

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**  
**Advanced GCE**

**BIOLOGY**

**2805/05**

**Mammalian Physiology and Behaviour**

Monday **31 JANUARY 2005** Afternoon 1 hour 30 minutes

Candidates answer on the question paper.

Additional materials:  
Electronic calculator  
Ruler (cm/mm)

Candidate Name	Centre Number	Candidate Number										
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**TIME** 1 hour 30 minutes

**INSTRUCTIONS TO CANDIDATES**

- Write your name in the space above.
- Write your Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, in the spaces provided on the question paper.
- Read the questions carefully before starting your answer.

**INFORMATION FOR CANDIDATES**

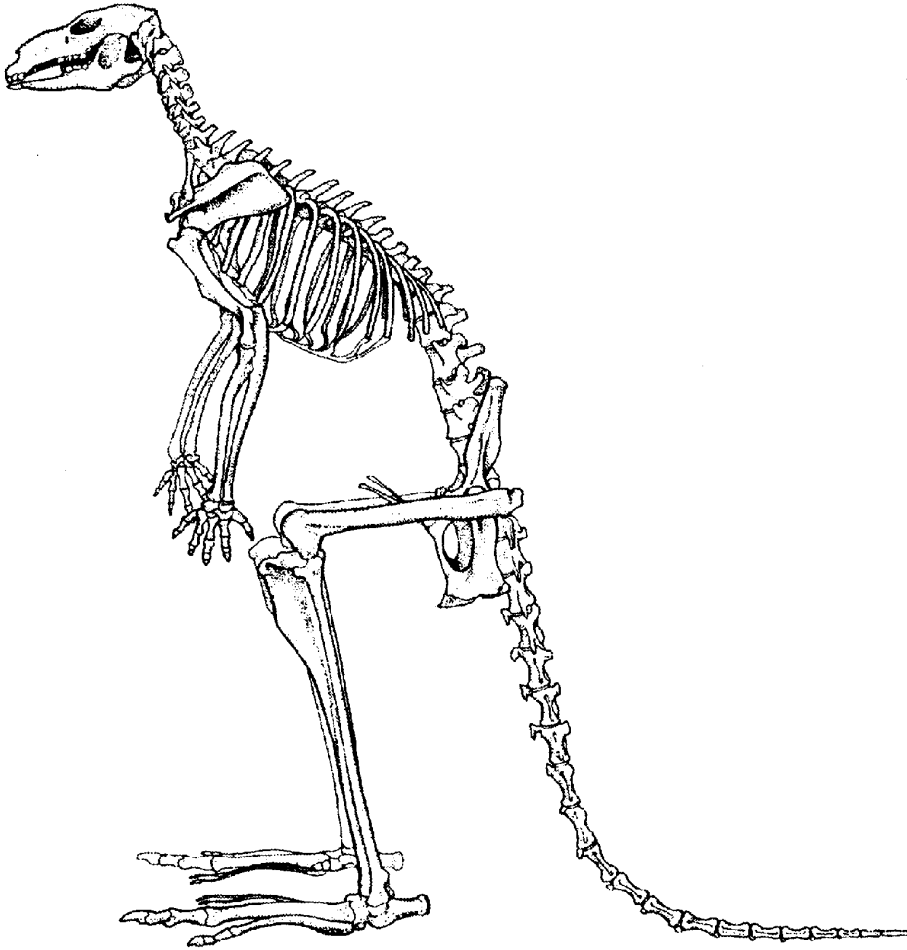
- The number of marks is given in brackets [ ] at the end of each question or part question.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

<b>FOR EXAMINER'S USE</b>		
Qu.	Max.	Mark
1	14	
2	14	
3	16	
4	20	
5	12	
6	14	
<b>TOTAL</b>	<b>90</b>	

