OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
Advanced GCE

BIOLOGY 2805/05

Mammalian Physiology and Behaviour

Thursday **29 JANUARY 2004** Afternoon 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Ruler (cm/mm)

Candidate Name	Centre Number	Candidate Number

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 each question 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.

FOR EXAMINER'S USE		
Qu	Max.	Mark
1	12	
2	17	
3	14	
4	19	
5	13	
6	15	
TOTAL	90	

This question paper consists of 21 printed pages, 3 blank pages and an insert.

Registered Charity Number: 1066969
[Turn over

For Examiner's Use

Answer **all** the questions.

1 **(a)** Fig. 1.1 shows the major components of the mammalian nervous system. Complete Fig. 1.1 using the terms from the list below.

autonomic nervous system
cerebellum
spinal cord
cerebrum
peripheral nervous system

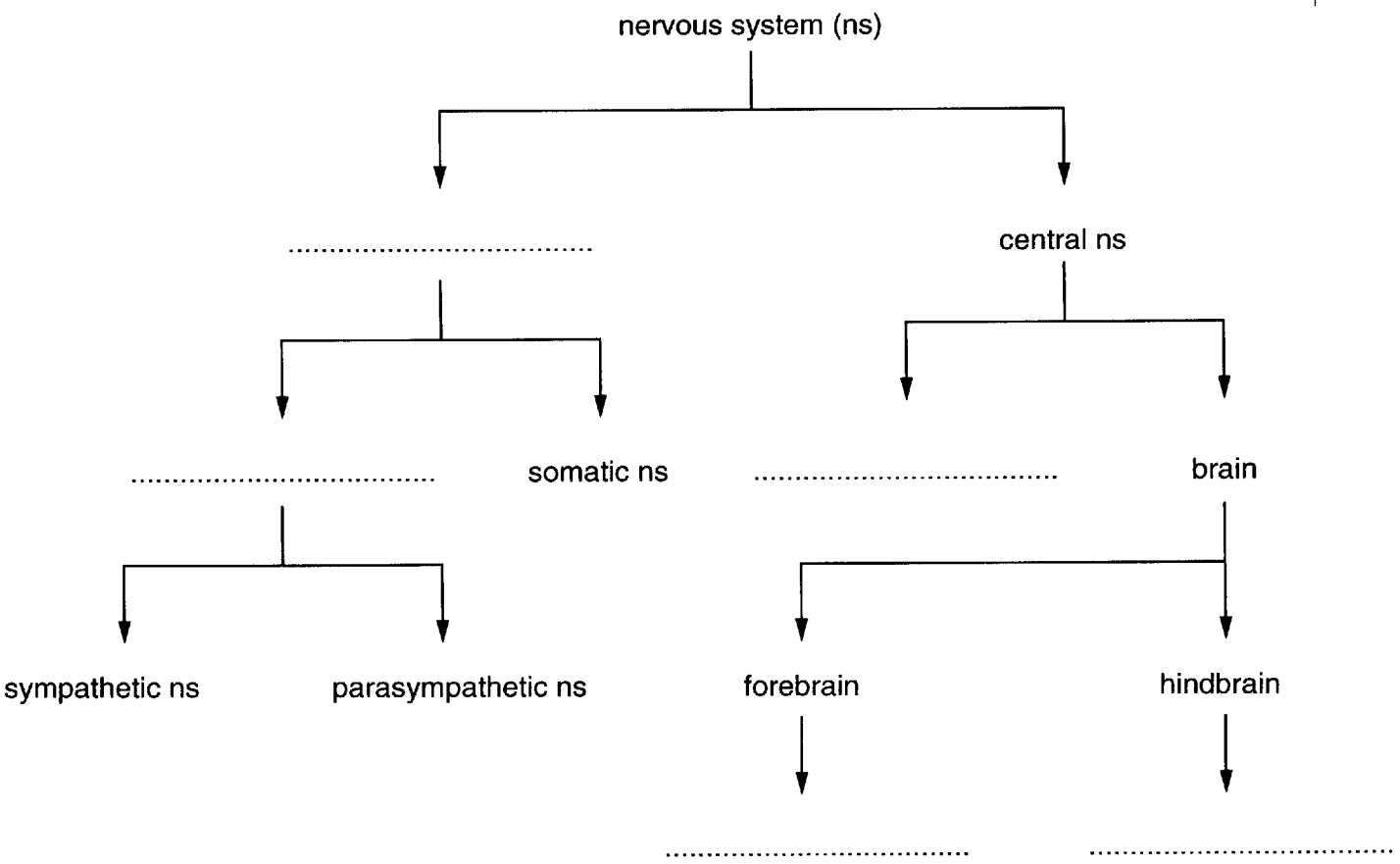

Fig. 1.1

[5]

