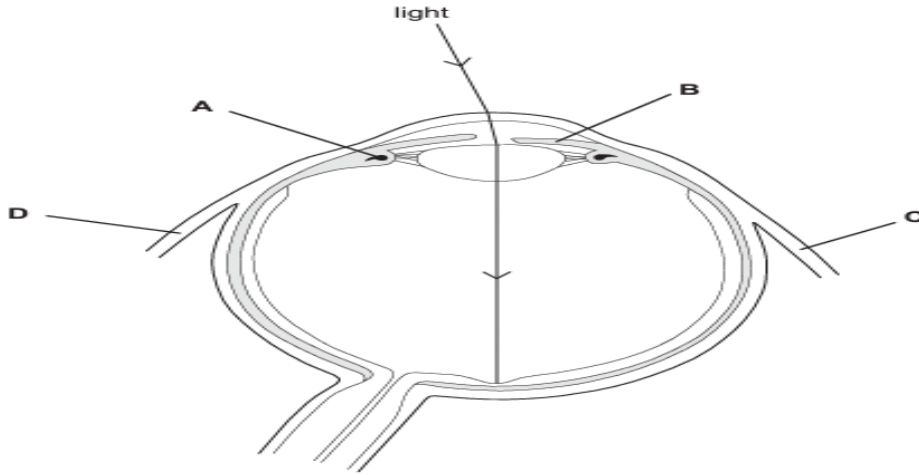


1.

Fig. 2.1 shows a section through the eye with a ray of light passing through it and four muscles labelled **A**, **B**, **C** and **D**.



**Fig. 2.1**

(a) Complete the table.

part	name of muscle	effect of contraction
<b>A</b>	.....	allows the lens to become fatter for focusing on close objects
<b>B</b>	iris circular muscle	..... .....

[2]

Muscles **C** and **D** are voluntary muscles that are antagonistic. They are attached to the eye socket of the skull.

(b) (i) Explain the terms *voluntary* and *antagonistic*.

voluntary .....

.....

antagonistic .....

..... [2]

(ii) Suggest the effect on the eye when muscle **C** contracts.

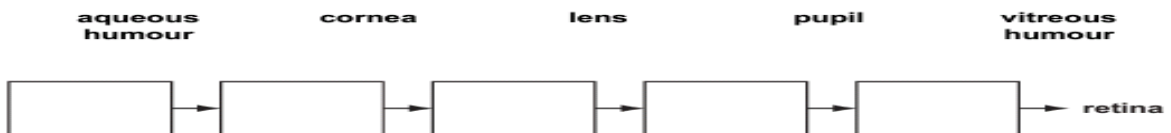
..... [1]

(iii) Explain how the eye would return to its original position after this contraction.

..... [2]

(c) Light passes through parts of the eye to reach the retina.

Complete the flow chart by putting the following terms in the boxes to show the correct order that the light passes through them.



[2]

(d) The retina contains rods and cones.

Complete the table to distinguish between rods and cones.

	type of light detected	distribution in the retina
rods	.....	..... .....
cones	.....	..... .....

[4]

2. Ahmed entered a very dark room. His irises responded by changing the pupil size and gradually he could see shapes of objects in the room. Dust in the air made him sneeze. Suddenly the door slammed shut, causing his heart beat to speed up. He switched on the light to find the door and he grabbed the door handle.....

(a) Complete the table by stating two voluntary actions and two involuntary actions described in the text above.

voluntary actions	involuntary actions
1. .... .....	1. .... .....
2. .... .....	2. .... .....

[4]

(b) Actions are caused by the stimulation of effectors.

(i) Name the two different types of effector in the body.

1. ....
2. .... [2]

(ii) State the type of neurone that stimulates effectors.

..... [1]

(c) Plants also respond to stimuli such as light.

(i) State the name of the response of plants to light.

..... [1]

Ahmed was provided with several young plant shoots and a sample of auxin.

(ii) Describe an experiment he could carry out to show that auxin causes bending of a shoot.

.....  
 .....  
 .....  
 .....  
 .....  
 .....  
 ..... [4]

(iii) Explain the mechanism that results in a shoot bending towards light.