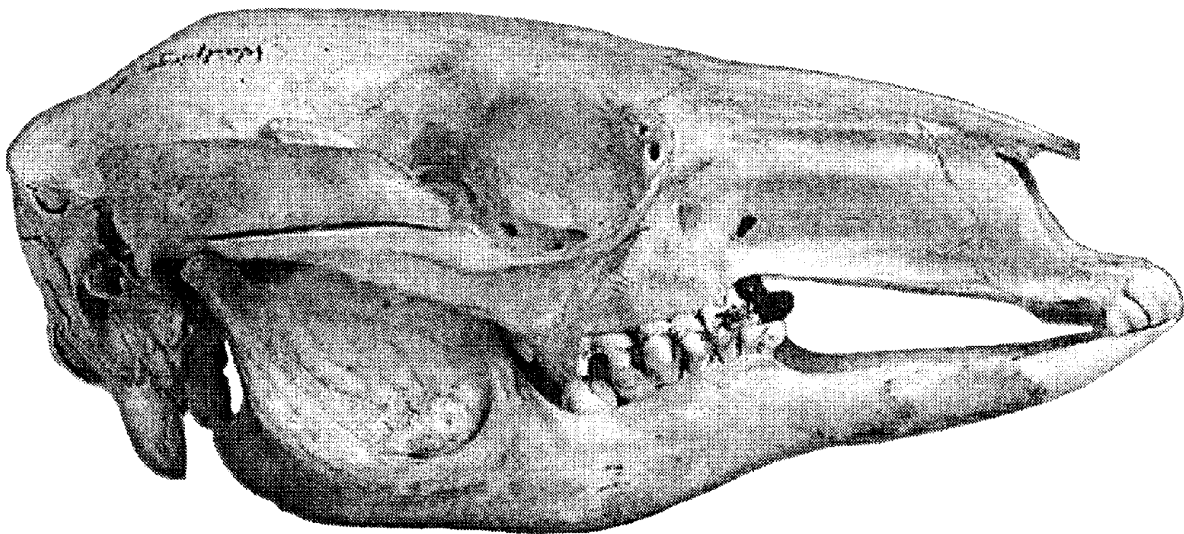
**This question paper consists of 21 printed pages and 3 blank pages.**

Answer **all** the questions.

- 1 Fig. 1.1 shows the skeleton of a kangaroo. Fig. 1.2 shows the skull and teeth of a kangaroo.



**Fig. 1.1**



**Fig. 1.2**

(a) Use the letters **W**, **X**, **Y** and **Z** to label the structures on Fig. 1.1 as follows:

**W** a tarsal

**X** the scapula

**Y** a thoracic vertebra

**Z** a joint, which allows movement in **more** than one plane. [4]

(b) (i) Using **only** features visible in Fig. 1.1, explain why it is likely that kangaroos and humans evolved from a single common ancestor.

.....  
.....  
.....  
.....  
.....  
.....  
.....[3]

(ii) Using **only** features visible in Fig. 1.2, explain why the kangaroo is a herbivore.

.....  
.....  
.....[2]

In an investigation, a kangaroo walked at different speeds on a treadmill. The number of strides per minute and the rate of oxygen consumption were measured. Fig. 1.3 shows the results of this investigation.

