

APOLLO

Neural signalling SL

Biology

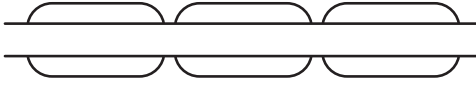
First assessment 2025

11 questions | questions

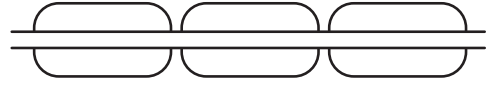
- 17.** Which of these structures is most likely to be the effector in a pain reflex arc?
- A. Grey matter
 - B. Skeletal muscle
 - C. Motor neuron
 - D. Pineal gland

12. The diagrams represent sections through different axons. Which axon has the slowest speed of impulse?

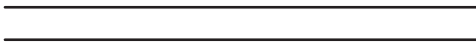
A.



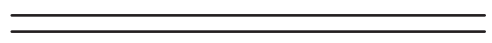
B.



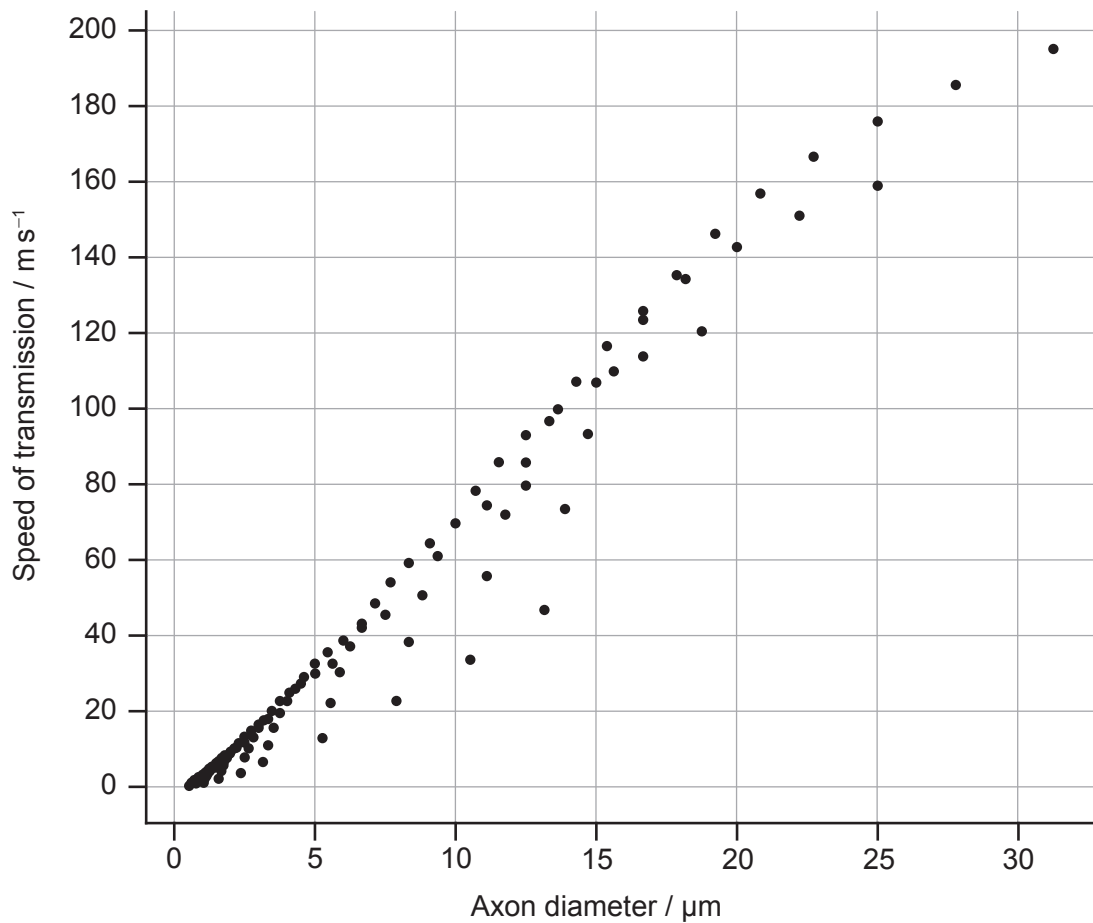
C.



D.