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

(d) Synthetic plant hormones behave in a similar way to auxins. Describe how synthetic plant hormones are effective as weedkillers.

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

[Total: 17]

3 Fig. 3.1 shows a female lion in a game reserve.



Fig. 3.1

- (a) (i) State **one** feature, visible in Fig. 3.1, which identifies the lion as a mammal.  
..... [1]
- (ii) State **one** other feature, **not** visible in Fig. 3.1, which distinguishes mammals from all other vertebrate groups.  
..... [1]
- (b) Study the eyes of the lion in Fig. 3.1.
- (i) Suggest and explain what the light conditions were when the photograph was taken.  
light conditions .....  
explanation ..... [2]
- (ii) Explain the importance of the eyes reacting to light in this way.  
..... [2]
- (c) Scientists say that lions are unable to see in colour.  
Suggest how a study of a lion's retina would provide evidence for this statement.  
..... [1]
- (d) The lion in Fig. 3.1 was observing tourists nearby. It turned its head to see zebras moving in the distance.  
Describe how the eyes of the lion would adjust to focus on the zebras.  
..... [3]
- (e) The lion was photographed in a game reserve in Namibia.  
Explain why the conservation of animals in game reserves is important.  
..... [3]

4. (a) Define the terms *sensitivity* and *involuntary action*.

*sensitivity* .....

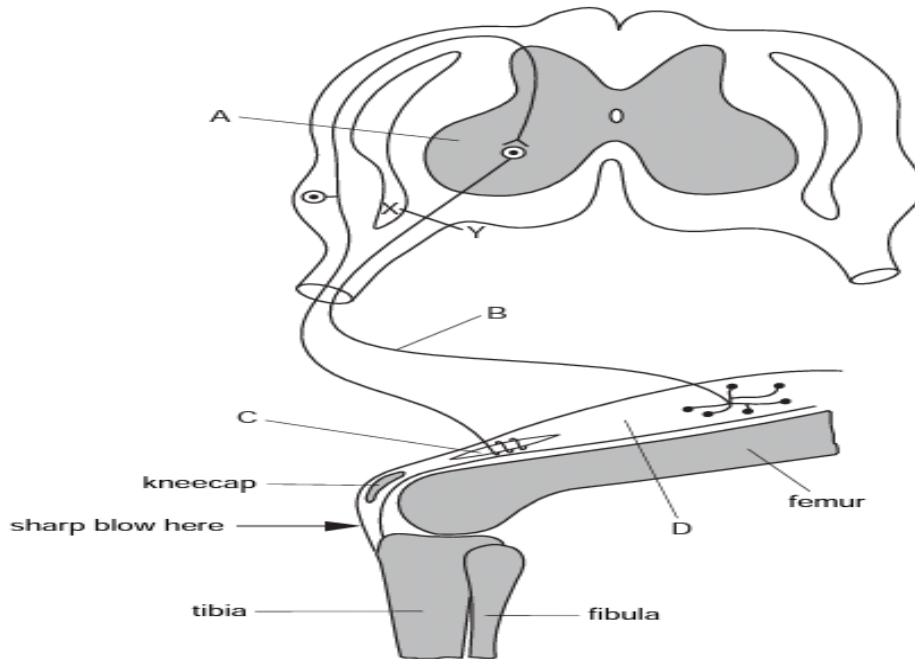
.....

*involuntary action* .....

.....

..... [3]

Fig. 1.1 shows the reflex arc for the knee jerk reflex.



(b) (i) Name parts A to D.

A .....

B .....

C .....

D ..... [4]

(ii) Nerve cells use active transport to move ions across their cell membranes.

Explain what is meant by the term *active transport*.

.....

.....

..... [2]

(c) Explain what would happen to the reflex shown in Fig. 1.1 if the nerve was cut across at X-Y.

.....

.....

.....

.....

..... [3]

(d) Fig. 1.2 shows the grasping reflex of a baby.



Fig. 1.2

Suggest why it is a good idea to test a baby's reflexes immediately after birth.

.....

..... [1]

5. The light sensitive cells in the eye are known as rods and cones.

Fig. 2.1 shows drawings of a rod cell and a cone cell.

