring around ONE way in which Lizzie is most likely to be losing water from her body.

DIGESTION

MOVING

SWEATING

DRINKING

TALKING

[1]

[Total: 7]

4 Two scientists, Watson and Crick, are famous because they discovered the structure of DNA in 1953.

(a) Complete the sentences about DNA.

Use words from this list.

CYTOPLASM

DOUBLE

MEMBRANE

NUCLEUS

SINGLE

TRIPLE

DNA has a _____ helix structure.

The genetic code is based on the structure of DNA.

The DNA is kept in the _____ but proteins are produced in the

_____ .

[2]

(b) Watson and Crick found that DNA is made from different bases.

Draw one straight line between the correct NUMBER OF TYPES OF BASES and the way in which they are JOINED TOGETHER.

NUMBER OF TYPES OF BASES	JOINED TOGETHER
two	in twos
three	in fours
four	in eights

[1]

(c) Since the 1950s, much more is known about DNA and the cell cycle.

(i) What happens to the strands of DNA during cell growth in the cell cycle?

[2]

(ii) A bean plant has 22 chromosomes in each leaf cell.

How many chromosomes will be found in each new leaf cell produced by mitosis?

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

11

22

44

88

[1]

[Total: 6]

5 This question is about the nervous system in mammals.

(a) Which structures are only found in the CENTRAL nervous system?

Put a ring around each of the TWO correct answers.

BRAIN

EFFECTOR

LIVER

RECEPTOR

RETINA

SPINAL CORD

[2]

(b) Complete the sentences about neurons.

Use words from this list.

AXON

CELL BODY

CELL MEMBRANE

CELL WALL

DECREASES

INCREASES

MAINTAINS

NUCLEUS

The long structure containing cytoplasm in a motor neuron is called the

_____ .

This structure is surrounded by a

_____ .

A fatty sheath can be found on some motor neurons.

This sheath _____ the speed of transmission of a nerve impulse.

[3]

(c) Reflex arcs are part of the nervous system.
 Impulses are transmitted along the reflex arc.
 Complete the labels on the diagram.
 Use the correct words from this list.

