

Candidate forename						Candidate surname					
Centre number						Candidate number					

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**  
**GCSE**  
**A222/02**  
**TWENTY FIRST CENTURY SCIENCE**  
**BIOLOGY A**

**Unit 2: Modules B4 B5 B6 (Higher Tier)**

**WEDNESDAY 20 JUNE 2012: Morning**

**DURATION: 40 minutes**  
**plus your additional time allowance**

**MODIFIED ENLARGED**

**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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**Answer ALL the questions.**

**1 Maria is playing tennis.**

**She feels hot.**

**(a) Maria's internal body temperature stays the same, even though it is very hot outside.**

**(i) What is this process called?**

**answer \_\_\_\_\_ [1]**

**(ii) Maria gains heat from the energy released by her muscles.**

**What must happen to Maria's heat LOSS and heat GAIN to keep her body temperature constant?**

\_\_\_\_\_  
\_\_\_\_\_ **[1]**

**(b) Describe how the external temperature and the temperature of the blood are detected by Maria's body.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ **[3]**

**[Total: 5]**

**2 Sam drinks lots of water.**

**(a) Apart from drinking, name TWO other ways in which Sam can gain water.**

**1** \_\_\_\_\_

**2** \_\_\_\_\_ **[1]**

**(b) Sam drinks far more water than he needs.**

**His body now contains too much water.**

**What will happen in Sam's kidneys?**

**Put ticks (✓) in the correct boxes to complete the table.**

<b>Process</b>	<b>Decreases</b>	<b>Increases</b>	<b>Stays the same</b>
<b>Reabsorption of sugar</b>			
<b>Reabsorption of water</b>			
<b>Excretion of urea</b>			

**[2]**

**(c) The concentration of urine produced is controlled by the hormone ADH.**

**Which part of the body releases ADH into the bloodstream?**

**answer** \_\_\_\_\_ **[1]**

**[Total: 4]**

**3 This question is about control systems.**

- (a) Artificial control systems are designed to allow astronauts to survive during a space mission.**

**It is necessary to maintain the correct oxygen level in an astronaut's space suit.**

**Some of the equipment linked to the astronaut's suit is designed to act like parts of the body.**

**Draw a straight line from each FUNCTION of the equipment to the PART OF THE BODY to which it corresponds.**

**FUNCTION**

**detects any change in  
oxygen levels**

**processes information  
about oxygen levels**

**adds more or less  
oxygen**

**PART OF THE  
BODY**

**the brain**

**receptors**

**effectors**

**[1]**

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

**What is negative feedback?**

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**[3]**

**[Total: 4]**

**4 This question is about human cells.**

**(a) Complete the table.**

**Write the NAME of the part of the human cell ...**

<b>... where DNA is found.</b>	
<b>... where proteins are made.</b>	

**[1]**

**(b) What are the features of DNA?**

**Complete the table by putting a tick (✓) in the correct box in each row.**

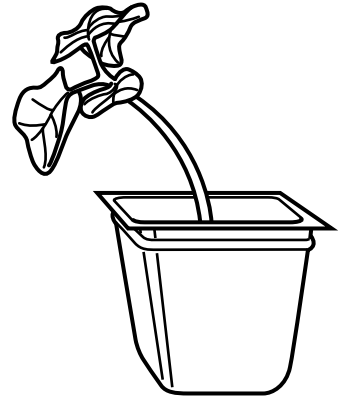
<b>The DNA molecule ...</b>	<b>True</b>	<b>False</b>
<b>... has a double helix shape.</b>		
<b>... is found in chromosomes.</b>		
<b>... is made from four strands.</b>		
<b>... contains five different types of bases.</b>		
<b>... has bases which always pair up in the same way.</b>		

