

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**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)**

**WEDNESDAY 22 JUNE 2011: 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. 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.**

**1 Maria is studying ENZYMES in a lesson.**

**(a) She works with a group of friends and asks them to describe the properties of enzymes.**

**Nick says, 'The shape of an enzyme is changed by the concentration of the enzyme.'**

**Lucy says, 'The collision rate between enzymes and molecules is greater at higher temperatures.'**

**Ranjit says, 'Many enzymes are denatured at 25 °C.'**

**Liz says, 'Enzymes need a specific constant temperature to work at their optimum.'**

**Jill says, 'Enzymes are made from proteins and carbohydrates.'**

**Which two friends give the best answers?**

**names \_\_\_\_\_ and \_\_\_\_\_ [2]**

**(b) Maria reads about the LOCK AND KEY model.**

**It describes how an enzyme works.**

**Explain the lock and key model.**

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**[3]**

**[Total: 5]**

2 (a) A patient has problems with his kidneys.

A doctor tests the patient's URINE and records the results in a table.

COMPOSITION OF PATIENT'S URINE	PRESENT
glucose	✓
salts	✓
urea	✓
water	✓

Which one of the four components of the patient's urine should normally be ABSENT?

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

(b) The patient produces the hormone ADH.

Where in the patient's body is ADH released?

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

**CEREBRAL CORTEX**

**HYPOTHALAMUS**

**PITUITARY GLAND**

**KIDNEY**

**MEDULLA**

[1]

**(c) Drinking alcohol affects urine production.**

**Describe AND explain the effects of alcohol on urine production.**

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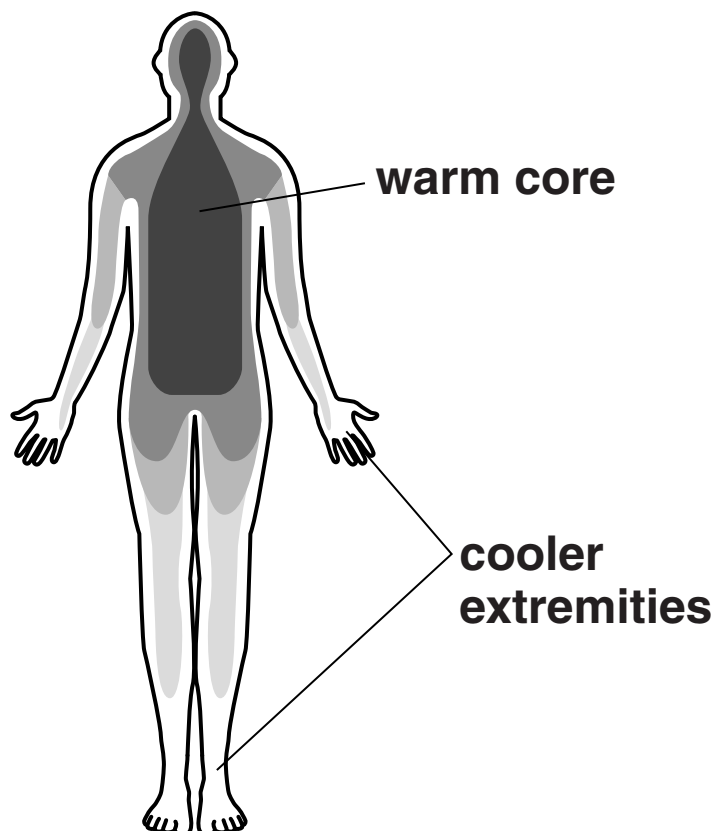
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**[3]**

**[Total: 5]**

**3 The extremities of the human body tend to be cooler than the core body temperature.**



**(a) Which part of the human brain contains receptors to detect the temperature of the blood?**

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

**(b) What happens if the core body temperature is TOO LOW?**

**Complete each sentence by putting a ring around the correct choice.**

**The blood vessels supplying skin capillaries**

**CONSTRICT/DILATE/STAY THE SAME.**

**The blood flow through the skin capillaries**

**INCREASES/DECREASES/STAYS THE SAME.**

**Energy loss at the skin surface**

**INCREASES/DECREASES/STAYS THE SAME. [2]**

**(c) The human body can also experience HEAT STROKE.**

**Explain what happens in the body during heat stroke.**

\_\_\_\_\_

\_\_\_\_\_ [2]

