14. Coordination and response

14.2 Sense organs

Paper 3 and 4

Question Paper

Paper 3

Questions are applicable for both core and extended candidates

1 **(a)** The eye is a sense organ that contains receptor cells that respond to light.

State **three** other stimuli that sense organs respond to.

1 .....

2 .....

3 .....

[3]

(b) Fig. 6.1 shows a section through the human eye.

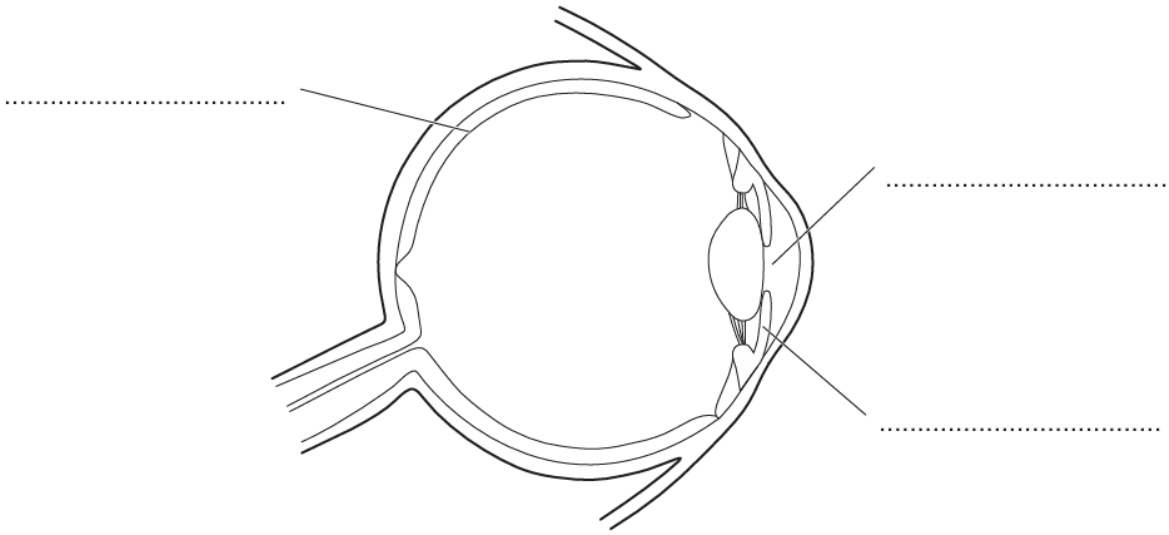

Fig. 6.1

(i) State the names of the structures labelled on Fig. 6.1.

Write your answers in the spaces provided. [3]

(ii) Draw an **X on Fig. 6.1** to show the location of the blind spot. [1]

(c) (i) The sentences describe some of the events that occur when the eye responds to light.

Complete the sentences using the words from the list.

Each word may be used once, more than once or not at all.

absorbed **brain** **glands** **lens** **muscles**

pupil **receptors** **reflected** **refracted**

Rays of light reach the front of the eye. Light is ..... through the cornea and the ..... focuses light on the retina. Light ..... in the retina detect light and the optic nerve carries impulses to the ..... .

[4]

(ii) State what happens to the pupil's diameter in a person's eye when they move from a bright room to a dark room.

..... [1]

[Total: 12]

2 **(a)** Fig. 1.1 is a diagram of the parts of the eye.