**[2]**

**[Total: 3]**



**5 Plant seedlings form new shoots and roots.**



**(a) Plant shoots grow towards a light source.**

**Explain how auxin brings about this directional growth.**

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**[3]**

**(b) What name is given to any plant tissue which can produce new cells?**

**answer** \_\_\_\_\_ **[1]**

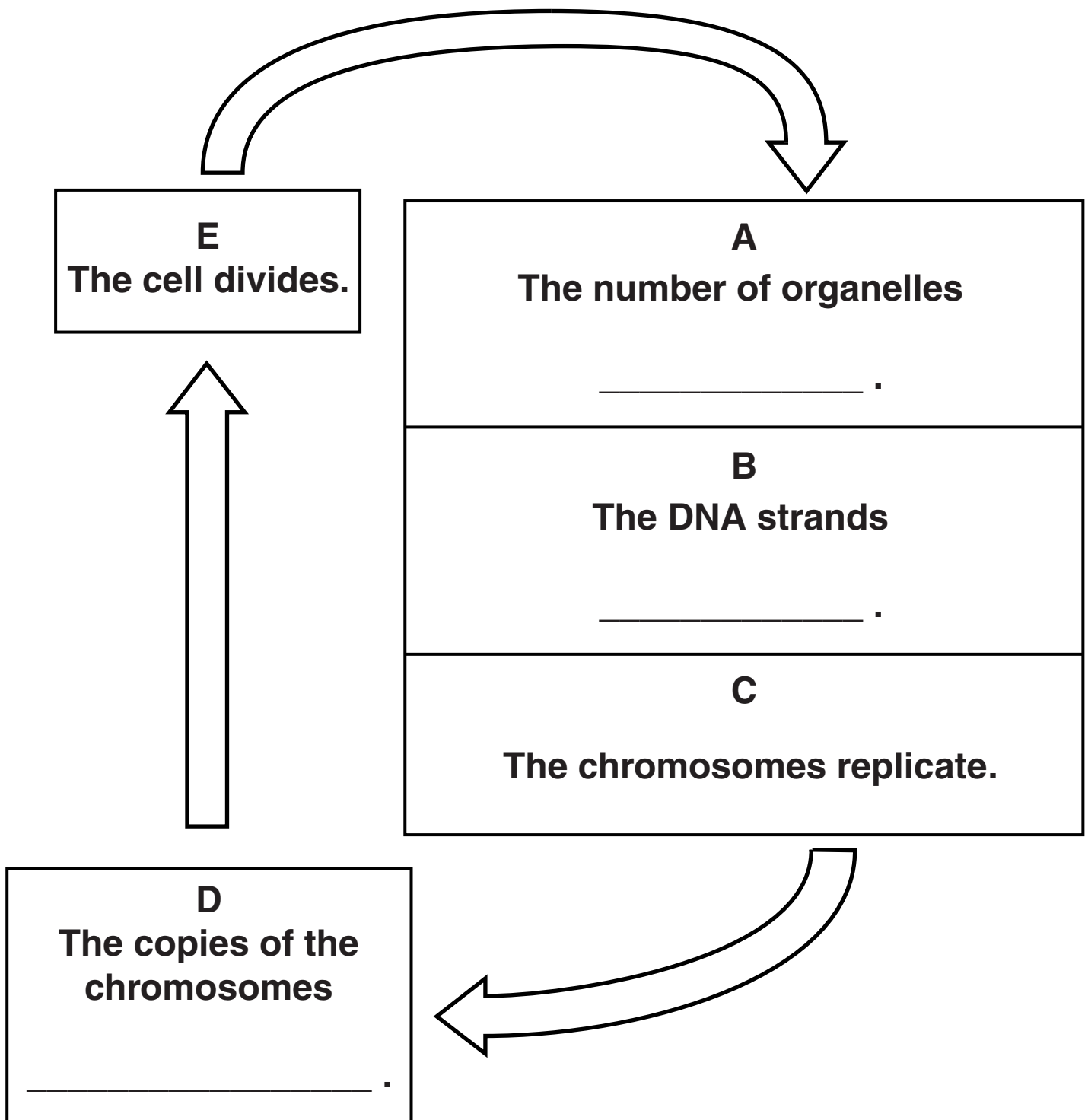
**[Total: 4]**

6 Gametes fuse to form a zygote during fertilisation.

(a) The zygote grows to form an embryo.

Each cell in the embryo undergoes the **CELL CYCLE**.

(i) Complete the diagram of the cell cycle.



[3]

**(ii) Which letters represent mitosis? Choose from A, B, C, D and E.**

\_\_\_\_\_ **[1]**

**(b) Cells become specialised as embryos develop.**

**What happens to the genes as embryo cells undergo specialisation?**

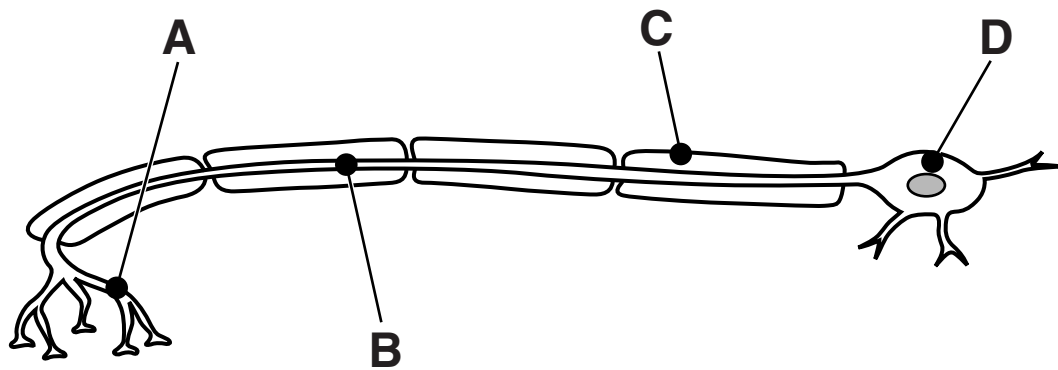
**Put a tick (✓) in the correct box next to each statement to show whether it is TRUE or FALSE.**

