Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION

A222/02

TWENTY FIRST CENTURY SCIENCE

BIOLOGY A

Unit 2: Modules B4 B5 B6
(Higher Tier)

TUESDAY 22 JUNE 2010: 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

DC (CW/DJ) MEP60591 32556/1

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. 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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Answer ALL the questions.

1 Andy goes out in cold weather.

(a) Andy's internal body temperature stays at 37 °C.

This is an example of homeostasis.

(i) What is HOMEOSTASIS?

_____ **[1]**

(ii) What should happen to energy GAIN and energy LOSS to keep Andy's body temperature at 37 °C?

_____

_____ **[1]**

(b) Complete the sentences about body temperature.

Choose words from this list.

BRAIN

EFFECTORS

NEURONS

RECEPTORS

SKIN

SPINAL CORD

The external temperature is detected by the

_____

in the _____ .

The temperature of the blood is detected in the

_____ . **[3]**

(c) Andy's muscles produce heat.

Which process in Andy's muscles produces heat?

Put a (ring) around the correct answer.

BREATHING **DIFFUSION**

DIGESTION **RESPIRATION**

[1]

[Total: 6]

2 This question is about control systems.

(a) Doctors may use artificial control systems to help patients.

One example is using an artificial control system to maintain a patient's blood oxygen levels.

The artificial control system is designed to act like different parts of the body.

Draw a straight line from each FUNCTION of the artificial control system to the PART OF THE BODY that it acts like.

FUNCTION	PART OF THE BODY
detects any change in blood oxygen levels	processing centre in the brain
receives information about blood oxygen levels	receptors
adds more or less oxygen to the blood	effectors

[1]

(b) Negative feedback takes place in both artificial and body systems.

What are the characteristics of a <u>NEGATIVE FEEDBACK</u> system?

_____

_____

_____

_____

_____ **[3]**

[Total: 4]

3 Sharveena drinks a glass of water.

(a) In what other ways can Sharveena gain water?

Put a (ring) around the TWO correct answers.

BREATHING

EATING FOOD

EXCRETING URINE

PRODUCING FAECES

RESPIRING

SWEATING

[2]

(b) The concentration of Sharveena's urine is controlled by the hormone ADH.

(i) Which part of her brain RELEASES ADH into the bloodstream?

Put a (ring) around the correct answer.

CEREBRAL CORTEX

HYPOTHALAMUS

PITUITARY GLAND

SYNAPSE

[1]

(ii) Sharveena drinks another glass of water.

How does ADH help to control the balance of water in Sharveena's body?

_____

_____

_____

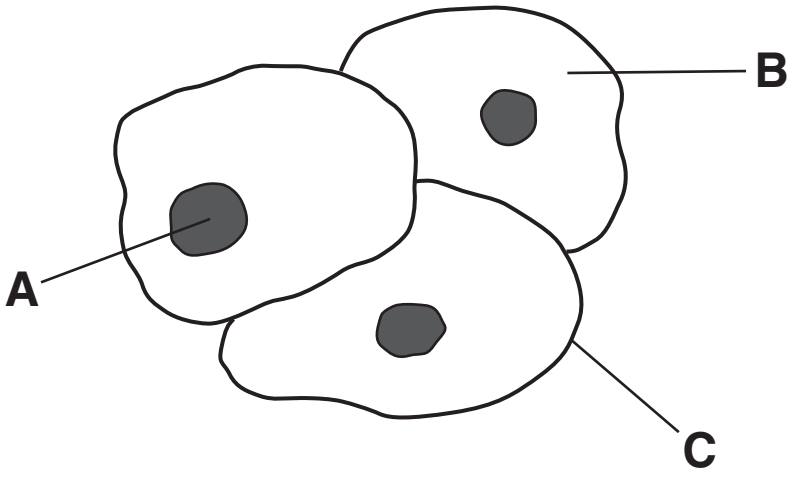
_____

_____ **[3]**

[Total: 6]

4 Alan uses a microscope to study cells.

He looks at some human cheek cells.



(a) Complete the table to match each <u>DESCRIPTION</u> with the correct <u>LABEL</u>.

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

DESCRIPTION	LABEL
where the genetic code is found	
where proteins are made	

[1]

(b) The growth and development of each cell is controlled by its DNA.

What are the features of DNA?