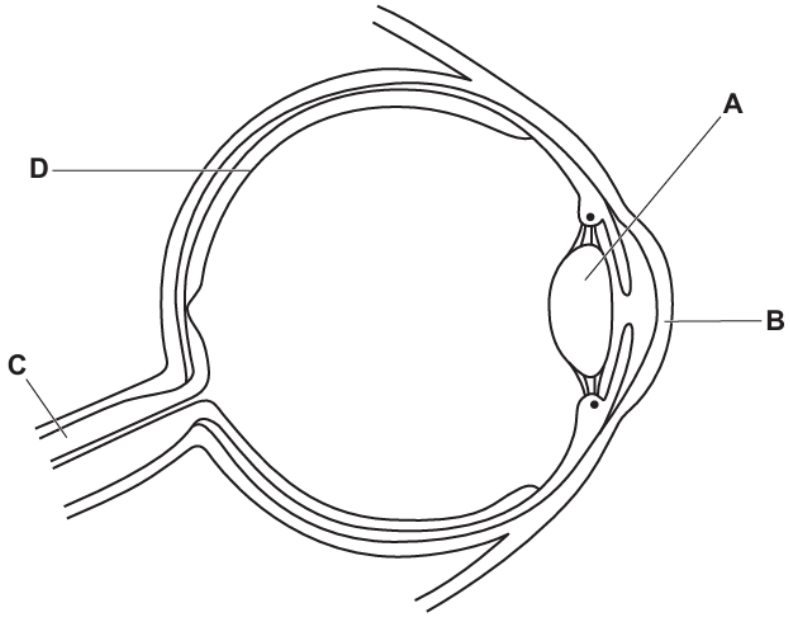

Fig. 1.1

(i) The boxes on the left show the letters of the parts of the eye in Fig. 1.1.

The boxes on the right show some functions of parts of the eye.

Draw lines to link the letter of the part from Fig. 1.1 to its function.

letter in Fig. 1.1	**function**
A	carries impulses to the brain
B	contains light receptors
C	focusses light onto the retina
D	refracts light as it enters the eye

[3]

(ii) Draw an **X on Fig. 1.1** to show the position of the blind spot. [1]

(b) Fig. 1.2 shows the change that occurs in the eye after it is exposed to bright light.

before exposure after exposure

Fig. 1.2

Describe the change to the eye in Fig. 1.2 **and** explain why this change is important.

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..... [3]

(c) The eye is a sense organ.

The skin is another type of sense organ.

State **two** stimuli that skin responds to.

1 .....

2 .....

[2]

3 The eye is an example of a sense organ.

(a) Define the term *sense organ*.

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..... [2]

(b) Fig. 9.1 shows a section through the eye.

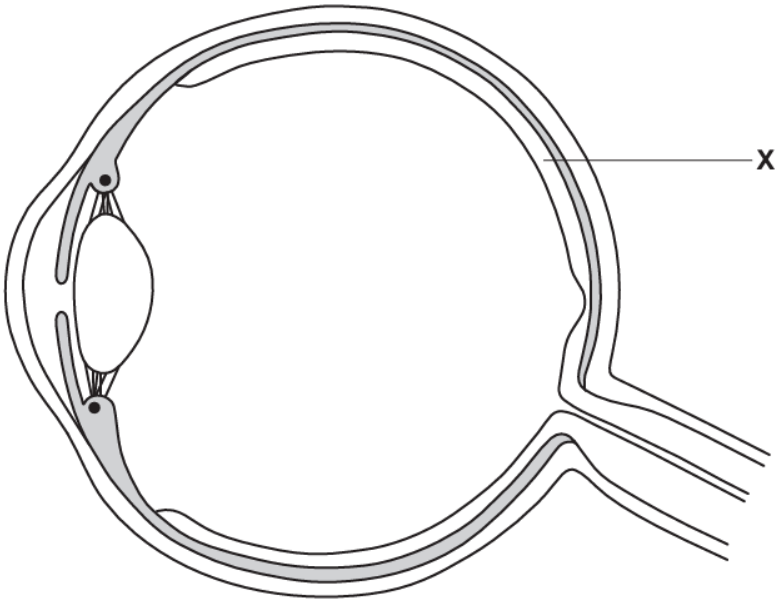

Fig. 9.1

(i) State the name of structure **X** in Fig. 9.1.

..... [1]

(ii) List **three** parts of the eye that light passes through to reach structure **X**.

1 .....

2 .....

3 .....

[3]

(iii) Label the optic nerve **on** Fig. 9.1 by drawing a label line and the letter **N**. [1]

(iv) State the function of the optic nerve.

..... [1]

[Total: 8]

4 The eye is a sense organ.

Fig. 4.1 is a diagram of a section through the eye.

