

Candidate Forename						Candidate Surname					
Centre Number						Candidate Number					

**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 25 JANUARY 2010: 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 clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **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.**
- **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.**

BLANK PAGE

Answer ALL the questions.

- 1 (a) David's body maintains a constant internal temperature.

What is the name for this process in David's body?

Put a ring around the correct answer.

HOMEOSTASIS

HORMONAL

HYPERACTIVITY

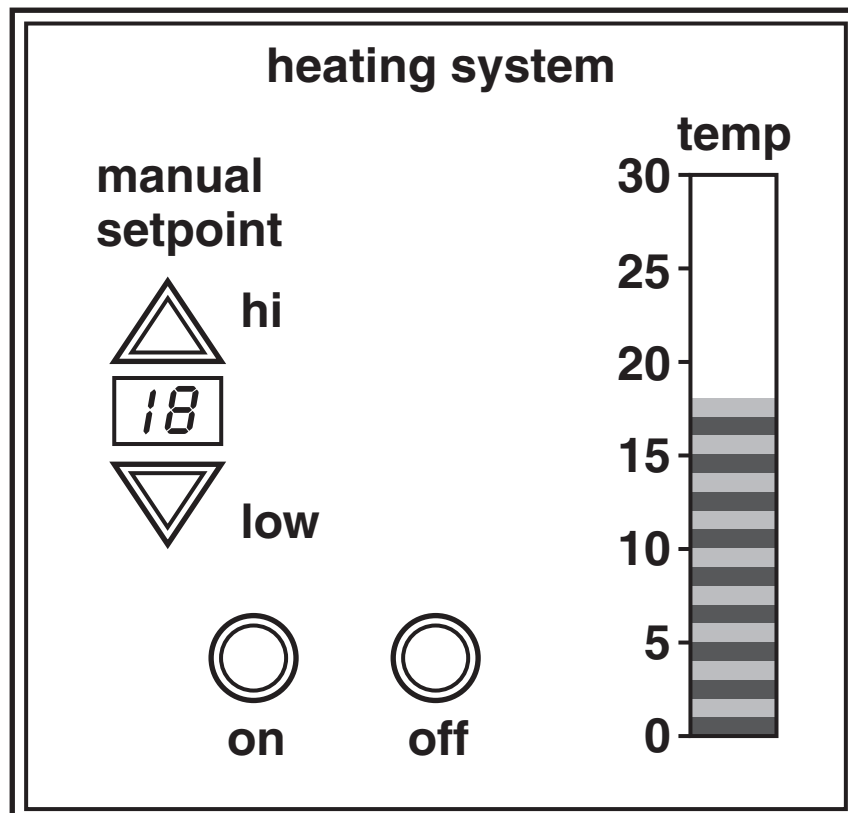
HYPOTHERMIA

[1]

- (b) David moves into a new apartment.

The apartment has an automatic temperature control system.

The system maintains a constant temperature in the apartment.



Parts of the temperature control system in the apartment act like parts of the human body.

Draw a straight line from each PART IN THE CONTROL SYSTEM to the PART IN THE HUMAN BODY that does the same job.

**PART IN THE
CONTROL SYSTEM**

heating and
cooling unit

computer

unit used to detect
room temperature

**PART IN THE
HUMAN BODY**

receptor

brain

effector

[2]

(c) How does the control system in David's body work to maintain a constant internal temperature?

In your answer you should consider the part played by:

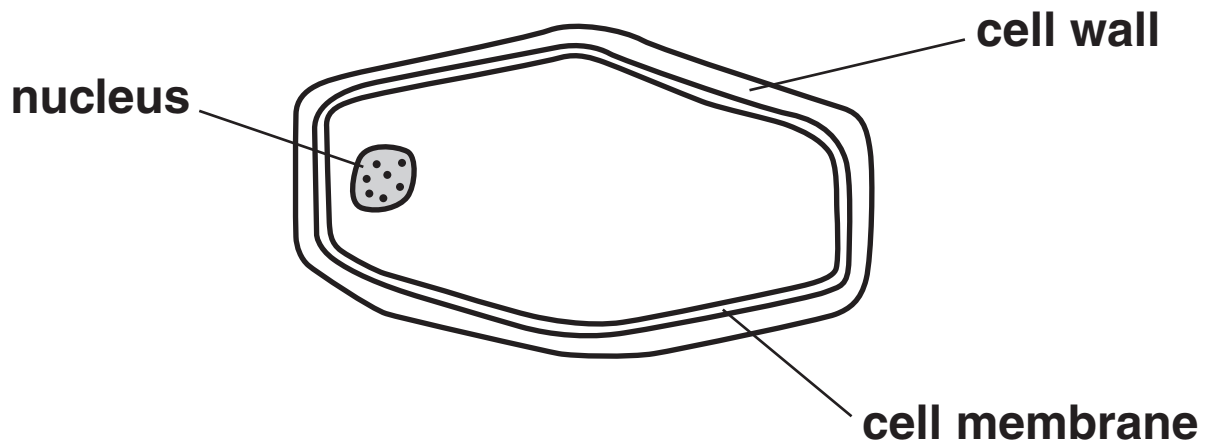
- **receptors**
- **brain**
- **effectors.**

[3]

[Total: 6]

2 Charlie is studying osmosis.

She looks at an onion cell using a microscope.