BRAIN

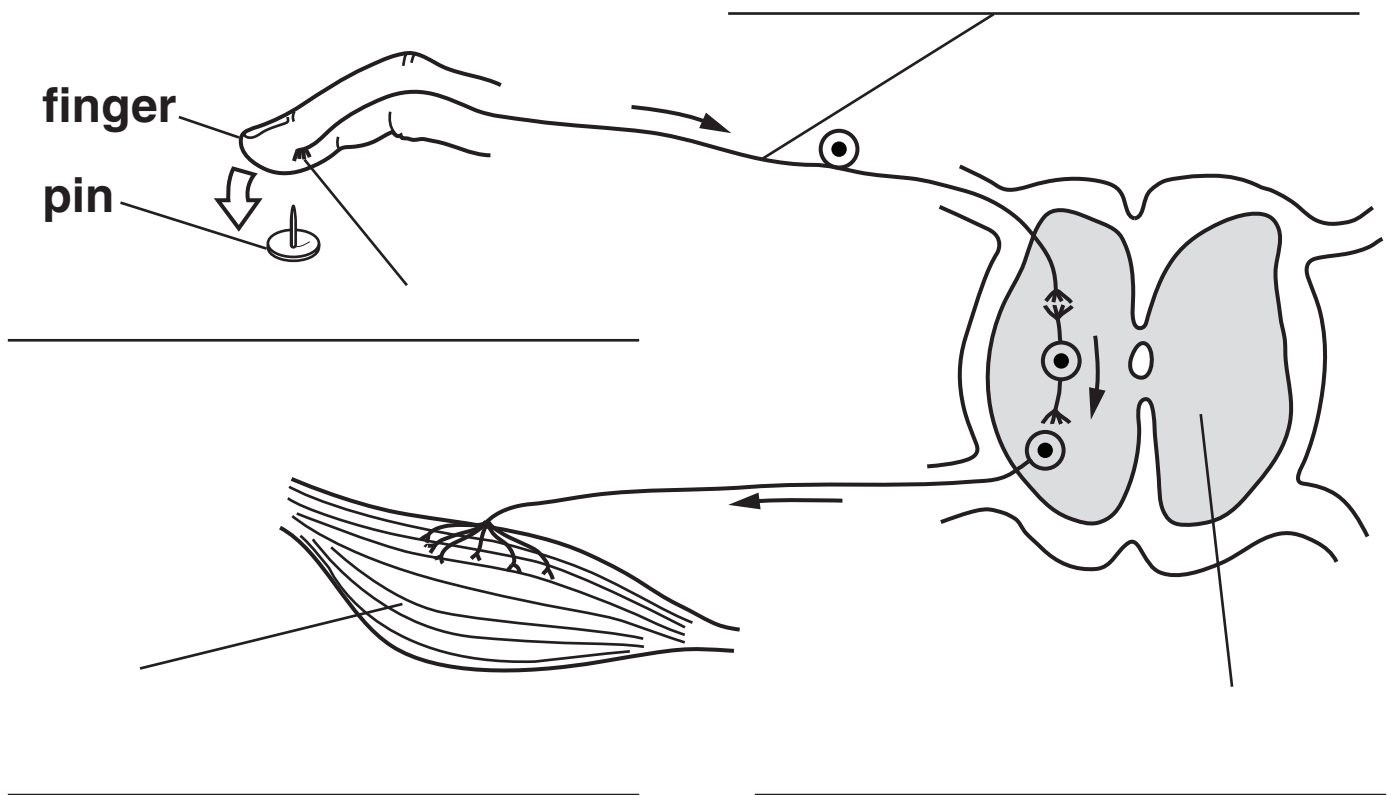
EFFECTOR

MOTOR NEURON

RECEPTOR

SENSORY NEURON

SPINAL CORD



[2]

[Total: 7]

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QUESTION 6 STARTS ON PAGE 18

6 Some students are talking to a research scientist about specialisation of cells.

(a) The scientist asks the students to give her some ideas about HUMAN cells and their specialisation.

ANDREW

Each body cell in a human contains different genes.

GEORGE

When human cells specialise, they produce only the proteins they need.

CHARLEY

Many genes in a specialised human cell are not active.

LISA

Cells collected from a human embryo at the 16 cell stage can become any type of specialised cell.

RACHEL

Some genes are missing in specialised human cells.

Which TWO students suggest correct ideas?

answers _____ and _____ [2]

(b) Plants also have specialised and unspecialised cells.

(i) Which part of a PLANT contains ONLY unspecialised cells?

answer _____ [1]

(ii) Unspecialised plant cells can develop into a range of tissues and organs.

Give one example of a plant tissue and one example of a plant organ.

plant tissue _____

plant organ _____ [2]

[Total: 5]

7 An MRI scanner can be used to study patients with brain damage.

(a) Which other method can be used to identify brain damage?

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

TAKING BODY TEMPERATURE

ELECTRICAL STIMULATION

PULSE READING

URINE SAMPLING

[1]

(b) A patient's MEMORY may be affected by damage to the cerebral cortex.

(i) Put a tick (✓) in the box next to the correct description of memory.

Memory is the ...

... activity of effectors.

... response to a stimulus.

... storage and retrieval of information.

... ability to link together previous experiences.

[1]

- (ii) As well as memory, other processes are carried out by the cerebral cortex.**

Write down two of these other processes.

1 _____

2 _____ **[2]**

[Total: 4]

8 Mark is a newborn baby.

He holds onto his mother's finger very soon after he is born.

(a) Which word best describes this reflex?

Put a ring around the correct answer.

CONDITIONED

LEARNED

SIMPLE

VOLUNTARY

[1]

(b) Mark's brain contains billions of neurons.