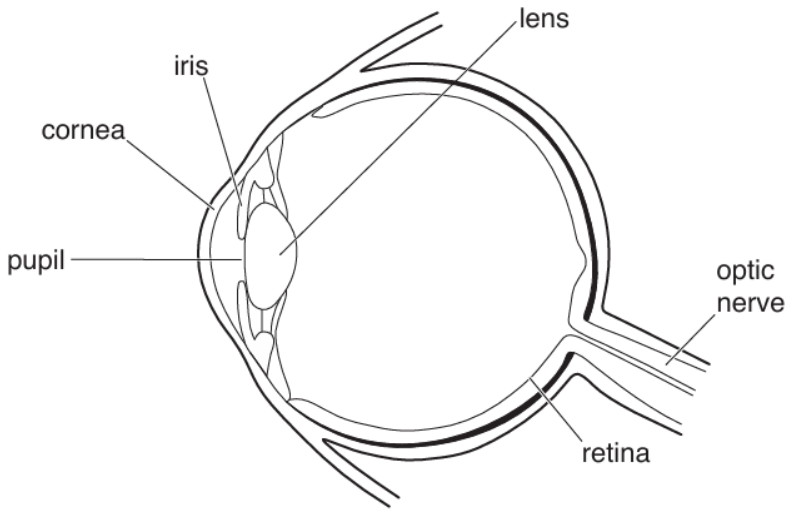

Fig. 4.1

(a) Shade in the part of the eye that gives people different eye colours on Fig. 4.1. [1]

(b) The boxes on the left show parts of the eye.

The boxes on the right show the functions of different parts of the eye.

Draw four lines to link the part of the eye with its correct function.

One has been done for you.

part	function
cornea	controls how much light enters the eye
iris	refracts light
lens	focuses light
retina	carries impulses to the brain
optic nerve	contains light receptors

[3]

(c) The skin is another sense organ.

Fig. 4.2 shows a photograph of the skin on a person's arm.

The skin of the person is responding to a stimulus.

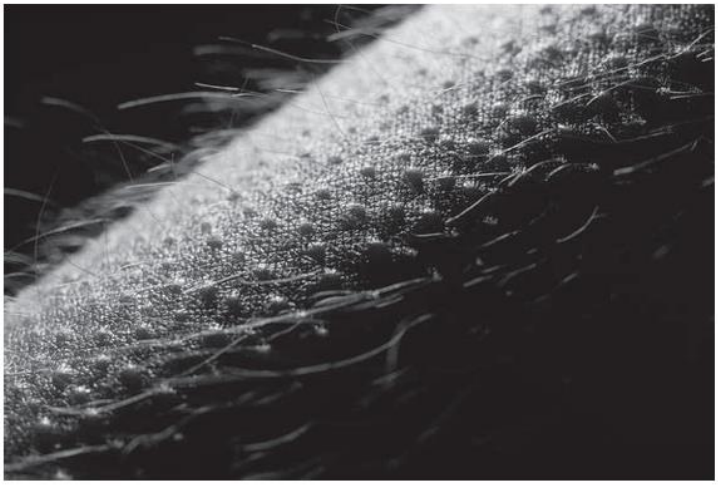

Fig. 4.2

(i) State the stimulus for the response shown in Fig. 4.2.

.....[1]

(ii) State the effector that causes the response shown in Fig. 4.2.

.....[1]

[Total: 6]

Paper 4

Questions are applicable for both core and extended candidates unless indicated in the question

5 **(a)** Define the term sense organ.

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.....

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..... [2]

(c) Describe the distribution and function of rods and cones in the eye. **(extended only)**

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..... [4]

6 **(a)** **(i)** Frogs are classified as amphibians.

State **two** features of amphibians that distinguish them from all other vertebrates.

1 .....

2 .....

[2]

(ii) Fig. 3.1 is a photograph of a cross-section of a frog's eye.