(a) The cell membrane is important in osmosis.

What is the best description of this membrane?

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

The membrane is ...

... partially permeable.

☐

... fully permeable to all molecules.

☐

... not permeable to any molecules.

☐

... not permeable to water molecules.

☐

[1]

(b) Charlie has some onion cells in a dilute sucrose solution.

She puts some of the cells in pure water and some in a concentrated sucrose solution.

What will happen to the AMOUNT OF WATER in the cells?

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

	INCREASES	DECREASES	STAYS THE SAME
onion cells in pure water			
onion cells in a concentrated sucrose solution			

[2]

- (c) Red blood cells are carried around the body in a fluid called blood plasma.

The amount of water in the red blood cells does not change.

Which statement explains why the amount of water does not change?

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

The concentration of the solution inside the red blood cells is ...

... less than the blood plasma.

☐

... the same as the blood plasma.

☐

... greater than the blood plasma.

☐

[1]

[Total: 4]

3 This question is about kidneys.

- (a) The kidneys excrete excess water from the body in urine.

Put a ring around THREE other ways in which water can be lost.

BREATHING

DRINKING

EATING

PRODUCING FAECES

RESPIRING

SWEATING

[1]

- (b) The kidneys filter some chemicals out of the blood.

Some chemicals are reabsorbed and others leave the body in the urine.

Complete the table to show what happens to each of these chemicals.

Put ticks (✓) in the correct boxes.

One row has been done for you.

	FILTERED OUT OF THE BLOOD	FOUND IN THE URINE
salt	✓	✓
sugar		
urea		
water		

[2]

(c) Kidneys can produce CONCENTRATED or DILUTE urine.

The concentration of urine is affected by different conditions.

For these two conditions, state the type of urine produced (CONCENTRATED or DILUTE) and explain why this happens.

- HIGH EXTERNAL TEMPERATURE

type of urine produced _____

explanation _____

- EATING TOO MUCH SALTY FOOD

type of urine produced _____

explanation _____

_____ [2]

[Total: 5]

4 Mr Mahmood is a biology teacher.

He gets his students to construct a model of DNA.

(a) Complete the sentences about the DNA model.

Use words from this list.

DOUBLE

FOUR

SINGLE

THREE

TRIPLE

TWO

The DNA model must be made from
_____ different bases.

The strands of DNA are held together by the bases
to form a _____ helix. [2]

- (b) Five students make statements about genes and protein production.

HELEN

The genetic code is held in the nucleus.

FRANK

A copy of a gene can leave the nucleus and is carried to the cytoplasm.

ALEX

The genes are able to leave the nucleus.

SEB

Proteins are made in the nucleus.

EMILY

The genetic code is not linked to protein synthesis.

Which two students made correct statements?

answer _____ and _____ [1]

- (c) Mr Mahmood asks his students to find out about the CELL CYCLE.

What happens to the chromosomes during CELL GROWTH and MITOSIS in the cell cycle?

during CELL GROWTH

during MITOSIS

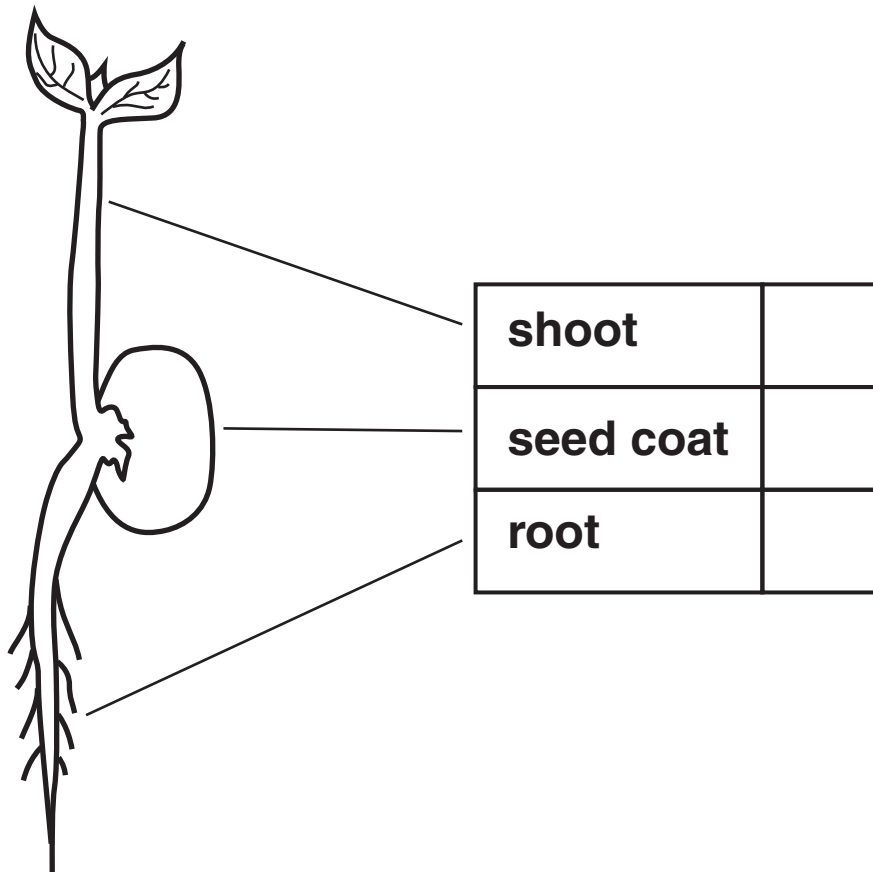
[2]