**[Total: 5]**

**4 George finds an oak tree seedling growing in his garden.**

**(a) A tissue at the tip of the root and stem of the oak seedling contains unspecialised cells.**

**These cells can continue to divide.**

**What is the name of this tissue?**

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

**(b) George lets the seedling grow into a young tree.**

**He takes a cutting from the young tree.**

**He cuts through one of the side-stems of the young tree and dips the cut end in a powder.**

**The powder contains AUXIN.**

**(i) What is auxin?**

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

**(ii) Why is auxin included in the powder?**

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



**(c) George plants his cutting in a pot of soil.**

**He puts the pot on a window ledge.**

**His cutting grows at an angle towards the light.**

**How does this directional growth response increase a plant's chance of survival?**

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**[3]**

**[Total: 6]**

**5 Dogs have millions of body cells.**

**(a) Every nucleus in the body cells of a dog contains 78 chromosomes.**

**Read the statements about cell division in dogs.**

**Each statement refers to either MITOSIS, MEIOSIS, NEITHER or BOTH.**

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

**You should have only ONE TICK in each row.**

	<b>ONLY MITOSIS</b>	<b>ONLY MEIOSIS</b>	<b>NEITHER MITOSIS OR MEIOSIS</b>	<b>BOTH MITOSIS AND MEIOSIS</b>
<b>The chromosome number in each new cell produced is 39.</b>				
<b>The new cells become sex cells or gametes.</b>				
<b>The nucleus is reformed in the cells produced.</b>				
<b>Two identical cells are produced.</b>				
<b>Takes place in muscle cells.</b>				

**[3]**

**(b) Why is it important that dog gametes contain 39 chromosomes?**

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**[1]**

**[Total: 4]**

**6 The human body contains many specialised TISSUES.**

**(a) A human embryo has different stages of development.**

**Complete the sentence.**

**The embryo BEGINS to show cell specialisation**

**AFTER the \_\_\_\_\_ cell stage. [1]**

**(b) Which of the statements about a skin cell in a human are true?**

**Put a tick (✓) in the box next to each correct statement.**

**A skin cell in a human ...**

**... has some inactive genes.**

**... has more genes than a muscle cell.**

**... contains genes that code for nervous tissue.**

**... produces all the same proteins as a liver cell.**

**... contains copies of the same genes as a liver cell.**

**[2]**

**(c) The spinal cord also contains specialised cells.**

**The spinal cord can become damaged due to injury.**

**Scientists are researching ways to replace these damaged tissues in humans.**

**Complete the sentences about this research.**

**Embryonic stem cells can be used because they are \_\_\_\_\_ .**

**These cells divide to make identical copies.**

**These copies are called \_\_\_\_\_ .**

**However, embryonic stem cells are difficult to obtain.**

**In this research, adult body cells are used.**

**A number of specific \_\_\_\_\_ are reactivated in the nucleus of the body cells to form the spinal cord tissue needed.**

**[2]**

**[Total: 5]**

**7 Impulses are transmitted within the brain in mammals.**

**What happens to the brain when a mammal develops and learns new skills?**

**Include in your answer ideas about**

- **neuron pathways**
- **transmission of impulses**
- **repetition.**

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**[3]**

**[Total: 3]**

**8 There are different types of reflexes shown by animals.**

**(a) One type of reflex is a conditioned reflex.**

**Name ANOTHER type of reflex and give an example.**

**type of reflex \_\_\_\_\_**

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

**(b) A famous experiment was carried out by Pavlov to show a conditioned reflex.**

- **A dog was given food and the dog produced saliva.**
- **A bell was rung each time the dog was given food.**
- **This was repeated for several days.**
- **The bell was rung, without food being given, and the dog produced saliva.**

**The process involved a primary stimulus and a secondary stimulus.**

**Look at the statements about conditioned reflexes.**

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

	<b>TRUE</b>	<b>FALSE</b>
<b>The bell is used as a primary stimulus.</b>	<input type="checkbox"/>	<input type="checkbox"/>
<b>The final response does NOT have a direct connection to the primary stimulus.</b>	<input type="checkbox"/>	<input type="checkbox"/>
<b>The conditioned reflex is learned by introducing a secondary stimulus.</b>	<input type="checkbox"/>	<input type="checkbox"/>