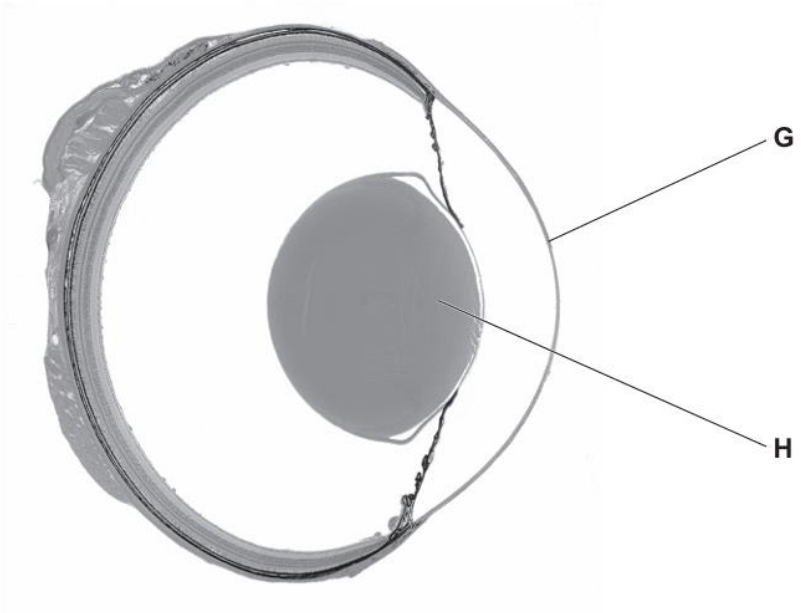

Fig. 3.1

Identify the structures labelled **G** and **H** in Fig. 3.1.

G .....

H .....

[2]

7 **(c)** Fig. 3.3 is a graph showing the distribution of rod cells and cone cells across the retina in a human eye.

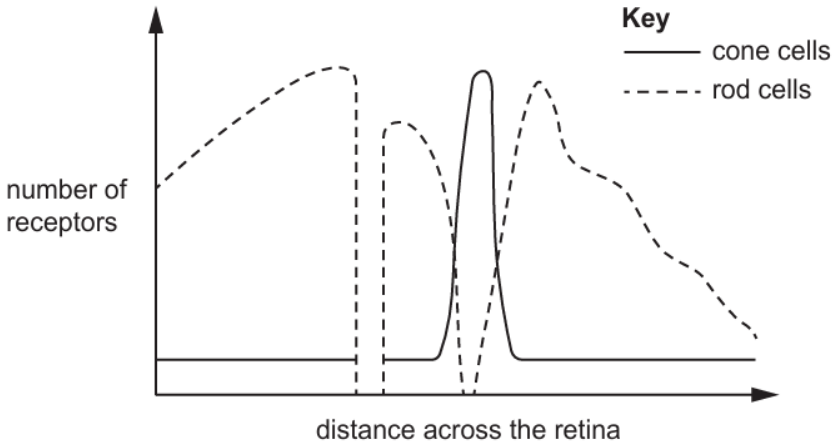

Fig. 3.3

(i) **On Fig. 3.3** draw: **(extended only)**

- the letter **P** to show the location of the fovea
- the letter **Q** to show the location of the blind spot.

[2]

(ii) Describe and explain the distribution of rod cells and cone cells shown in Fig. 3.3.

(extended only)

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..... [5]

(iii) Some mammals are nocturnal which means they are active at night and sleep during the day.

Suggest how the number and distribution of rod cells and cone cells across the retina of a nocturnal mammal would differ from a human retina. **(extended only)**

.....

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..... [2]

8 The eye is adapted for focusing on near and distant objects.

Fig. 3.1 shows the parts of the eye involved in focusing. The eye is focused on a distant object.

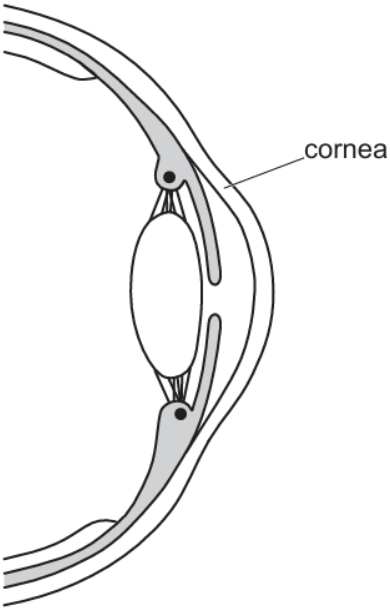

Fig. 3.1

(a) (i) State the term used to describe what happens to light as it passes from the air into the cornea.

..... [1]

(ii) Describe **and** explain the changes that occur in the eye when adjusting focus from a **distant** object to a **near** object. **(extended only)**

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.....

..... [3]

(b) Rods and cones are the receptors in the retina of the eye.

(i) Describe the functions of rods and cones in the eye. **(extended only)**

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.....