3. Scientists used MRI to calculate the speed of transmission of nerve impulses along axons of brain neurons.



- (a) (i) Describe the relationship between speed of transmission and axon diameter. [1]

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- (ii) In a similar experiment, scientists determined an R^2 value of 0.92.
 Comment on this result. [2]

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(This question continues on the following page)



(Question 3 continued)

(b) Distinguish between the functions of sensory and motor neurons. [1]

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(c) The transmission of nerve impulses along axons relies on a supply of energy.
Explain how ATP is adapted to perform this function. [3]

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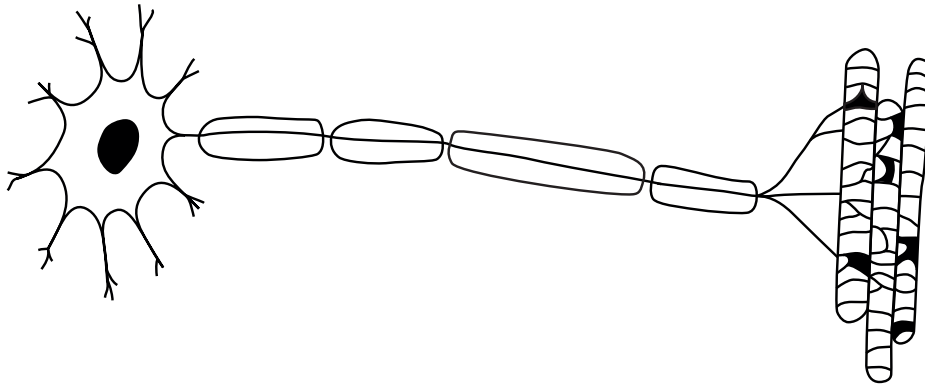


Turn over

Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

3. The neuron is a specialized cell that exhibits a structure important to its function. The diagram shows a neuron interacting with a muscle cell.



- (a) Determine, with a reason, whether this neuron is insulated. [1]

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- (b) List **two** structures that neurons have in common with prokaryotic cells. [2]

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- (c) Describe how neurotransmitters are released from a presynaptic neuron membrane. [3]

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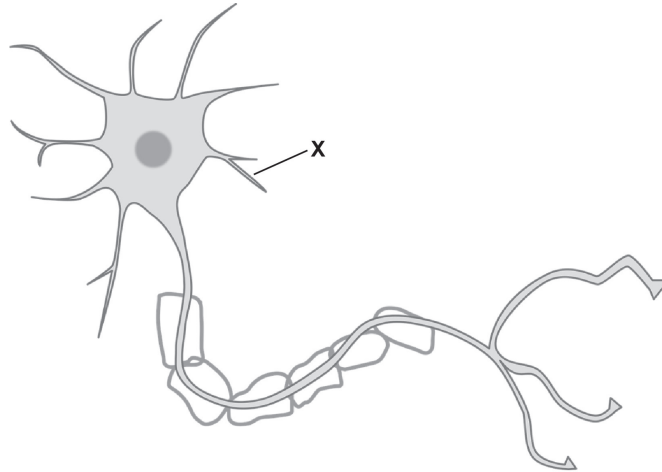


Turn over

Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

6. The diagram shows a neuron.



- (a) Identify the structure and function for the part of the neuron labelled X.

[2]

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- (b) Describe how an excitatory postsynaptic potential is generated.

[3]

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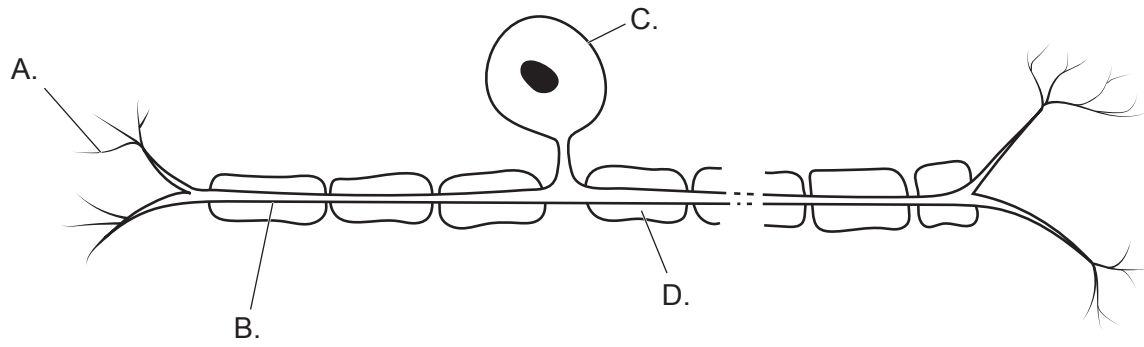
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Turn over

