

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

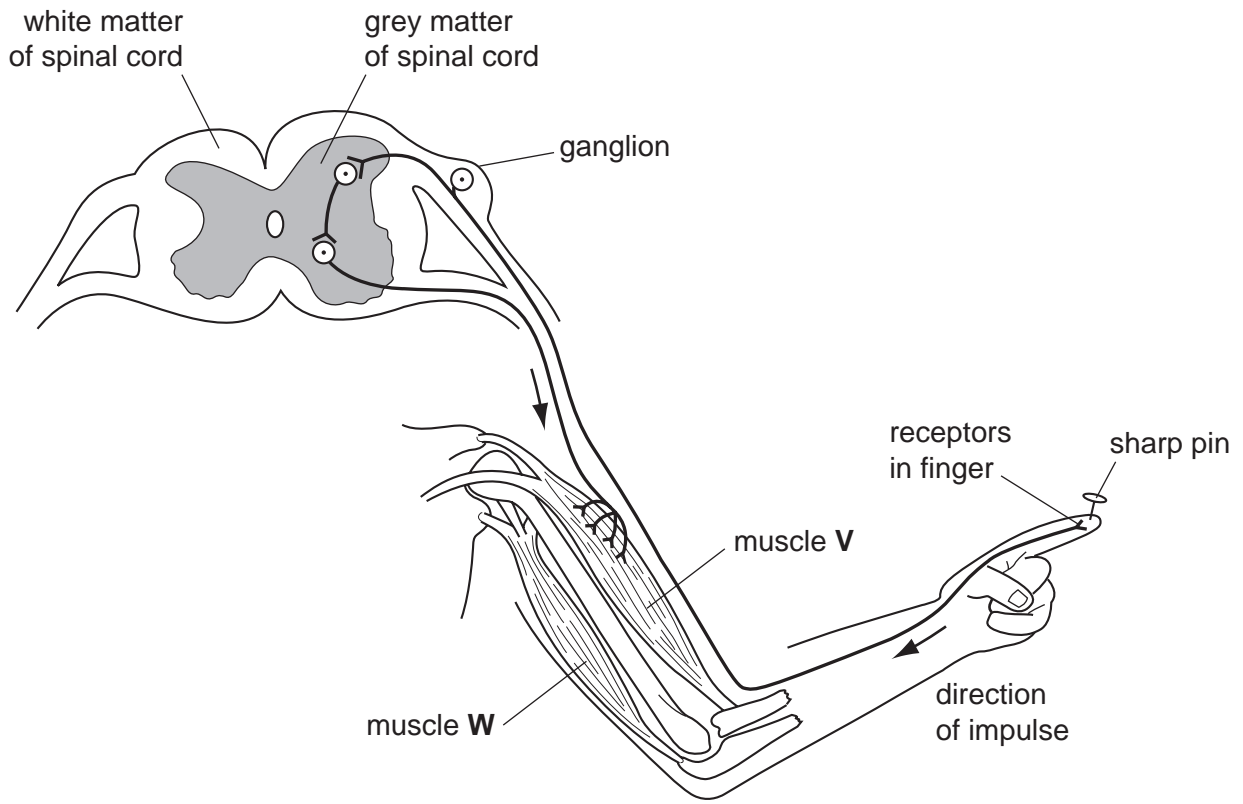


Fig. 2.1

(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 neuron
2. a relay neuron [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]

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 Insulin is a hormone produced to control blood glucose levels. Diabetics do not have a natural ability to control these levels.

(a) Define the term *hormone*.

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

(b) With reference to the pancreas and the liver, describe the role of insulin in controlling blood glucose levels.

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

(c)

- Insulin is a protein.
- Diabetics can control their blood glucose levels artificially by injecting insulin.
- Many medicines are swallowed as tablets.

Explain what would happen to the insulin in the stomach if it was swallowed as a tablet.

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

(d) An alternative treatment to injecting insulin is being developed. The insulin is inhaled into the lungs as a spray. It is then absorbed into the bloodstream.

(i) Suggest the path the spray would take from the mouth to enter the alveoli.

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

(ii) Suggest the process by which the insulin would pass from the alveoli into the bloodstream.

..... [1]

(iii) State three features of the alveoli that might help the insulin to pass into the blood stream efficiently.

1.
2.
3. [3]

[Total: 15]