(b) The brain consists of white matter, containing myelinated neurones, and grey matter, containing unmyelinated neurones.

Explain the advantage of a neurone being myelinated.

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(c) Cerebrospinal fluid (CSF) is formed by filtration of the blood. It bathes brain tissues, removing metabolites and excess heat, before returning into the bloodstream. CSF is similar to blood but contains no blood cells or plasma proteins. The main component of CSF is water.

(i) Explain how CSF is able to remove excess heat from the brain.

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(ii) Explain, using the term **water potential**, how CSF is returned into the bloodstream.

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[Total: 12]

2 Read the following passage about liver transplants.

The most common reason for a liver transplant in young children is a blockage of the bile duct. This leads to a build up of bile in the liver that cannot enter the duodenum. Liver cells become damaged by bile. Children with this condition suffer from jaundice and weight loss. Liver transplants in adults are usually required because of cirrhosis of the liver.

During transplant surgery, the diseased liver is removed leaving portions of its major blood vessels in place. The new liver is then inserted and attached to these blood vessels. The liver is also connected to the patient's bile duct by means of a 'T-tube'. One section of this T-tube passes to the outside of the patient's body where it is temporarily closed off.

The first successful liver transplant was performed in 1967, but until the discovery of new anti-rejection drugs in the 1980s only a small number of these transplants were performed and many were unsuccessful. These drugs prevent destruction of the transplanted liver by the patient's immune system. Use of these drugs has increased the number of successful transplants.

(a) Name **two** of the major blood vessels which are attached to the transplanted liver.

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2 .....[1]

(b) Suggest **one** use of the T-tube following a liver transplant.

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(c) Outline how the patient's immune system might destroy the transplanted liver if anti-rejection drugs were not given to the patient.

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(d) Explain why children with a blocked bile duct lose weight.

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Question 2 continues on page 6

[Turn over

(e) In this question, one mark is available for the quality of written communication.

Explain the likely effects of liver damage on the metabolism of carbohydrate and protein.

carbohydrate metabolism .....

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protein metabolism .....

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Quality of Written Communication [1]

[Total: 17]

3 **(a)** Explain why the eye is described as an organ.

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Fig. 3.1 is an electron micrograph of the retina showing the parts of several rod cells.