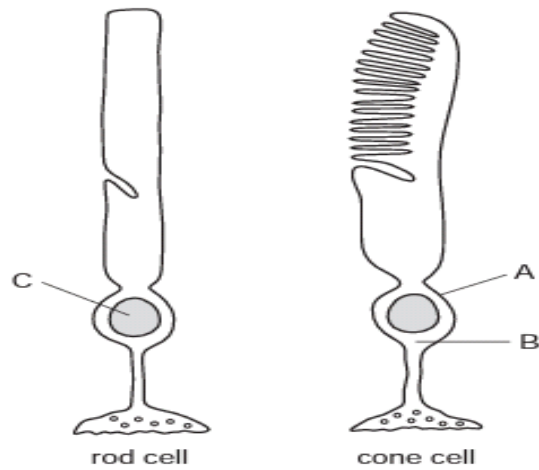


Fig. 2.1

(a) Name the structures labelled A to C.

- A .....
- B .....
- C ..... [3]

(b) (i) Name the tissue in the eye where rods and cones are found.

..... [1]

(ii) Name the parts of this tissue where there are

cones but no rods .....

no cones or rods ..... [2]

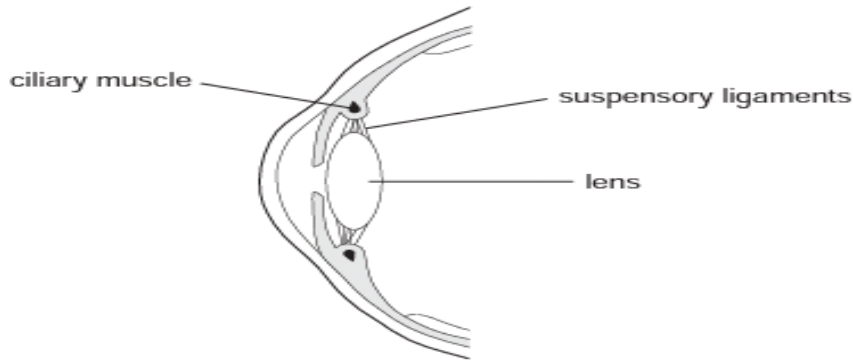
(c) Describe how rods and cones function.

.....  
.....  
.....  
.....  
.....  
.....  
..... [4]

[Total: 10]

6. Fig. 3.1 shows the front part of the eye.

The eye shown in Fig. 3.1 is **far adapted**, which means that the lens is focusing light from a distance.



**Fig. 3.1**

The lens changes shape to alter the direction of light rays passing through the eye.

(a) Name:

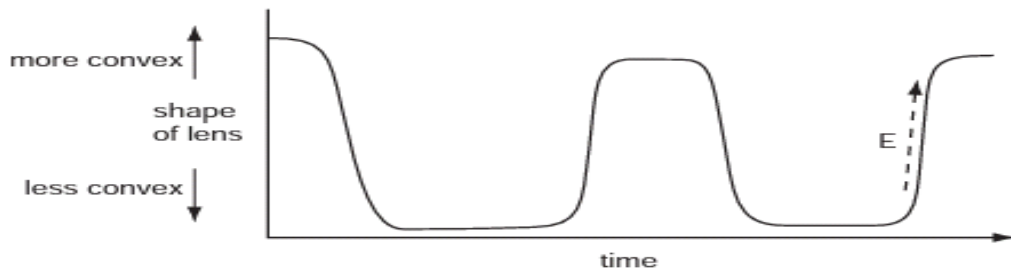
(i) another part of the eye that also alters the direction of the light rays;

..... [1]

(ii) the part of the eye where the light rays form an image.

..... [1]

(b) An eye specialist measured the change in shape of the lens of a patient during an eye test. The specialist recorded the change in shape of the lens with the patient looking at a chart 10 metres away and when reading from a book. This is shown in Fig. 3.2.



**Fig. 3.2**

(i) Write the letter **D** on Fig. 3.2 to show a time when the patient was looking at the chart that was 10 metres away. [1]

(ii) State how the ciliary muscles and suspensory ligaments act to change the shape of the lens during the time marked **E** on Fig. 3.2.

*ciliary muscles* .....

.....