11. The image shows a neuron. Which letter shows a dendrite?



Turn over

16. Which is the receptor in a pain reflex arc?

- A. Skeletal muscle
- B. Grey matter of spinal cord
- C. Pituitary gland
- D. Sensory nerve ending

Turn over

11. The conduction velocity of electrical impulses was measured in different myelinated nerve fibres.

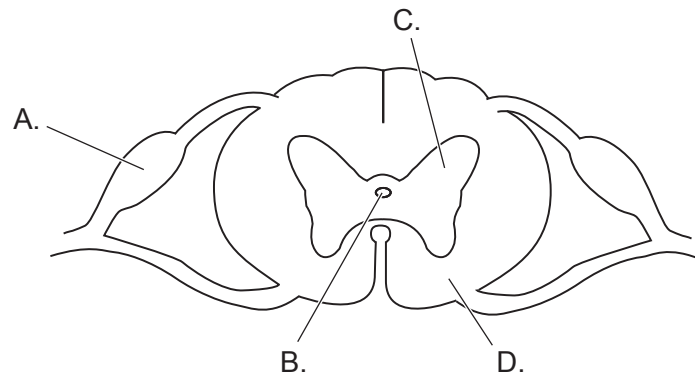
Type of nerve fibre	Conduction velocity / m s^{-1}
P	3–10
Q	30–70
R	80–110

Which hypothesis would explain the higher conduction velocity of nerve fibre R, compared to nerve fibres P and Q?

- A. It is the longest.
- B. It has the thinnest myelin sheath.
- C. It has the largest diameter.
- D. It has the greatest number of mitochondria.

17. The spinal cord is involved in the coordination of involuntary actions such as the pain reflex.

Where are synapses between sensory neurons and interneurons found?

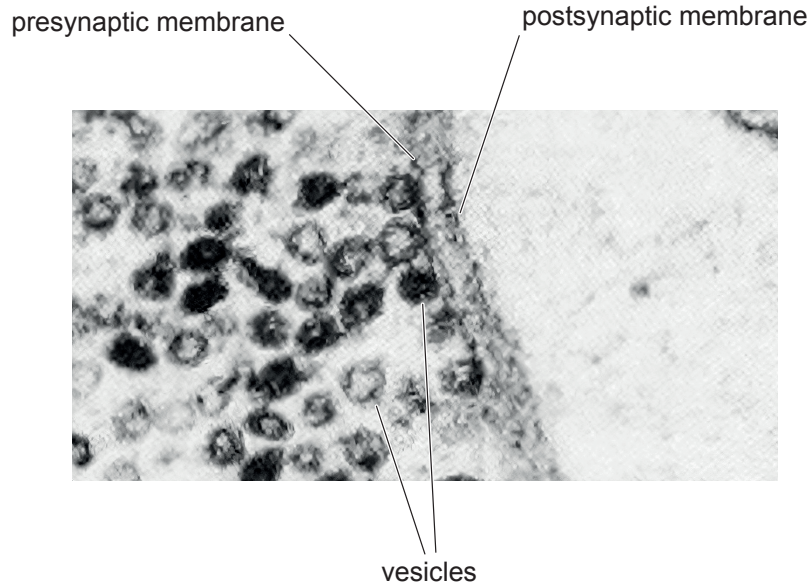


Turn over

Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

5. The electron micrograph shows part of a synapse between two neurons.



- (a) Deduce what type of substance the vesicles contain.

[1]

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- (b) Distinguish between the presynaptic and postsynaptic membranes by giving **two** differences.

[2]

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- (c) The gap between the presynaptic and postsynaptic membranes is very narrow. Suggest an advantage of this.

[1]

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Turn over

13. How is the Na/K ion ratio established during the resting potential phase of neuron activity?

	Na ions	K ions
A.	Actively transferred in	Actively transferred out
B.	Actively transferred out	Actively transferred in
C.	Passively diffused in	Passively diffused out
D.	Passively diffused out	Passively diffused in