[Total: 5]

5 Amy grows a bean seedling.

(a) Which part of the bean seedling does NOT contain a meristem?

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



[1]

(b) The shoot of the bean seedling breaks.

Amy tries to grow a new plant from the piece of shoot that has broken off.

She dips the end of the damaged shoot in a powder before planting it.

What needs to be in the powder?

Draw a ring around the correct answer.

CHLOROPHYLL

HORMONES

ENZYMES

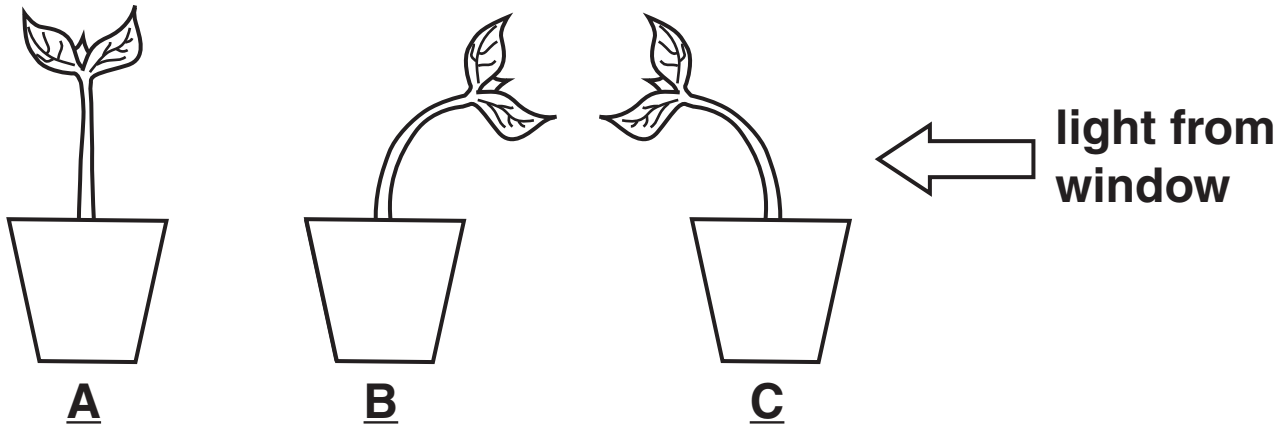
SUGAR

[1]

(c) Amy grows some more bean seedlings.

(i) What will the seedlings look like after three days?

Choose from A, B or C.



answer _____ [1]

(ii) The seedlings carry out many different processes.

Which process is directly affected by light?

Draw a ring around the correct answer.

EXCRETION

REPRODUCTION

PHOTOSYNTHESIS

RESPIRATION

[1]

[Total: 4]

6 Joe is a farmer.

He is very proud of his prize cow because she produces good quality milk.

Joe would like his cow to give birth to calves that could also produce good quality milk.

(a) An adult cow has 60 chromosomes in its body cells.

How many chromosomes are in a cow's egg cell?

Put a ring around the correct answer.

15

30

60

120

[1]

- (b) The cow's egg cells are fertilised by sperm from a bull.

Complete the sentences.

Use words from this list.

ALL

FERTILISATION

HALF

MEIOSIS

MITOSIS

MOST

The egg cells and sperm cells are gametes and are produced by _____ .

An egg cell and a sperm cell fuse to form a zygote.

The zygote will contain _____ of the chromosomes found in the cow's egg cell.

[2]

(c) Each zygote will grow to form an embryo.

Joe finds out that scientists can take individual cells from an embryo and make identical copies of the embryo.

