

**Nervous Transmission - Questions by Topic**

Q1.

The muscles of the earthworm (*Lumbricus terrestris*) contract when it is touched. This is known as the withdrawal response.

Contraction of the muscle in the withdrawal response is stimulated by nerve impulses. These nerve impulses can be detected using electrodes.

Explain the electrical changes in an axon that allow these nerve impulses to be detected.

**(4)**

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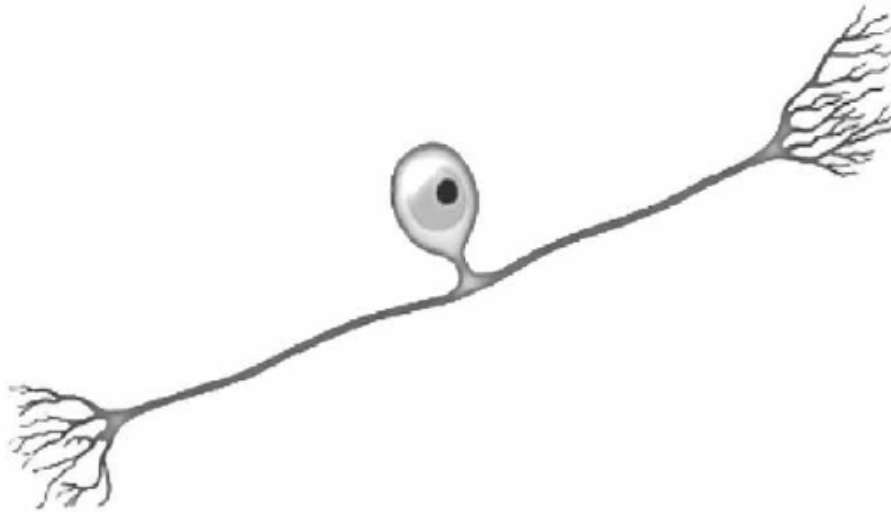
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**(Total for question = 4 marks)**

Q2.

The nervous system contains myelinated and unmyelinated neurones.

The diagram below shows a myelinated sensory neurone.



(a) Give **one** feature, shown in the diagram, that identifies this cell as a sensory neurone.

(1)

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(b) The table shows the conduction velocity of a nerve impulse along a myelinated and an unmyelinated neurone, each with a diameter of 5  $\mu\text{m}$ .

Conduction velocity / $\text{ms}^{-1}$	
Myelinated neurone	Unmyelinated neurone
24.9	5.1

Explain why there is a difference in the conduction velocity of these neurones.

(5)

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(Total for question = 6 marks)

Q3.

Voltage-gated  $K^+$  and  $Na^+$  channels are involved in the transmission of impulses in sensory and motor neurones.

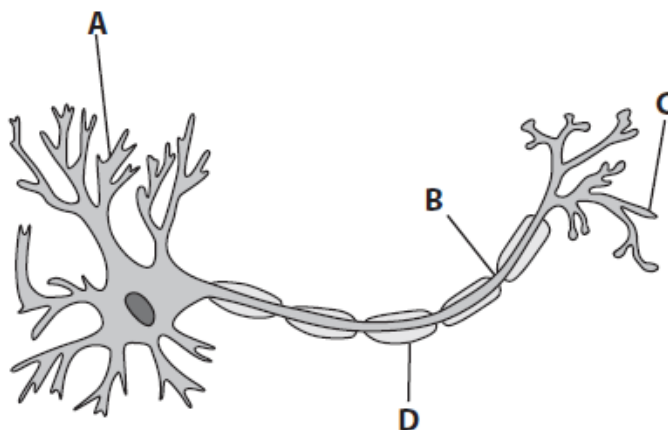
(i) The table below identifies two stages in the transmission of an impulse in a sensory neurone.

Place a tick (✓) in each box that correctly identifies whether the channels are open or closed during these two stages.

(2)

Stage	Voltage-gated $K^+$ channels open	Voltage-gated $K^+$ channels closed	Voltage-gated $Na^+$ channels closed
Depolarisation			
Repolarisation			

(ii) The diagram below shows a myelinated motor neurone.



Place a cross in the box ☒ that labels the site where neurotransmitters bind and initiate depolarisation.

A

B

C

D

(1)