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..... [4]

(ii) Fig. 3.2 is a photograph showing regions of a human retina, as viewed through the pupil at the front of the eye. **(extended only)**

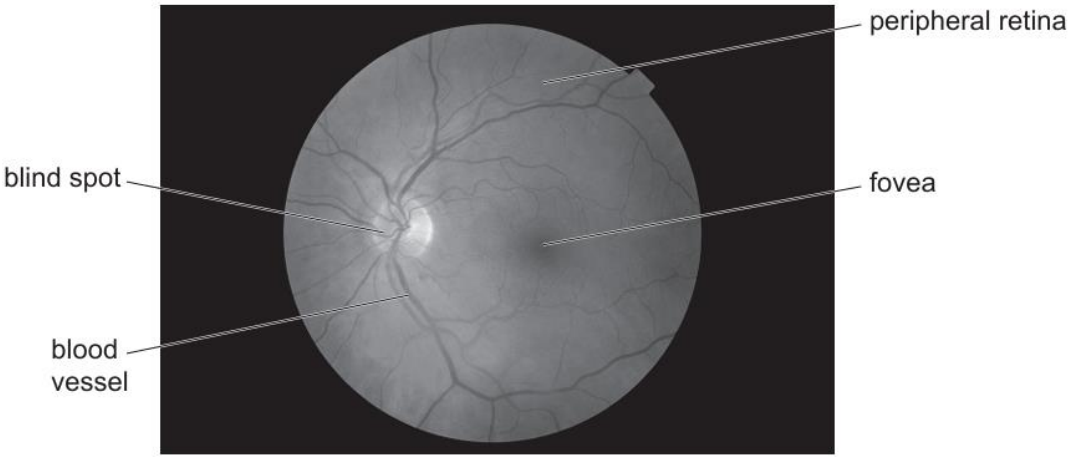

Fig. 3.2

Complete Table 3.1 to show the distribution of rods and cones across the retina.

Use these words to complete the table, each word may be used once, more than once or not at all:

many **few** **none**

Table 3.1

receptor	distribution across the retina		
	peripheral retina	blind spot	fovea
rods			
cones			

[3]

9 **(b)** Fig. 1.1 shows part of a human eye and three neurones that conduct electrical impulses between the eye and the brain. These neurones are involved in the pupil reflex.

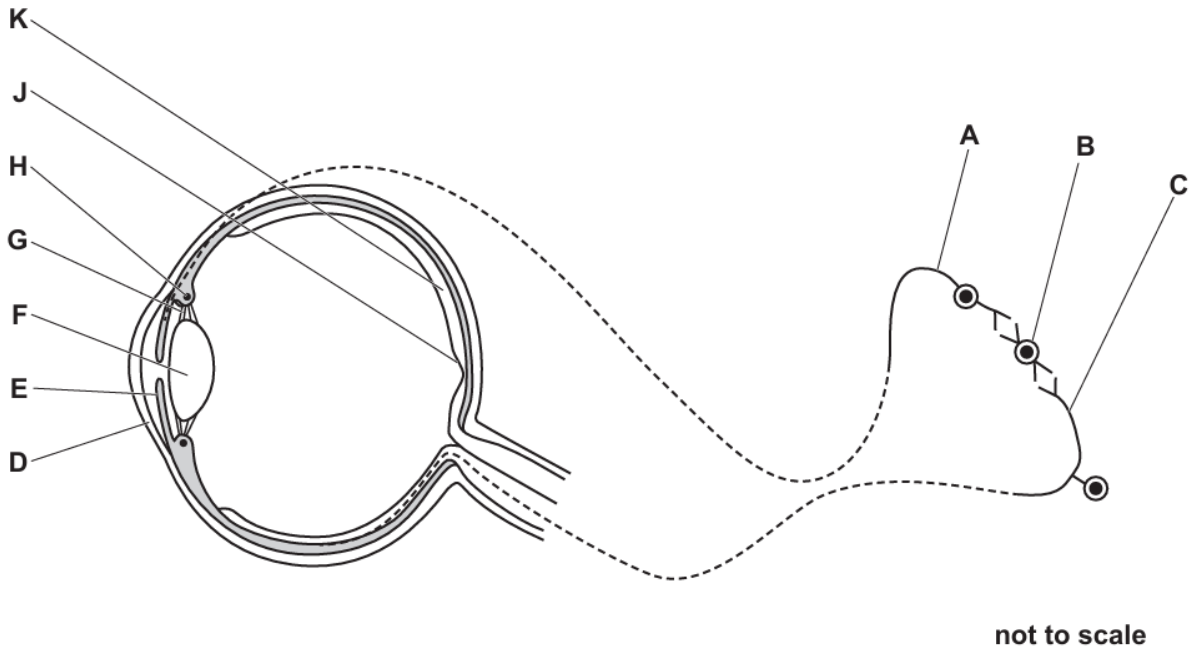

Fig. 1.1

(i) State the type of neurone identified as **A** in Fig. 1.1.

