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Centre number						Candidate number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE**

A222/01

**TWENTY FIRST CENTURY SCIENCE
BIOLOGY A**

Unit 2: Modules B4 B5 B6 (Foundation Tier)

TUESDAY 31 JANUARY 2012: Morning

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. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **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).**

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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Please turn over for Question 1

Answer ALL the questions.

1 David is visiting a hot country.



(a) David's body is kept at a constant internal temperature.

David gains heat and he loses heat.

Draw a straight line to link David's heat gain to the correct box.

David's heat gain

is greater than his heat loss

is equal to his heat loss

is less than his heat loss

[1]

(b) Complete the sentences about temperature change and the body.

Use words from this list.

Each word may be used once, more than once or not at all.

blood

effectors

heart

kidney

receptors

skin

The temperature in the air is detected by

temperature _____

in the _____ .

**Temperature _____ in the brain
detect the temperature**

of the _____ . [2]

(c) David puts a cap soaked in water on his head.

Suggest how this helps him to control his body temperature.

[3]

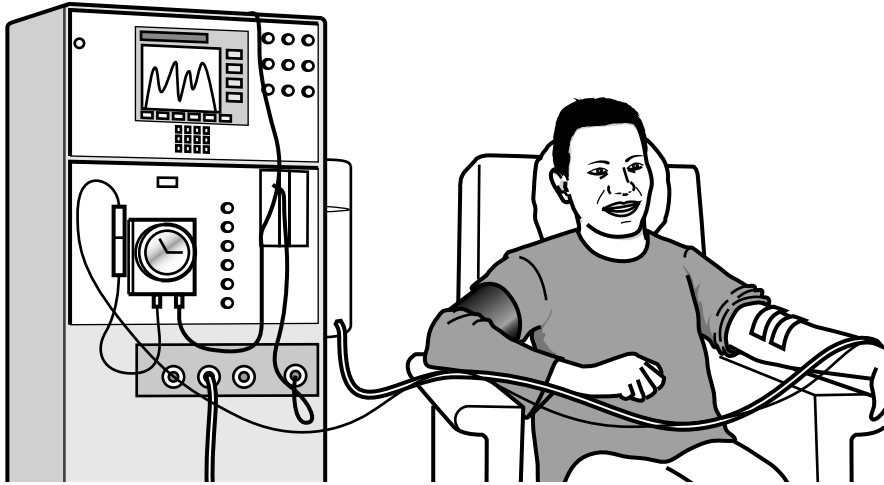
[Total: 6]

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Question 2 begins on page 8

2 Mr Armit has kidney problems.

He visits his local hospital so that his blood can be filtered by an artificial kidney machine.



(a) When Mr Armit is using the artificial kidney machine he drinks lots of water.

What are TWO other ways in which Mr Armit can GAIN WATER?

and _____

[2]

(b) Complete the sentences about the function of healthy kidneys.

Use words from this list.

blood

enzymes

fully

not

partly

salt

starch

urine

water

Kidneys filter molecules from the blood to form

_____ .

Some molecules are reabsorbed back into the blood in different amounts.

Sugar is _____ reabsorbed.

The kidneys reabsorb as much water and

_____ as the body needs.

[3]

[Total: 5]

3 Ruth wants to find out about osmosis in animal cells.

She already knows that animal cells are surrounded by a partially permeable membrane.

(a) Describe the process of osmosis.

[2]

(b) Ruth puts some animal cells into three different beakers, A, B and C.

The three beakers contain

A pure water

B a salt solution that is the same concentration as the inside of the cells

C a salt solution that is more concentrated than the inside of the cells.

She uses a microscope to look at the cells before and after the experiment.

What will happen to the cells?

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

		CELLS BURST	CELLS SHRINK	CELLS STAY THE SAME
A	cells in pure water			
B	cells in a salt solution that is the same concentration as the inside of the cells			
C	cells in a salt solution that is more concentrated than the inside of the cells			

[2]

[Total: 4]

4 This question is about the CELL CYCLE.

The main processes of cell growth and mitosis take place in the cell cycle.

(a) Each of the following events, A, B, C and D, takes place during either cell growth or mitosis.

A the cell divides

B the chromosomes are copied

C copies of the chromosomes separate

D numbers of organelles increase

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

CELL GROWTH	MITOSIS

[2]

(b) A group of 12 cells are studied using a microscope.

50% of the cells undergo mitosis and form new cells.

What is the total number of cells present at the end of mitosis?

Put a ring around the correct answer.

6

12

16

18

36

[1]

(c) What type of cell is produced by MEIOSIS?

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

gametes

neurons

skin cells

stem cells

[1]

(d) Cells produced by meiosis contain HALF the chromosome number of the parent cell.

Why is this important?

[2]

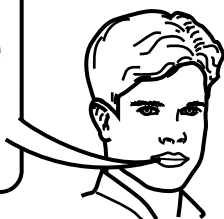
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Question 5 begins on page 16

5 A group of students are talking about DNA.

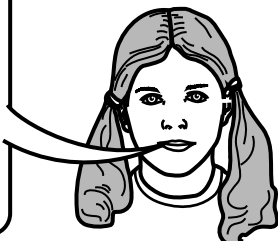
Liam
DNA is made
from two
strands.



Emma
DNA contains only
two different types
of bases.



Ali
Each DNA base
can pair up with
any other DNA
base.



Arthur
DNA forms a
double helix.