*suspensory ligaments* .....

..... [2]

(c) Outline how humans are able to see in colour.

.....

.....

.....

.....

.....

.....

..... [3]

7. (a) Define the term *sensitivity*.

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

(b) Describe how voluntary actions differ from involuntary actions.

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

(c) Name the neurone that transmits impulses from a receptor.

.....[1]

(d) Reaction time is defined as the time taken to respond to a stimulus.

During a swimming relay race, the reaction times of four swimmers in two teams, **A** and **B**, were recorded.

In each team, swimmer 1 responded to the sound of the start gun; swimmers 2, 3 and 4 responded to seeing the previous swimmer touch the swimming pool wall.

Table 3.1 shows the reaction times for the swimming relay teams.

**Table 3.1**

swimmer	reaction time / s	
	team <b>A</b>	team <b>B</b>
1	0.81	0.75
2	0.48	0.40
3	0.58	0.06
4	0.31	0.35

Compare the reaction time of swimmer 1 in each team with the reaction times of the other swimmers in each team. Use the information in Table 3.1 to support your answer.

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

(e) Adrenaline is often secreted during sporting competitions.

Outline how adrenaline affects the performance of a swimmer.

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

[Total: 11]

8. Jasmine went into a dark room from a bright corridor.

(a) Fig. 4.1 represents Jasmine's right eye before and after entering the dark room.



**Fig. 4.1**

(i) Complete Fig. 4.1 by **drawing** the appearance of the pupil and iris

1. before entering the dark room, [1]
2. a few seconds after entering the dark room. [1]

(ii) Label the following parts of the eye on the first diagram in Fig. 4.1.

**iris** **pupil** **sclera** [3]

(b) Explain how the size of the pupil was changed when Jasmine went into the dark room.

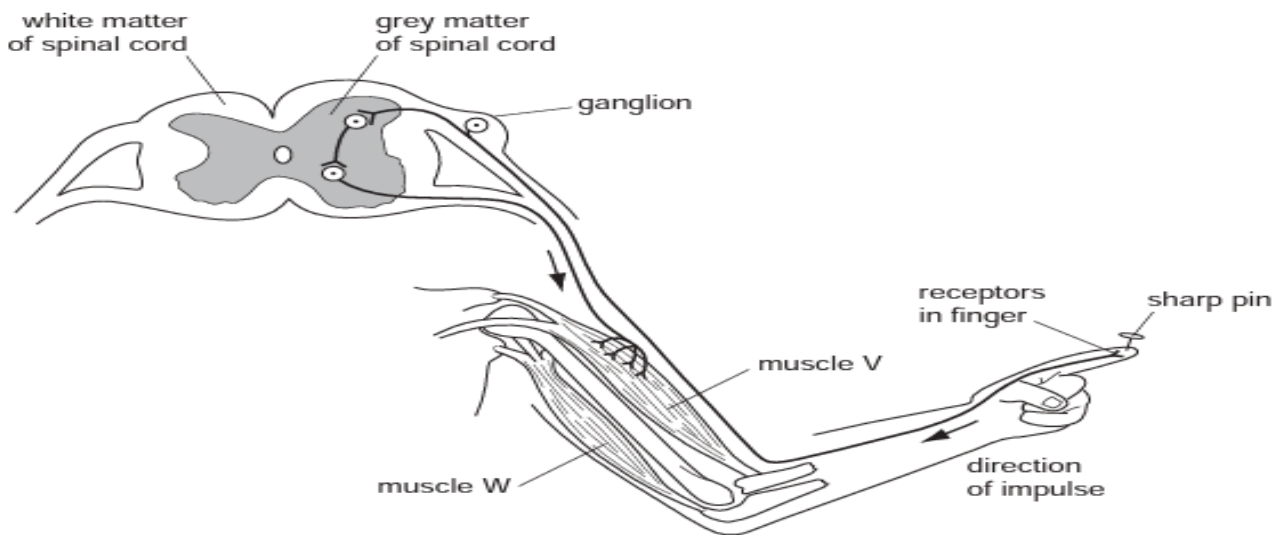
.....  
 .....  
 ..... [2]

(c) Explain why Jasmine could see shapes but **not** colours in the dark room.