..... [1]

(ii) Table 1.1 shows the names of some parts of the eye, their functions and the letters in Fig. 1.1 that identify the parts of the eye. **(extended only)**

Complete Table 1.1.

Table 1.1

part of the eye	function	letter in Fig. 1.1
suspensory ligament		**G**
	contracts in response to a bright light	
cornea		
	contains a high density of cones for colour vision	

[4]

(c) (i) The eye can adjust how light is refracted through it in order to focus on a near object.

State **one** process that uses energy when focusing on a near object. **(extended only)**

..... [1]

10 **(c)** State **one** example of a reflex action that occurs in the eye.

.....

.....

..... [1]

11 **(b)** The eye is an example of a sense organ.

(i) Define the term *sense organ*.

.....

.....

..... [2]

(ii) Adrenaline is a hormone that is released in 'fight or flight' situations. It causes a change in the eye.

Complete Table 6.1 by stating the parts of the eye that change when adrenaline is released into the blood. **(extended only)**

Table 6.1

action	part of the eye
muscle that relaxes	
muscle that contracts	
widens	

[3]

12 **(b)** Accommodation (focusing) is one of the functions of the eye.

Fig. 1.1 is a diagram of an eye that is focusing on a distant object.

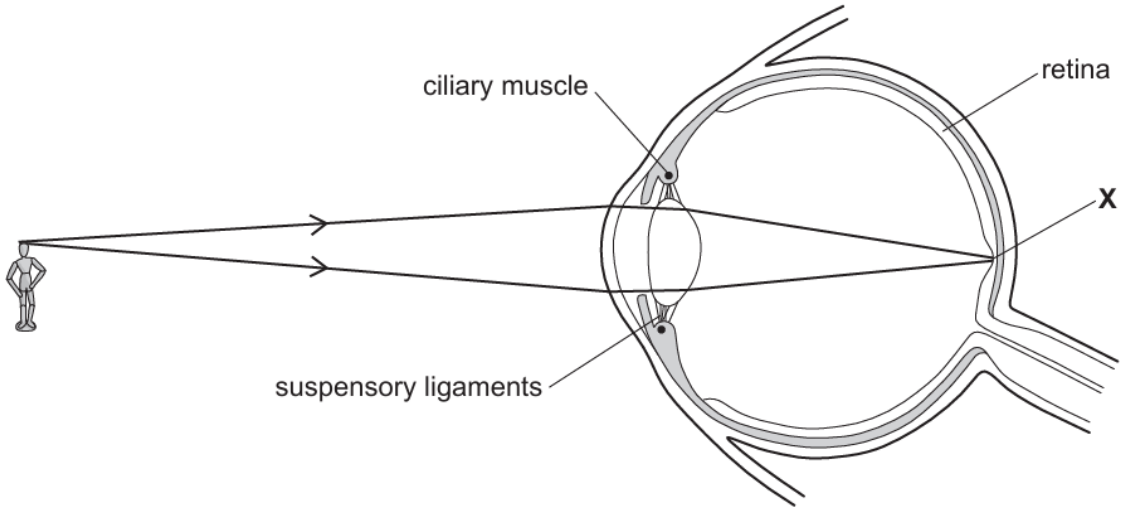

Fig. 1.1

(i) State the name of the part of the retina labelled **X**. **(extended only)**

..... [1]

Fig. 1.2 is an incomplete diagram of an eye that is focusing on a near object.