	<b>True</b>	<b>False</b>
<b>The cells contain the same genes.</b>		
<b>All of the genes are active.</b>		
<b>Each cell produces only the specific proteins it needs.</b>		

**[1]**

**[Total: 5]**

**7 The diagram shows a motor neuron.**



**(a) Which part of the neuron is the AXON and which part is the FATTY SHEATH?**

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

<b>axon</b>	
<b>fatty sheath</b>	

**[1]**

**(b) A scientist is investigating the speed of nerve impulses.**

**He records the speeds of impulses travelling along five different neurons.**

	Neuron				
	1	2	3	4	5
Speed of nerve impulses in m/s	90	80	85	75	70

**What is the average speed of the nerve impulses recorded?**

**Show your working.**

**answer \_\_\_\_\_ m/s [1]**

- (c) The fatty sheath of the motor neuron may be damaged.

Suggest how this will affect the neuron.

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[2]

- (d) Which structure RECEIVES impulses from the motor neuron?

Put a ring around the correct answer.

effector

receptor

retina

sensory neuron

[1]

[Total: 5]

**8 A SYNAPSE is a gap between adjacent neurons.**

**(a) A number of different steps take place at the synapse between two neurons.**

**The following steps are in the wrong order and one is incorrect.**

- A Chemicals are released into the synapse.**
- B An impulse reaches the end of a neuron.**
- C Chemicals bind with receptor molecules on the second neuron membrane.**
- D Chemicals diffuse across the synapse.**
- E The impulse travels along the second neuron.**
- F The receptor molecules release chemicals.**

**Select the five correct statements and put them in the correct order.**

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

**The first one has been done for you.**

<b>B</b>				
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**[2]**

**(b) Explain why the impulse can only travel in ONE DIRECTION across the synapse.**

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**[2]**



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

**Complete the sentences about the effects of the drug ECSTASY.**

**Put a tick (✓) in the correct box to complete each sentence.**

**Ecstasy blocks the sites in the brain's synapses**

**where serotonin is ...**

<b>... produced.</b>	
<b>... removed.</b>	
<b>... secreted.</b>	

**As a result, the serotonin concentration in**

**the synapse ...**

<b>... decreases.</b>	
<b>... increases.</b>	
<b>... stays the same.</b>	

**[1]**

**[Total: 5]**

**9 Edward is a student.**

**He is studying for an examination.**

**(a) As part of his revision, Edward is trying to remember lots of facts.**

**(i) Write down the definition of MEMORY.**

\_\_\_\_\_ [1]  
\_\_\_\_\_

**(ii) Which part of the brain is most concerned with memory?**

**answer** \_\_\_\_\_ [1]

**(b) Edward asks his friends about how they revise for their exams.**

**He makes a list of their revision methods.**

**Put ticks (✓) in the boxes next to the methods which are likely to help Edward to remember information.**

**I do my revision when on holiday because it is much nicer that way.**

☐

**I leave my learning until the morning of the exam so that there is no time to forget it.**

☐

**I don't bother to write notes because the facts are in my textbook.**

☐

**I look for patterns in what I am learning.**

☐

**I go over my school work time and time again.**

☐

**I colour-code my notes.**

☐

**[2]**

**(c) Edward asks four friends in his school to describe the link between learning and neuron pathways.**

**Daniel**

**Certain neuron pathways become more likely to transmit impulses than others.**



**Rachel**

**Some pathways transmit impulses more quickly than others.**



**Emma**

**During development, new neuron pathways are formed as a result of changes in the environment.**



**Andy**

**Some pathways stop working because the neurons no longer function.**



**Write down the names of the friends who give a  
CORRECT answer.**

\_\_\_\_\_ [1]

**(d) Some FERAL CHILDREN do not develop language skills.**

**Which TWO of the following statements, A, B, C, D, E, F or G, when taken together, explain this?**

- A Language skills are inherited.**
- B Language skills are reflex actions.**
- C Memories can only form up to a certain age.**
- D A feral child has been without human contact for years.**
- E Feral children do not have neuron pathways in the brain.**
- F The sense organs in feral children do not develop properly.**
- G Some language skills cannot be acquired after a certain age.**

**statements \_\_\_\_\_ and \_\_\_\_\_ [2]**

**[Total: 7]**

**END OF QUESTION PAPER**

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