

1 (a) Define the term *sensitivity*.

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

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

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.....[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.

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**(e)** Adrenaline is often secreted during sporting competitions.

Outline how adrenaline affects the performance of a swimmer.

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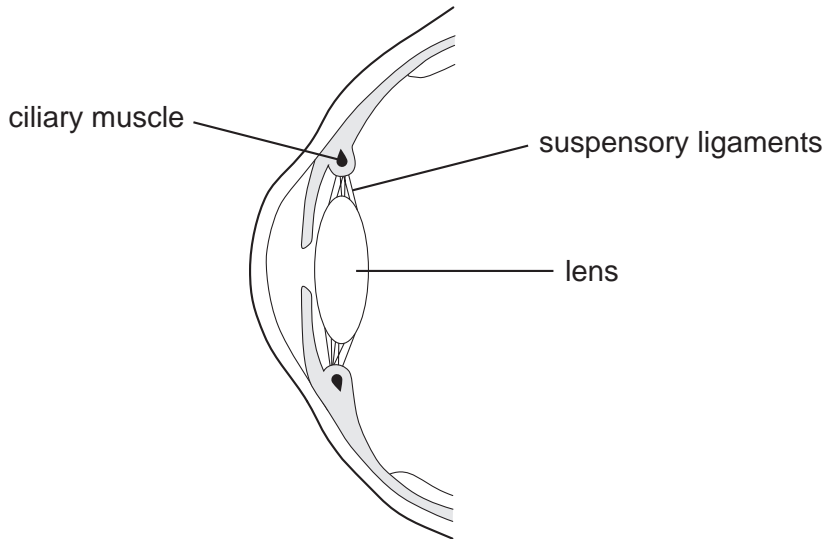
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[Total: 11]

2 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:

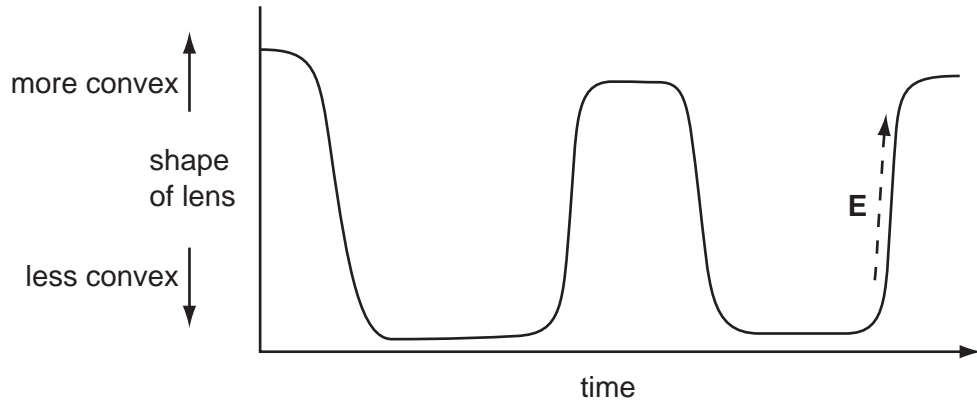
**(i)** another part of the eye that also alters the direction of the light rays;

..... [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.

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..... [3]

**[Total: 8]**

3 Fig. 3.1 shows a diagram of a cell from the pancreas that secretes the hormone, insulin.

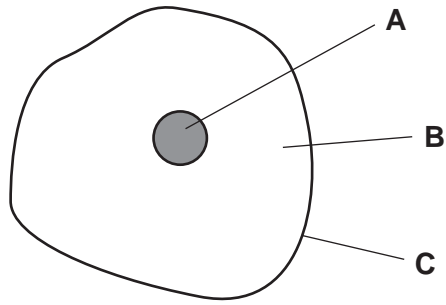


Fig. 3.1

(a) State **one** function of each of the parts of the cell labelled **A**, **B** and **C**.

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

(b) Glucose in the blood is absorbed by liver cells and muscle cells. These cells convert glucose to glycogen for storage.

Explain why glucose needs to be converted to glycogen for storage rather than remaining dissolved in the blood.

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

(c) Other cells in the pancreas secrete the hormone glucagon.

Glucagon stimulates liver cells, but has no effect on muscle cells.

(i) State the effect that glucagon has on liver cells.

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..... [1]

(ii) State how hormones, such as glucagon and insulin, travel around the body.

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..... [1]

(d) Hormone Growth Promotants (HGPs) are hormones. HGPs are used to improve the production of food from animals.