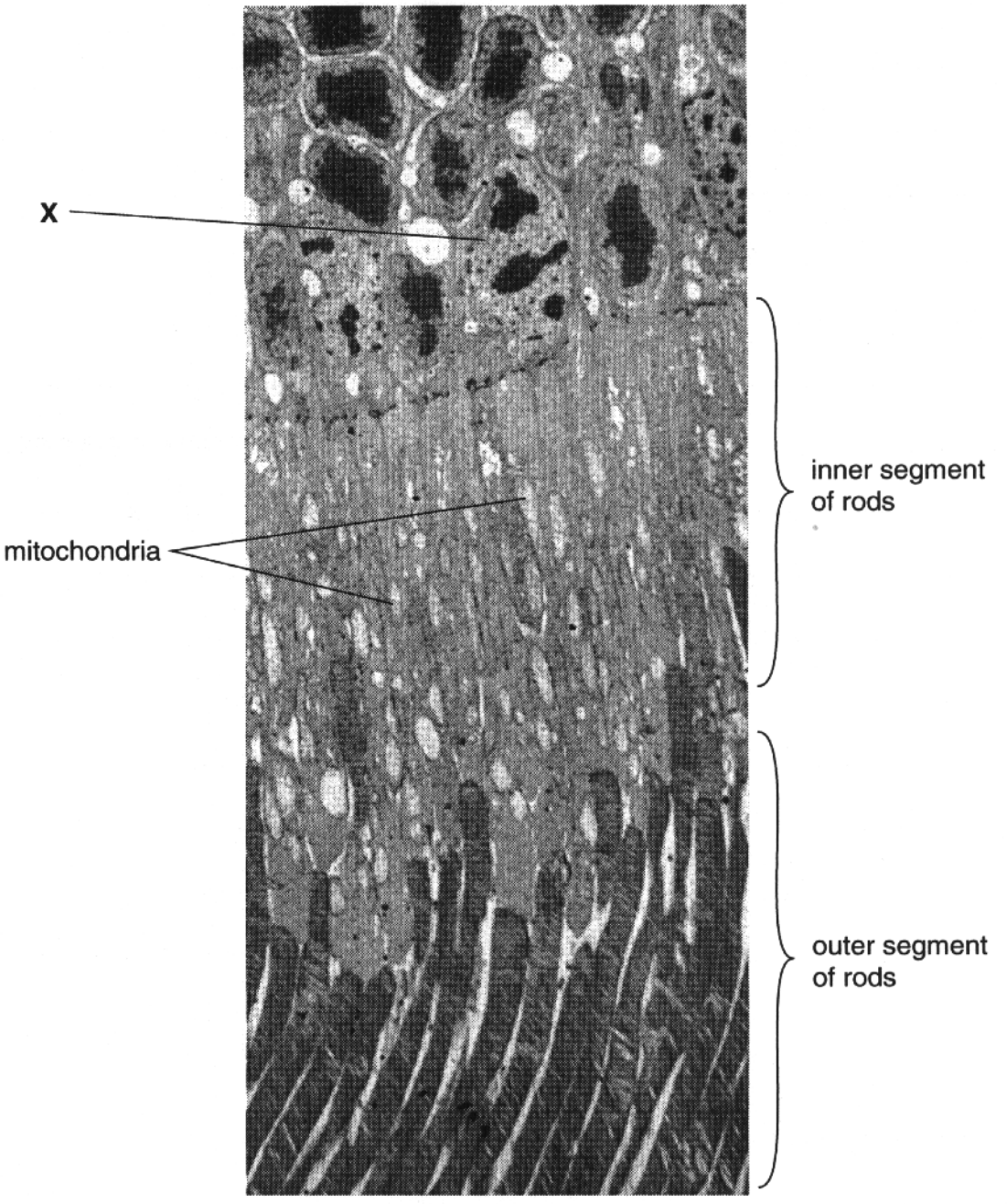

Fig. 3.1

(b) (i) Name structure **X**.

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(ii) Use a line and the letter **P** to label a region of a rod cell on Fig. 3.1 that contains a high concentration of visual pigment. [1]

(c) Describe the role of mitochondria in rod cells.

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Question 3 continues on page 10

[Turn over

The sensitivity of the human eye can be measured in the following way.

- A person stares at a white light for five minutes, then the room is immediately made completely dark.
- Every minute, a large spot of red light is repeatedly flashed at increasing intensities until the person says they can see the light spot.

Fig. 3.2 shows the results of such an investigation.