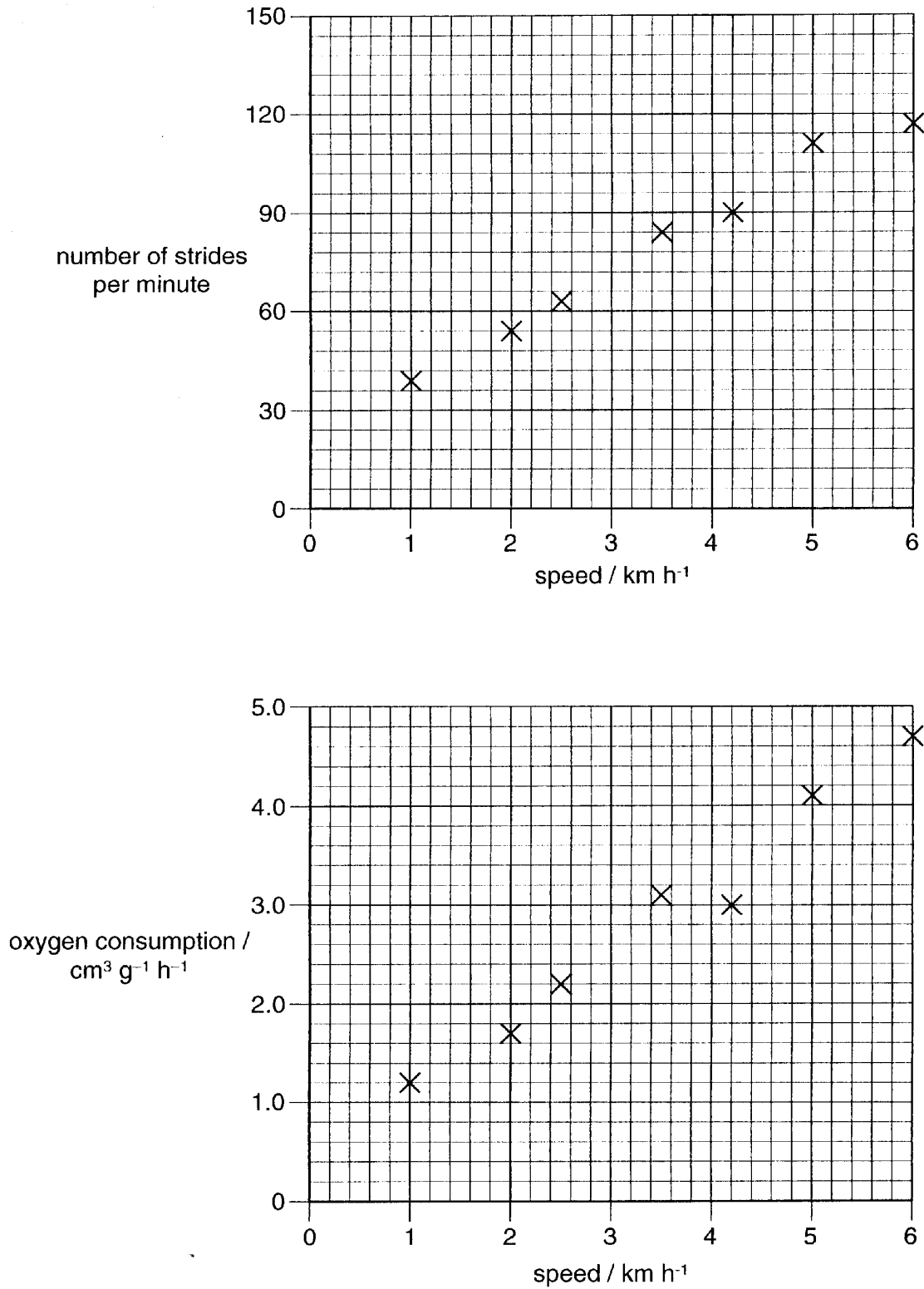


Fig. 1.3



2 Reflexes are automatic, stereotyped responses to stimuli that can also be conditioned.

(a) Explain the meaning of the terms

(i) *automatic*;

.....  
.....[1]

(ii) *stereotyped*;

.....  
.....[1]

(iii) *conditioned*.

.....  
.....[1]

(b) Describe **one** example of a reflex response to a **named** stimulus.

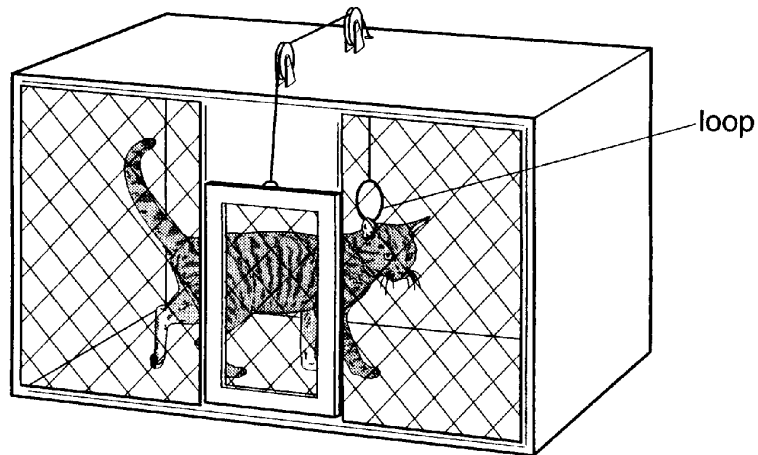
stimulus

.....