Put a (ring) around the correct answer in each row.

DNA FEATURE				
number of strands	1	2	3	4
number of different types of bases	2	3	4	5
arrangement of bases between the strands	SINGLE	PAIRS	TRIPLETS	FOURS
shape of molecule	CIRCULAR	CUBIC	HELIX	ZIG-ZAG

[3]

[Total : 4]

5 Fertilisation in humans involves the fusion of gametes or sex cells to form a zygote with 46 chromosomes.

(a) Meiosis occurs during the formation of gametes.

Four people try to explain the link between meiosis and fertilisation.

JO
Fertilisation causes the zygote to have the full chromosome number.

LEE
Fertilisation avoids the chromosomes mixing together inside the zygote nucleus.

RAY
Meiosis produces gametes with 23 chromosomes each.

SUE
Since the number of chromosomes in gametes is halved, twice as many gametes can be produced.

Which TWO people's ideas, when put together, give the best explanation of the link between meiosis and fertilisation?

answer _____ and _____[1]

(b) The parent cells used to form the gametes are different from the zygote that is produced after fertilisation.

Why is this?

_____

_____ **[1]**

(c) The human zygote develops into an embryo.

Each cell in the embryo completes the CELL CYCLE.

(i) Complete the sentences about the cell cycle.

Choose words from this list.

CHROMOSOMES

EIGHT

NUCLEI

ORGANELLES

SIXTEEN

THIRTY TWO

As each cell grows before mitosis it

contains an increased number of

_____ .

Every cell in the embryo has the potential to

produce any sort of cell, up to the

_____ cell stage.

[2]

(ii) Cells in the embryo become specialised.

What are the results of this change?

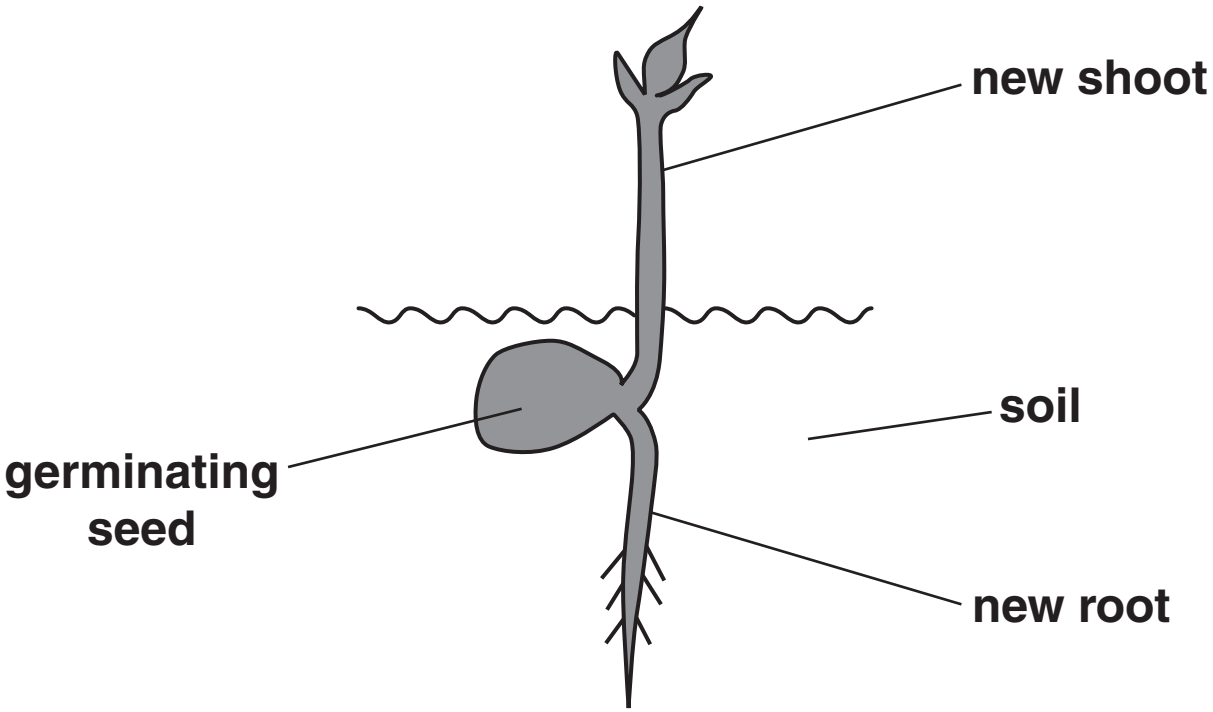
Put a tick (✓) in each row to show whether each statement is true or false.