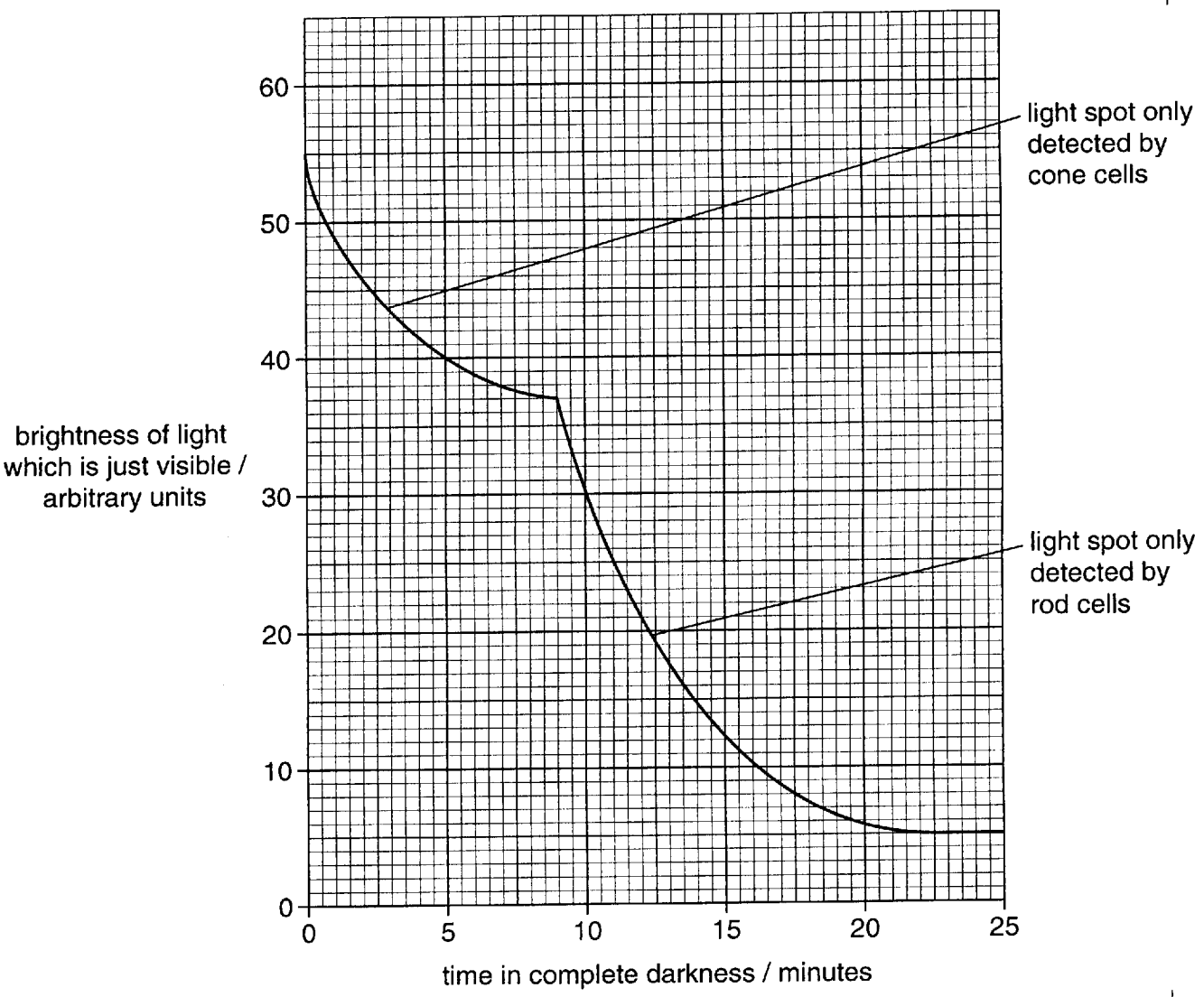

Fig. 3.2

(d) Name the process in which the sensitivity of the eye changes as shown in Fig. 3.2.

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(e) Explain the results shown in Fig. 3.2 in terms of the sensitivity of rods and cones.

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(f) The results shown in Fig. 3.2 were obtained when a large spot of red light was directed at the whole of the surface of the retina.

Complete the curve on Fig. 3.3 to show the likely result obtained when a smaller spot of red light was directed **only** at the fovea. [2]