response

.....  
.....[1]

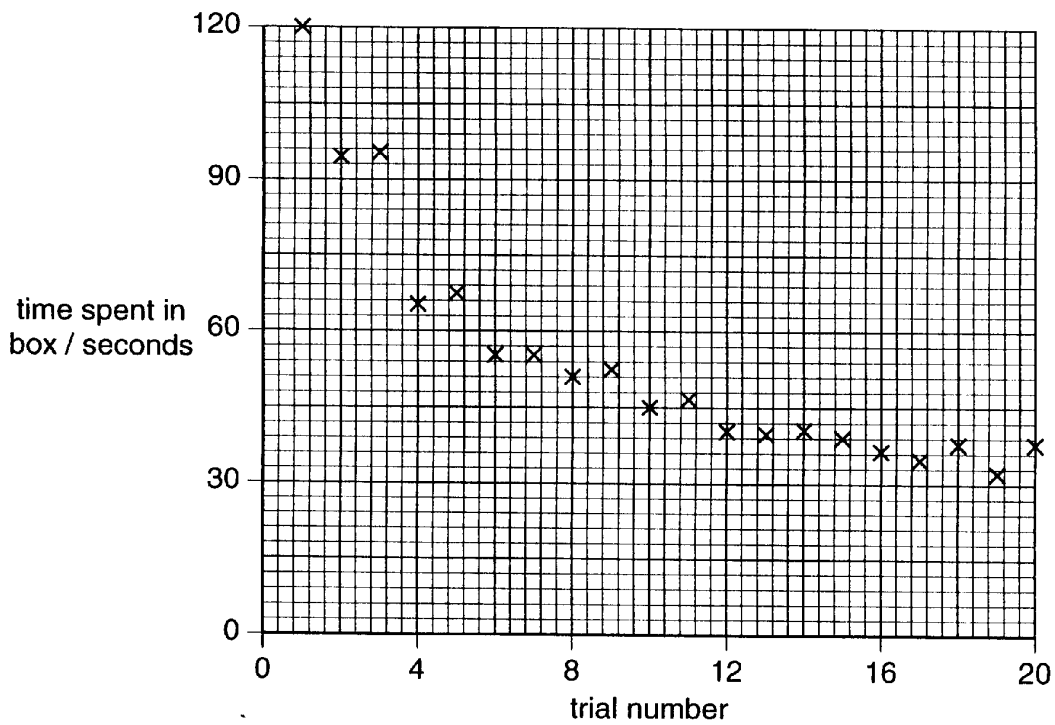
Fig. 2.1 shows a piece of apparatus called a puzzle box, used by Edward Thorndike to investigate operant conditioning in animals.



**Fig. 2.1**

During an experimental trial, a cat was placed inside the puzzle box. If the cat pulled the loop with its mouth or a paw, the door opened and it could escape. The time taken for the cat to escape was recorded. The experiment was then repeated several times with the same cat.

Fig. 2.2 shows a graph of the time taken for the cat to escape from the puzzle box during repeated trials.



**Fig. 2.2**





(d) State **two** differences between operant conditioning and classical conditioning.

1 .....

.....

.....

2 .....

.....

.....[2]

[Total: 14]

3 (a) Complete the following passage.

Mechanical digestion of food involves chewing by teeth in the mouth and churning in the stomach. Both these actions increase the ..... of food. Chemical digestion is performed by enzymes. Each enzyme is specific to a particular substrate, for example starch is broken down by ..... and maltose is broken down by maltase.

However, in all these reactions as well as the enzyme, a molecule of water is needed to break each chemical bond, so all digestion reactions are examples of ..... reactions.

Some enzymes are released in their active form, others are released in their inactive form. The inactive form of trypsin is ..... and is secreted from ..... cells in the pancreas.

Other enzymes remain embedded in the cell surface membrane of cells, which produce them. Examples include ..... and ....., which are found in the membranes of epithelial cells in the ileum. [7]

(b) Outline the role of the hormones, secretin and cholecystokinin (CCK), in the control of digestive secretions.

secretin .....  
.....  
.....  
.....  
.....  
.....  
.....

cholecystokinin (CCK) .....  
.....  
.....  
.....  
.....  
.....  
.....[4]

(c) Coeliac disease affects an increasing number of people. A major feature of coeliac disease is destruction of villi in the small intestine.