This is not successful after a certain stage of embryo development.

Why is this?

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

The cells have become ...

... larger.

☐

... older.

☐

... smaller.

☐

... specialised.

☐

[1]

(d) An embryo grows into a female cow.

Every cell in the cow contains the same genes.

Only some of the cells in the cow produce milk.

Explain why.

**Use ideas about GENES and
PROTEIN PRODUCTION in your answer.**

[2]

[Total: 6]

- 7 Lucy and James are learning a dance for their next performance.

Lucy is struggling to remember the new steps.

Lucy's cerebral cortex is the part of her brain responsible for memory.

- (a) What else is the cerebral cortex responsible for?

Put a ring around the THREE correct answers.

BALANCING WATER LEVELS

CONSCIOUSNESS

HOMEOSTASIS

INTELLIGENCE

LANGUAGE DEVELOPMENT

REFLEX ACTIONS

[2]

- (b) Lucy asks James to describe what memory is.

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

looking at information

☐

responding to information

☐

storing information

☐

retrieving information

☐

[1]

(c) James tries to explain the dance steps to Lucy.

He uses verbal memory.

(i) What does James need to use verbal memory?

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

James needs ...

... long-term memory only.

☐

... short-term memory only.

☐

... both short and long-term memory.

☐

[1]

- (ii) James tells Lucy that she will eventually learn the new steps by repeating them during rehearsals.

What will happen to the neuron pathways in Lucy's brain as she learns the steps?

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

Some neuron pathways ...

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

☐

... start to transmit impulses in both directions.

☐

... transmit impulses more quickly.

☐

... stop transmitting impulses.

☐

[1]

[Total: 5]

8 Earthworms have a nervous system.

They have the same sort of reflexes as humans.

They can be seen above the soil surface when they leave their burrows.

(a) An earthworm will move back into its burrow quickly if it is touched.

This is a reflex action.

Complete this sentence about the reflex action shown by the earthworm.

Use words from this list.

COMPLEX

INVOLUNTARY

SIMPLE

VOLUNTARY

The earthworm's reflex action is both

_____ and _____ .
[1]

(b) Why is THIS reflex action an advantage to earthworms?

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

It helps earthworms to ...

... find a mate.

☐

... gain oxygen.

☐

... search for food.

☐

... hide from predators.

☐

[1]

(c) Humans have a more complicated nervous system than earthworms.

Humans have a central nervous system.

Which TWO structures are part of the central nervous system?

Put a ring around the TWO correct answers.

BRAIN

SKIN

LIVER

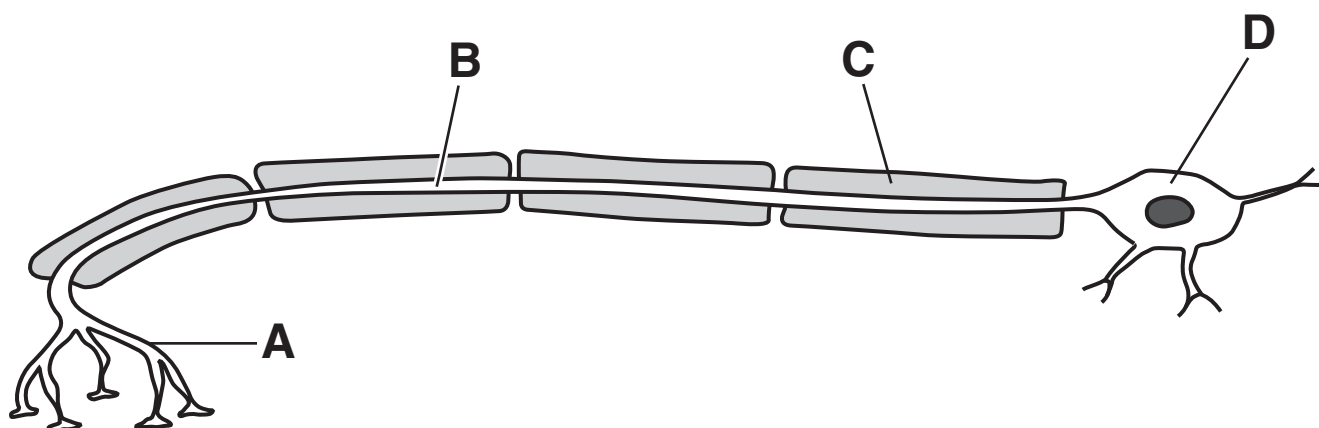
SPINAL CORD

MUSCLE

[1]

[Total: 3]

9 The diagram shows a motor neuron.



(a) Which structure, A, B, C or D, is the AXON?

answer _____ [1]

(b) Write about the fatty sheath.

In your answer include

- where it is
- what job it does.

[3]

[Total: 4]

END OF QUESTION PAPER



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