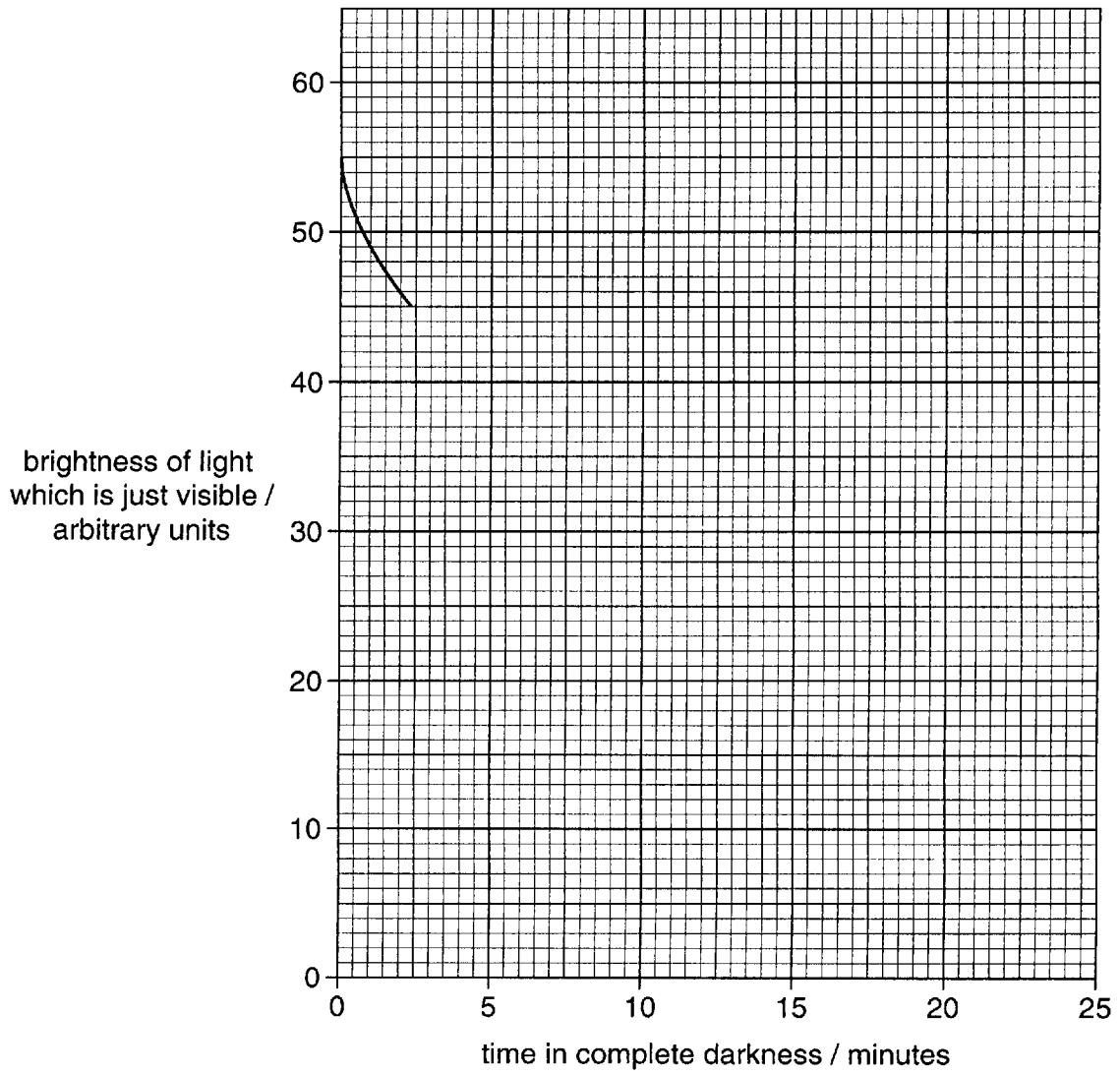

Fig. 3.3

[Total: 14]

4 The number of teeth in the lower and upper jaw in a mammal is represented by a dental formula. A mammal which has three incisors in each half of its upper jaw and in each half of its lower jaw has a dental formula for incisors of $\frac{3}{3}$.

Table 4.1 shows the dental formulae and diet of three mammals.

Table 4.1

name of mammal	incisors	canines	pre-molars	molars	diet of mammal
deer	$\frac{0}{3}$	$\frac{0}{0}$	$\frac{3}{3}$	$\frac{3}{3}$	herbivorous ruminant
leopard	$\frac{3}{3}$	$\frac{1}{1}$	$\frac{3}{2}$	$\frac{1}{1}$	carnivorous
pig	$\frac{3}{3}$	$\frac{1}{1}$	$\frac{4}{4}$	$\frac{3}{3}$	omnivorous

(a) (i) State **two** ways in which the arrangement of teeth in leopards differs from that in pigs.

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(ii) Explain the significance of the absence of canines and upper incisors in deer.

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(b) Explain how the structure of the pre-molars and molars in a carnivore such as a leopard are specialised for its diet.

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