Many of these HGPs are hormones that are secreted naturally by the gonads (ovaries and testes).

Name **two** hormones that are secreted by the gonads.

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

(e) The hormones are given to cattle by placing implants behind the ears. These release the hormones slowly during the animal's life time.

The advantages of using HGPs in meat production are:

- more meat is produced per animal;
- a 15 to 30 % increase in growth rate;
- a 5 to 15 % improvement in conversion of feed into meat;
- a decrease in greenhouse emissions from cattle.

Suggest:

(i) the advantages of an increase in the conversion of feed into meat for the farmer;

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..... [2]

(ii) how the use of HGP's leads to a decrease in greenhouse emissions from cattle.

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..... [2]

(f) HGP's are used in animal production systems in North America and Australia.

The European Union (EU) has banned the use of HGP's and the import of meat from countries where the hormones are used.

Suggest reasons for the ban on the use of HGP's in the EU.

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..... [2]

**[Total: 15]**

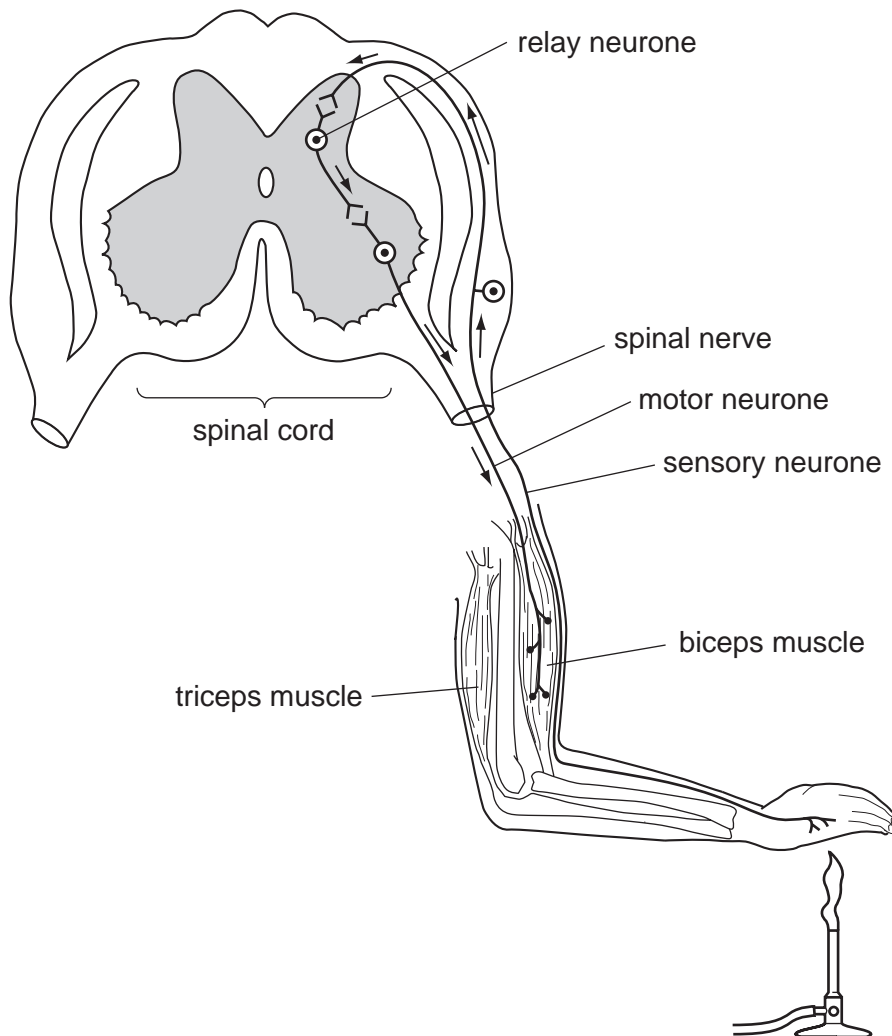
- 4 (a) Complete Table 5.1 by naming **three** sense organs and the stimulus which each detects.

**Table 5.1**

sense organ	stimulus

[3]

- (b) Reflexes are involuntary actions coordinated by reflex arcs like the one shown in Fig. 5.1.



**Fig. 5.1**



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

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..... [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.

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..... [5]

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

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..... [2]

(c) The organs of the human body are coordinated by the nervous system.

Outline **one** other way in which these organs are coordinated.

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**[Total: 14]**