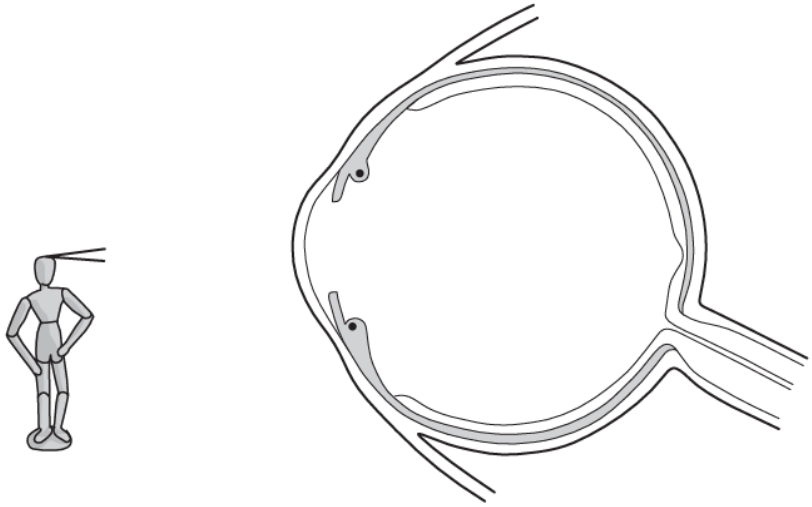

Fig. 1.2

(ii) Complete Fig. 1.2 by **drawing** the shape of the lens and the light rays from the object to the retina. [3]

(iii) Describe the roles of the ciliary muscles and suspensory ligaments in focusing on a **distant object**, as shown in Fig. 1.1. **(extended only)**

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.....

.....

..... [3]

(c) The eye also controls the amount of light that enters the pupil.

Fig. 1.3 shows an eye in low light and in bright light.

eye in low light

eye in bright light

Fig. 1.3

Describe the changes that occur in the eye when the light becomes bright, as shown in Fig. 1.3. **(extended only)**

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.....

.....

.....

..... [3]

13 **(a)** Complete the five sentences about the eye and the nervous system. **(extended only)**

Structures in the eye change the shape of the lens so that the eye can focus on near and distant objects. This is called .....

The radial and circular muscles in the iris of the eye are a pair of ..... muscles that work against each other.

Muscles in the eye are controlled by the nervous system. The ..... nervous system contains only sensory and motor neurones.

The ..... nerve from the eye contains sensory neurones that conduct impulses to the .....

[5]

14 The eye is a sense organ that responds to light.

Fig. 4.1 is a diagram of a section through the human eye.

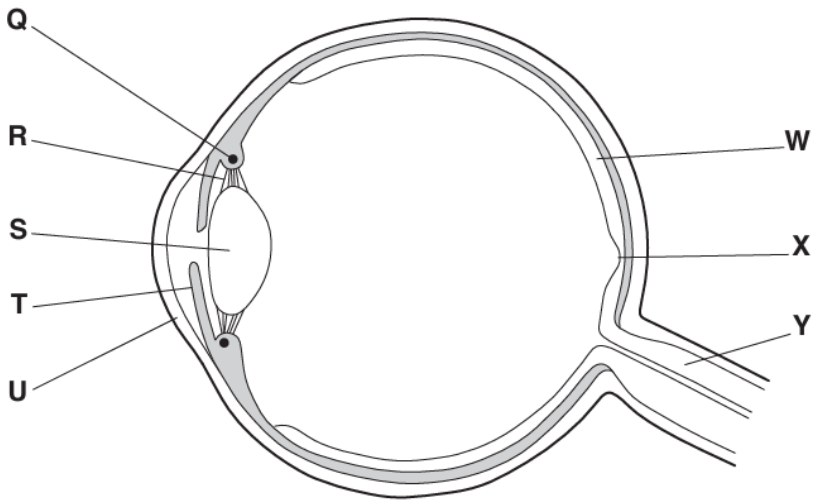

Fig. 4.1

(a) Table 4.1 describes some of the functions of the parts of the eye.

Complete the table by:

- naming the parts of the eye
- using the letters on Fig. 4.1 to identify the parts of the eye. **(extended only)**

Table 4.1

function	name of part	letter on Fig. 4.1
carries impulses to the brain		
focuses light onto the back of the eye		
controls the tension of the suspensory ligaments		
tissue that detects light and colour		
location of most of the cone cells		

[5]

(b) **(i)** A pair of muscles in the eye work in opposition to each other to adjust the amount of light entering the pupil. **(extended only)**

State the term that describes the action of a pair of muscles working in opposition to each other.

.....[1]

(ii) A different pair of muscles in the eye work in opposition to each other to view objects at different distances from the eye. **(extended only)**

State the name of the process that allows the eye to view objects at different distances.

.....[1]

(c) Explain why the eye cannot easily identify different colours in **low** levels of light. **(extended only)**

.....

.....

.....

.....

.....[2]