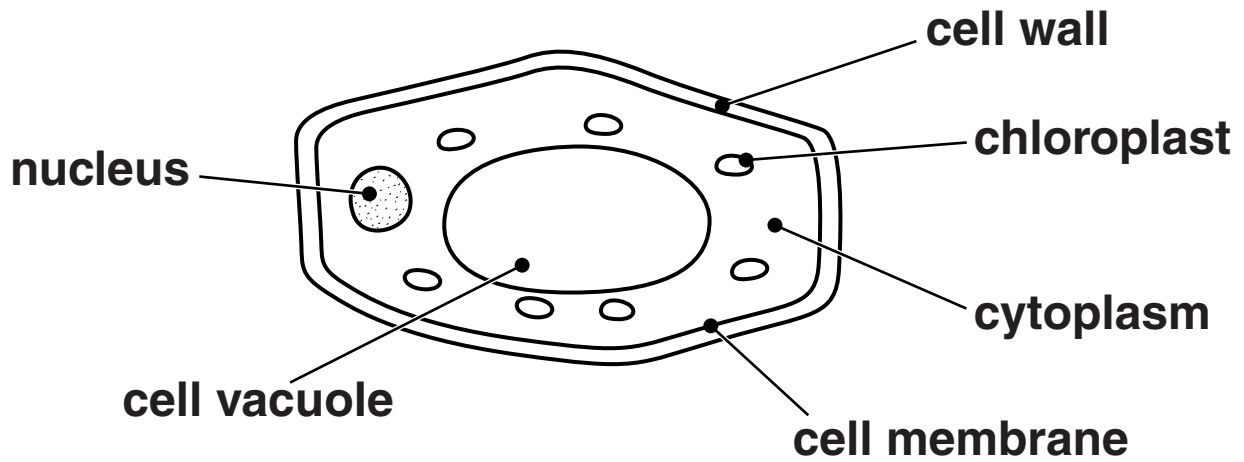


(a) Which TWO students give correct statements?

and _____

[1]

(b) Liam draws a plant cell.



Complete the sentences using labels from Liam's drawing.

Protein production happens in the

_____ .

The genetic code is stored in the

_____ .

[1]

[Total: 2]

6 A plant scientist is studying an apple tree.



(a) The scientist collects a seed from the apple tree and grows a seedling.

All of the cells in the seedling are produced from the same fertilised cell.

The cells specialise to do certain jobs.

(i) Which statements about cell specialisation are correct?

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

Each specialised cell only produces the specific proteins it needs.

Many of the genes in a specialised cell are not active.

New genes are produced during cell specialisation.

Some of the genes are lost as each cell becomes more specialised.

Specialised cells in the same seedling contain different genes.

The specialised cells only contain half the number of genes needed.

[2]

(ii) Complete the sentences about the development of cells.

Use words from this list.

alive

grow

respire

specialised

unspecialised

Unlike animal cells, some plant cells remain

_____ and can develop into any type of plant cell.

Unlike animals, most plants continue to

_____ throughout their lives.

[1]

(b) The scientist's seedling is kept on a bench near a window.

The seedling grows towards the light.

(i) What is this process called?

_____ [1]

(ii) Describe how the process of growing towards light is an advantage to the plant.

_____ [3]

[Total: 7]

7 Mice are very quick to respond to changes in their environment.

This is due to their nervous system.



(a) Draw straight lines to link each **STRUCTURE** of the nervous system to its **FUNCTION**.

STRUCTURE

FUNCTION

receptor

carries impulses from receptors to the CNS

sensory neuron

detects the stimulus

central nervous system (CNS)

carries impulses from the CNS to the effector

motor neuron

coordinates the mouse's response

[2]

(b) Which part of the nervous system connects the central nervous system (CNS) to the rest of the body?

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

brain

spinal cord

peripheral nervous system

synapse

[1]

(c) Motor neurons have an axon.

(i) What is the correct description of an axon?

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

AN AXON IS A ...

... special type of cell membrane.

... large cell body containing a nucleus.

... long fibre of cytoplasm surrounded by a cell membrane.

[1]

(ii) Some diseases destroy the fatty sheath around motor neurons.

This results in

- slower responses**
- impulses not reaching the correct effectors.**

Explain why these symptoms occur.

[2]

[Total: 6]

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Question 9 begins on page 26

8 Charles is a neuroscientist.

He studies the functions of the human brain.



(a) Charles uses ELECTRICAL STIMULATION to study the cerebral cortex in living patients.

State ONE other way of studying the cerebral cortex in these patients.

[1]

(b) The cerebral cortex is the site of memory.

Some people suffer from loss of memory.

(i) What will be affected by MEMORY LOSS?

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

The function of the spinal cord.

The storage and retrieval of information.

The activity of effectors, such as sweat glands.

The ability to carry out simple reflexes, such as blinking in bright light.

[1]

(ii) As well as memory, the cerebral cortex has other functions.

Put a ring around the TWO correct functions.

intelligence

language development

reflex actions

temperature control

water balance

[1]

[Total: 3]

9 Humans have large brains containing billions of neurons.

(a) Complete the sentences about the development of complex behaviour in humans.

Use words from this list.

brain

forgetting

impulses

learning

patterns

peripheral nervous system

a reflex

repetition

sensors

spinal cord

During development, the interaction between humans and their environment results in neuron pathways forming in the

_____ .

In humans, _____ is the result of experience where certain neuron pathways become more likely to transmit

_____ than others.

Some skills are learnt through

_____ . [2]

(b) Some actions can be learned.

Which of these actions are learned?

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

Jumping in response to a sudden, loud noise.

Maintaining a constant body temperature.

Quickly moving your hand from a sharp object.

Reducing the size of the pupils in the eyes.

Remembering a telephone number.

Speaking a language.

[1]

[Total: 3]

END OF QUESTION PAPER

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