What will happen to certain pathways in Mark's brain as he learns from experience?

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

Learning causes some of Mark's pathways to ...

... be lost.

... transmit much stronger impulses.

... transmit impulses more quickly than others.

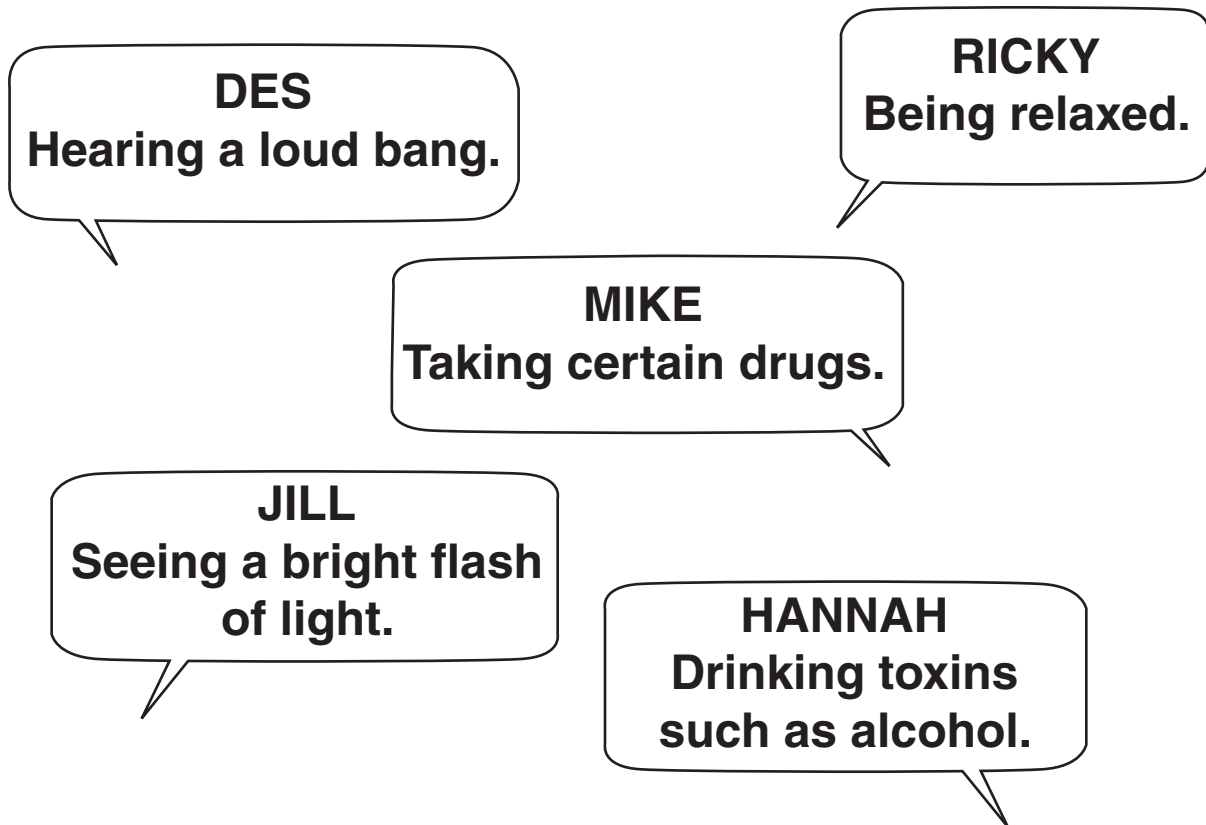
... be more likely to transmit impulses than others.

[1]

(c) Synapses are tiny gaps between neurons.

The speed at which synapses transmit information can change.

A group of friends suggest possible causes for this change.



Which TWO people give examples that can cause this change?

answers _____ and _____ [2]

[Total: 4]

END OF QUESTION PAPER



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