	TRUE	FALSE
The cells no longer contain the same genes.		
Some of the genes are no longer active.		
Each cell produces only the specific proteins it needs.		
The cells form different types of tissues.		

[2]

[Total: 6]

6 David grows a seedling for an experiment.



(a) The shoot and root both increase in length.

Which part of the seedling causes this increase?

Put a (ring) around the correct answer.

MERISTEM

PHLOEM

ROOT HAIR

XYLEM

[1]

(b) David allows the seedling to grow into a large plant.

He cuts a shoot from the large plant.

He dips the cut end of the shoot into a rooting powder.

What must the powder contain?

Put a (ring) around the correct answer.

ANTIBODIES **ANTIGENS**

ANTISERUM **AUXIN**

[1]

(c) The cutting is a clone.

What happens as clones grow?

Complete the sentences.

Choose words from this list.

CELL WALLS

CHROMOSOMES

DOUBLES

GENES

HALVES

PHLOEM

SPECIALISED

STAYS THE SAME

UNSPECIALISED

XYLEM

The chromosome number in each cell

_____ .

In plants, new xylem cells develop from

_____ cells.

During mammalian cloning, some

_____ are reactivated.

[2]

[Total: 4]

7 Tom is enjoying his camping holiday.

He sits by a camp fire.

(a) Complete the sentences.

Choose words from this list.

EFFECTORS

HEAT

LIGHT

MOTOR

RECEPTORS

SENSORY

SOUND

Tom can see the flames of the fire.

The receptor cells in the retina of the eye are stimulated by _____ .

Impulses are carried from the eye to the brain by _____ neurons. [1]

(b) Some neurons have long fibres called axons.

(i) What surrounds the axon?

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

chloroplast ☐

membrane ☐

vacuole ☐

cell wall ☐

[1]

(ii) The axon of some neurons is also surrounded by a fatty sheath.

Describe TWO functions of the fatty sheath.

_____

_____

_____ **[2]**

[Total: 4]

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8 The gaps between sensory and motor neurons are called SYNAPSES.

(a) When an impulse is transmitted, a series of events take place at the synapse.

These statements are in the wrong order.

One statement is incorrect.

A Chemicals are released into the synapse.

B The receptor molecules produce chemicals.

C Chemicals bind with receptor molecules on the motor neuron membrane.

D Chemicals diffuse across the synapse.

E The impulse travels along the motor neuron.

F An impulse reaches the end of a sensory neuron.

Select the five correct statements and put them into the correct order.

Write the letters A, B, C, D, E or F in the boxes.

The last one has been done for you.

				E

[2]

(b) The synapse chemicals are NOT able to stimulate the sensory neuron.

Suggest why.

_____

_____

_____ **[1]**

(c) A chemical found in many brain synapses is SEROTONIN.

The drug Ecstasy causes an increase in serotonin concentration.

How does this happen?

_____

_____

_____ **[1]**

[Total: 4]

9 Pavlov used salivation in dogs to study conditioned reflexes.

Pavlov's investigation consisted of a series of steps over a period of time to produce a CONDITIONED REFLEX.

(a) At each step a different stimulus was provided.

A dog hears bell ringing

B dog shown food

C dog shown food and hears bell ringing

Write the letters A, B or C in the unshaded boxes to show the correct stimulus provided at each step.

STEP 1: INITIAL REFLEX

	dog salivates	dog given food

STEP 2: REPEATED MANY TIMES

	dog salivates	dog given food

STEP 3: CONDITIONED REFLEX

	dog salivates	dog given food

[2]

(b) A number of conclusions could be made following the completion of this investigation.

Some conclusions are TRUE and some are FALSE.

Put a tick (✓) in each row to show whether each conclusion is true or false.

	TRUE	FALSE
The bell was used as a primary stimulus.		
The conditioned reflex response had a direct connection to the primary stimulus.		
The dog learned to associate the secondary stimulus with the primary stimulus.		

[2]

[Total: 4]

END OF QUESTION PAPER

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