**[2]**

**(c) Conditioned reflexes can be an advantage to animals.**

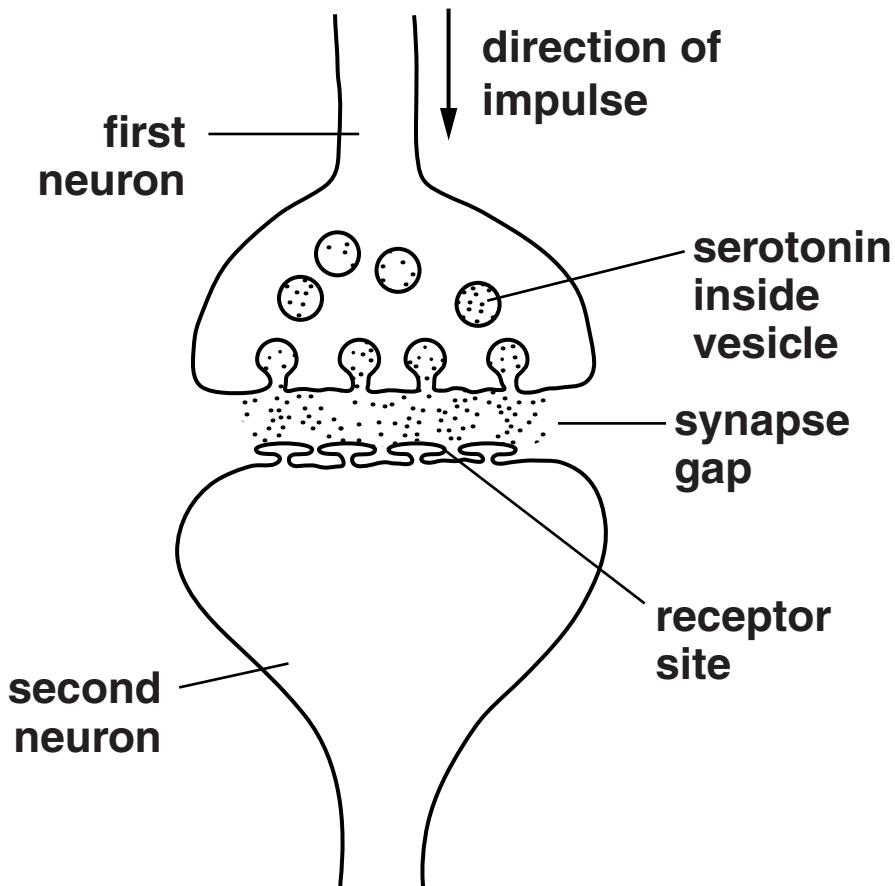
**Explain why.**

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

**[Total: 4]**

**9 The human brain contains billions of synapses.**

**Many of the brain synapses produce the chemical SEROTONIN.**



**(a) A sequence of events take place at the synapse.**

- A serotonin is reabsorbed and put back into vesicles**
- B serotonin recognised by receptor sites**
- C impulse arrives at end of first neuron**
- D vesicles fuse with membrane**
- E serotonin released into the synapse gap**
- F impulse continues along the second neuron**



**Put the letters A to F in the boxes to show the correct sequence of events.**

**One has been done for you.**

				<b>F</b>	
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—————→  
**sequence of events at synapse**

**[2]**

**(b) Name the process by which serotonin crosses the synapse gap.**

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

**(c) Some people take the drug ECSTASY.**

**How does Ecstasy affect serotonin in the brain synapses?**

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

**Ecstasy ...**

**... breaks down serotonin.**

**... blocks the receptor sites on the second neuron preventing impulse transmission.**

**... increases the speed of serotonin removal from the synapse gap.**

**... binds to the sites where serotonin is removed from the synapse gap.**

**... causes the concentration of serotonin to increase in the synapse gap.**

**[2]**

**[Total: 5]**

**END OF QUESTION PAPER**

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