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

[Total: 10]

9. Fig. 2.1 shows a reflex arc involving a finger and a muscle in the arm.



**Fig. 2.1**

(a) State two stimuli that can be detected by receptors in the finger.

1. .... [2]
2. ....

(b) Using labels from Fig. 2.1, state the site of the cell body of

1. a sensory neurone, .....
2. a relay neurone. .... [2]



(c) (i) In what form are impulses transmitted in the nervous system?

..... [1]

(ii) State the structure, present in many mammalian neurones, which reduces leakage of the impulse.

..... [1]

(iii) The impulse takes 0.02 seconds to pass from the finger to the spinal cord, a distance of 1.5 metres. Calculate the speed of the impulse. Show your working.

Speed ..... [2]

(iv) Although the total distance the impulse travels in the reflex arc is less than 3 metres, the time taken is more than 0.04 seconds. Suggest why the time taken is more than expected.

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

(d) (i) Describe what would happen to the muscle and the arm when muscle V receives the nerve impulse.

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

(ii) Explain how muscle V would return to its original position.

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

[Total: 13]

10. (a) Define the term *sensitivity*.

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

Fig. 2.1 shows the reflex arc involved in a simple reflex action.

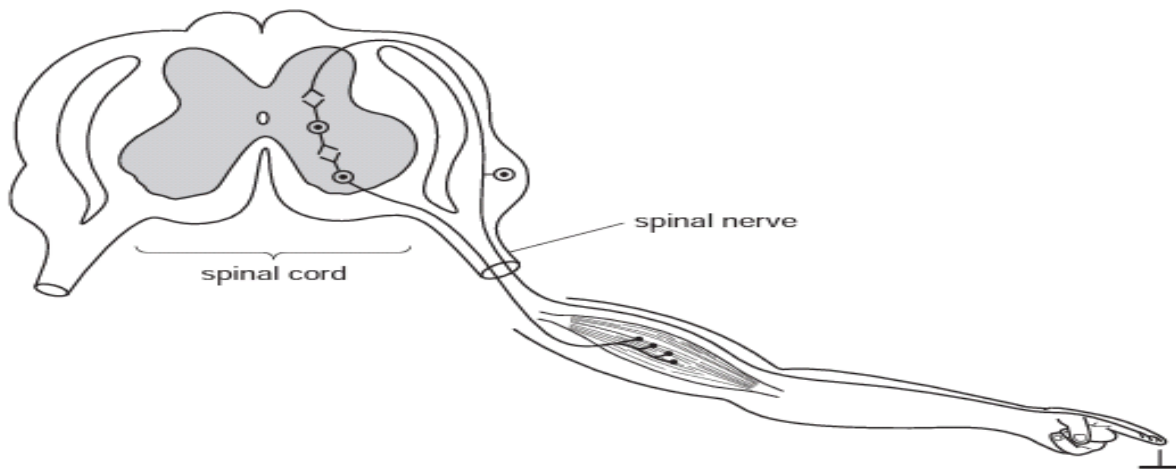


Fig. 2.1

(b) On Fig. 2.1 use label lines and the following letters to show

F a receptor in the skin

G the neurone that transmits impulses to the spinal cord

H the effector in this reflex arc.

[3]

(i) Explain what is meant by the term *involuntary action*.

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

(ii) The arm shown in Fig. 5.1 moves in response to the detection of heat.  
Explain how the parts of the reflex arc shown in Fig. 5.1 bring about this response.

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

(iii) Describe the advantages of simple reflexes, such as the one shown in Fig. 5.1.

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

(c) The organs of the human body are coordinated by the nervous system.  
Outline **one** other way in which these organs are coordinated.

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

**[Total: 14]**

11. (a) Define the term *sensitivity*.

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

Fig. 1.1 shows a horizontal section through the eye.