Outline the likely consequences of the loss of villi, for:

- the small intestine;
- the general health of people with coeliac disease.

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.....  
.....[5]

[Total: 16]







- (e) A major factor in the onset of macula degeneration is atherosclerosis of the arteries supplying blood to the retina.

Describe the advice that doctors might give to people showing early signs of macula degeneration.

.....

.....

.....

.....

.....[3]

[Total: 20]

5 The liver plays an important role in carbohydrate metabolism. The balance between the processes of glycogenesis and glycogenolysis helps to regulate the concentration of glucose in blood plasma. Fig. 5.1 shows some of the stages of these processes.

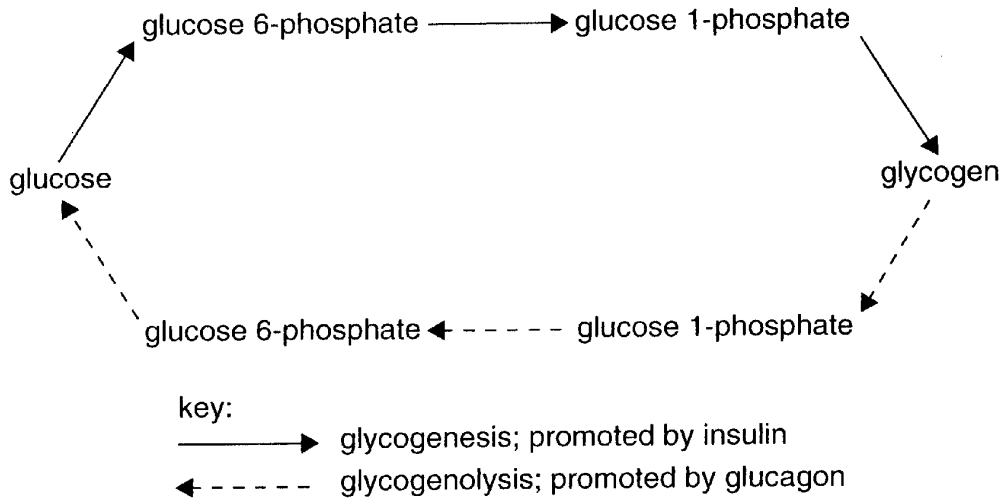


Fig. 5.1

(a) (i) Name **one** other hormone that promotes **glycogenolysis**.

.....[1]

(ii) Explain why glycogen is suitable for energy storage in cells.

.....  
.....  
.....  
.....  
.....  
.....  
.....[3]





- (c) After a prolonged period of fasting, glycogen levels in the liver are depleted. However, the liver can still produce glucose by the process of **gluconeogenesis**.

Describe **one** way in which this is done.

.....

.....

.....

.....

.....

.....

.....

.....

[3]

[Total: 12]

- 6 (a) The cerebellum and medulla oblongata are both parts of the hindbrain. Outline the functions of these two parts of the brain.

cerebellum

.....  
.....  
.....  
.....[2]

medulla oblongata

.....  
.....  
.....  
.....[2]

- (b) Alzheimer's disease is characterised by several changes in the cerebrum, including 'tangles' inside neurones and 'plaques' between neurones.

State what causes

(i) tangles; .....  
.....  
.....

(ii) plaques. ....  
.....  
.....[2]

Another change in the cerebrum of a person with Alzheimer's disease is a decrease in acetylcholine released by neurones that form memory circuits.

During a clinical trial, people with Alzheimer's disease were treated with a drug that inhibited the enzyme acetylcholinesterase. This improved their short-term memory.

(c) Suggest how the drug may inhibit acetylcholinesterase.

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.....

.....[3]

(d) Suggest how the drug improves short-term memory.

.....

.....

.....

.....

.....[2]

(e) State **three** precautions that should be taken when designing such clinical trials, to ensure that any effects are due to the drugs being tested.

1 .....

.....

2 .....

.....

3 .....

.....

.....[3]

[Total: 14]

**END OF QUESTION PAPER**