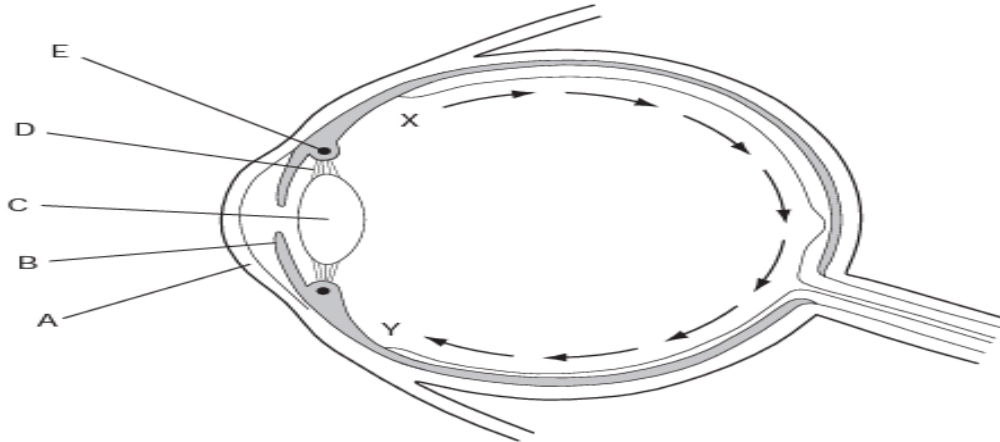


Fig. 1.1

(b) (i) Name structures A to D.

**A** .....  
**B** .....  
**C** .....  
**D** ..... [4]

(ii) State the functions of structures B and E.

**B** .....  
**E** ..... [2]

The retina contains light-sensitive cells known as rods and cones. The distribution of rods in the retina from point X to point Y, as shown on Fig. 1.1, was investigated.

Fig. 1.2 shows the distribution of rods in the retina from point X to point Y.

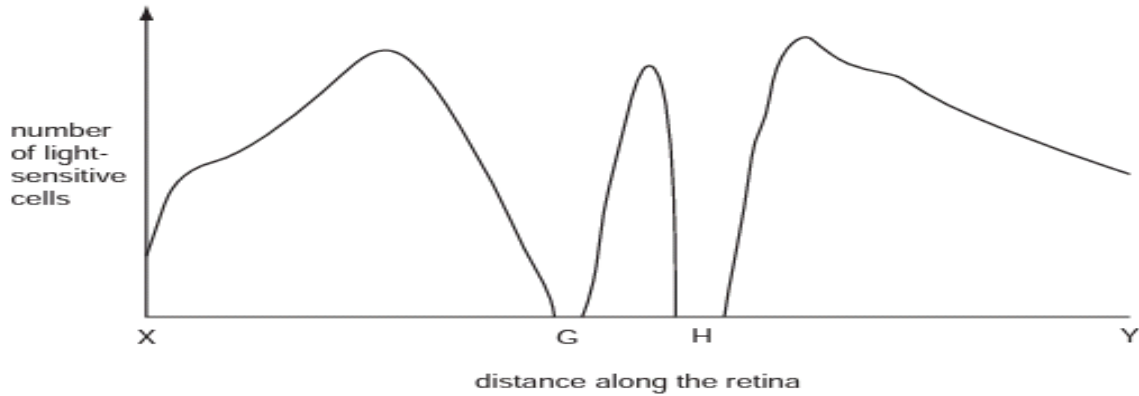


Fig. 1.2

(c) (i) G and H, as shown on Fig. 1.2, are parts of the retina.

Name G and H.

**G** .....  
**H** ..... [2]

(ii) Describe the function of the rods.

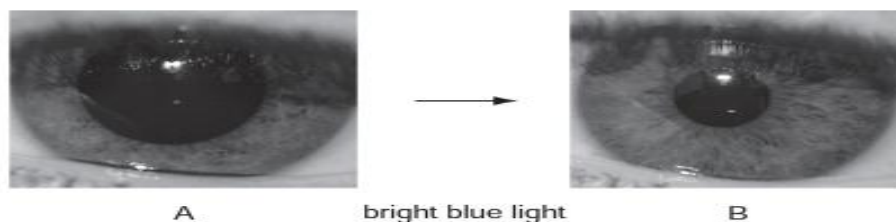
.....  
 .....  
 ..... [2]

(iii) Draw a line on Fig. 1.2 to show the distribution of cones in the retina.

[2]

12. (a) Fig. 2.1 shows a reflex action that involves the eye.

**A** shows an eye in dim light. **B** shows the same eye when a bright blue light is shone into it.



**Fig. 2.1**

(i) Identify the:

- stimulus to which the eye responds;
- receptor cells that detect the stimulus;
- effector;
- response that the eye makes.

Write your answers in Table 2.1.

**Table 2.1**

stimulus	
receptor cells	
effector	
response	

[4]

(ii) Describe how the nervous system coordinates the response shown in Fig. 2.1.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

[4]

(b) Adrenaline is secreted by the adrenal glands to prepare the body for dangerous situations.

Extreme sports, such as bungee jumping shown in Fig. 2.2, are an example of such a dangerous situation.



**Fig. 2.2**

Explain how adrenaline prepares the body for an extreme sport, such as making a bungee jump.

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

(c) The response shown in Fig. 2.1 is involuntary.

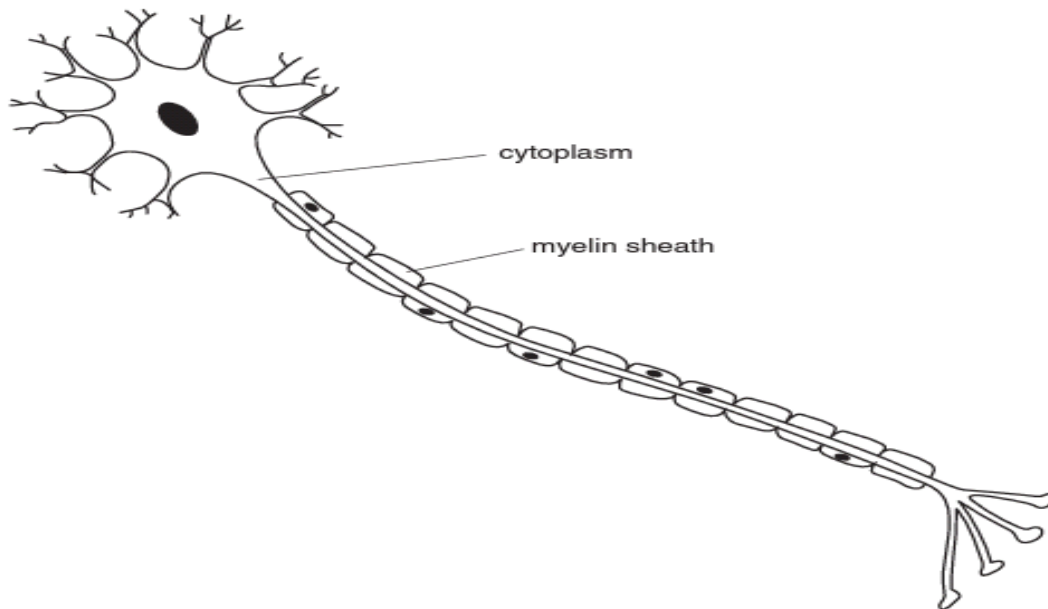
Bungee jumping is a voluntary action.

Describe **two** ways in which involuntary actions differ from voluntary actions.

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

**[Total: 15]**

13. Fig. 2.1 shows a nerve cell.



**Fig. 2.1**

(a) (i) Name the type of nerve cell shown in Fig. 2.1.  
 .....[1]

(ii) State two features that distinguish it from other types of nerve cell.  
 1. ....  
 2. ....[2]

(iii) Where, in the nervous system, is this cell located?  
 .....[1]

(b) Nerve cells are specialised cells.

Suggest how the parts of the nerve cell labelled in Fig. 2.1 enable the nerve cell to function successfully.

*cytoplasm* .....  
 .....  
*myelin sheath* .....  
 .....[4]

(c) Reflexes involve a response to a stimulus.

(i) Complete the flow chart by putting the following terms in the boxes to show the correct sequence in a reflex.

**coordinator      effector      receptor      response      stimulus**



[2]

(ii) For the pupil reflex, identify each of the parts of the sequence by completing Table 2.1. The first has been done for you.

**Table 2.1**

part of sequence	part in pupil reflex
coordinator	brain
effector	
receptor	
response	
stimulus	

[4]

[Total : 14]