

# 6.5 Neurones & Synapses

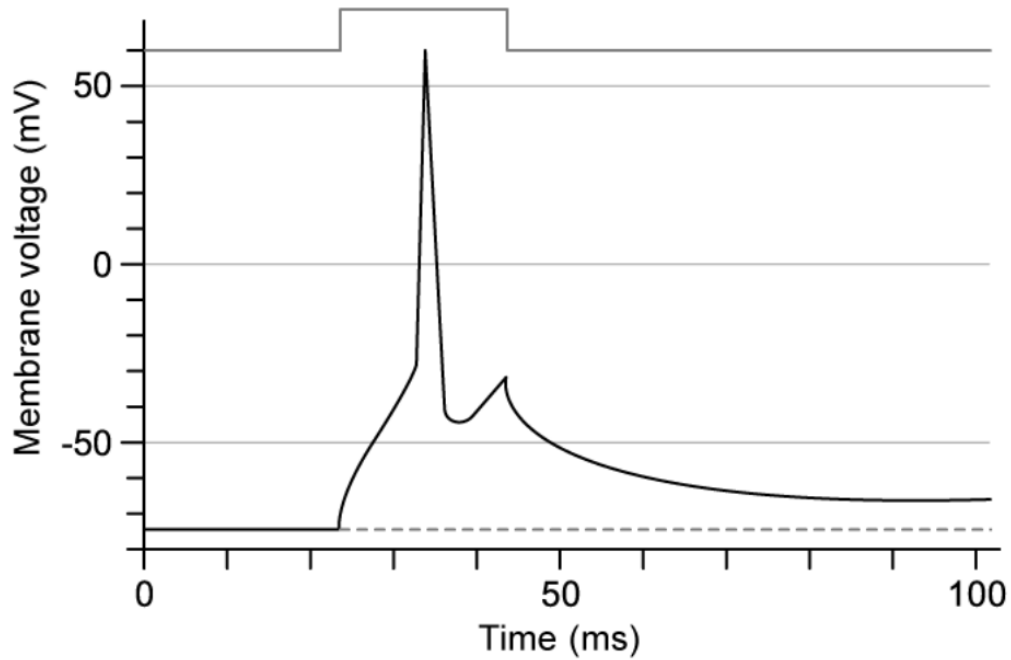
## Question Paper

Course	DP IB Biology
Section	6. Human Physiology
Topic	6.5 Neurones & Synapses
Difficulty	Medium

**Time allowed:** 20  
**Score:** /10  
**Percentage:** /100

**Question 1**

The following graph shows an action potential in a mouse neurone after stimulation with a pulse of current.



What is the threshold potential needed to open voltage gated sodium channels in this neurone?

- A** -70mV
- B** -50mV
- C** -30mV
- D** +50mV

[1 mark]

**Question 2**

The opening of axon membrane voltage gated potassium channels are responsible for which part of the action potential?

- A** Repolarisation of the membrane.
- B** Depolarisation of the membrane.
- C** Hyperpolarisation of the membrane.
- D** Signalling vesicular release of neurotransmitters.

[1 mark]

**Question 3**

It is thought that conditions such as schizophrenia are caused by an overabundance of the neurotransmitters serotonin and dopamine in some regions of the brain.

Given this is the case, which drug mode of action could work in treating symptoms of schizophrenia?

- A** Increased permeability of the presynaptic neurone to calcium.
- B** Increased reuptake of serotonin and dopamine by pre synaptic neurones.
- C** Release of acetylcholinesterase into the presynaptic cleft.
- D** Blockage of serotonin and dopamine receptors in postsynaptic neurones.

[1 mark]

**Question 4**

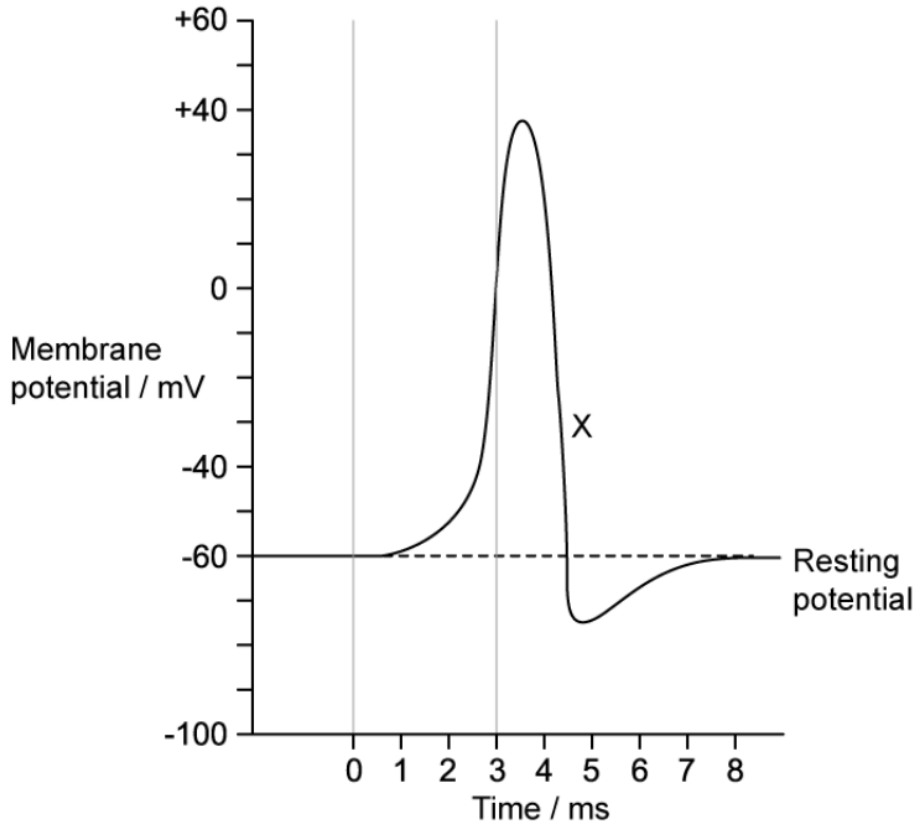
Which of the following statements about myelinated nerve fibres are correct?

- I. Nodes of Ranvier facilitate saltatory conduction.
  - II. Schwann cells are responsible for forming the myelin sheath.
  - III. The myelin sheath acts as an electrical conductor allowing electrical impulses to conduct at a more rapid rate.
- 
- A II only
  - B I and II only
  - C II and III only
  - D I, II, and III

[1 mark]

Question 5

The diagram below shows the change in membrane potential during an action potential.



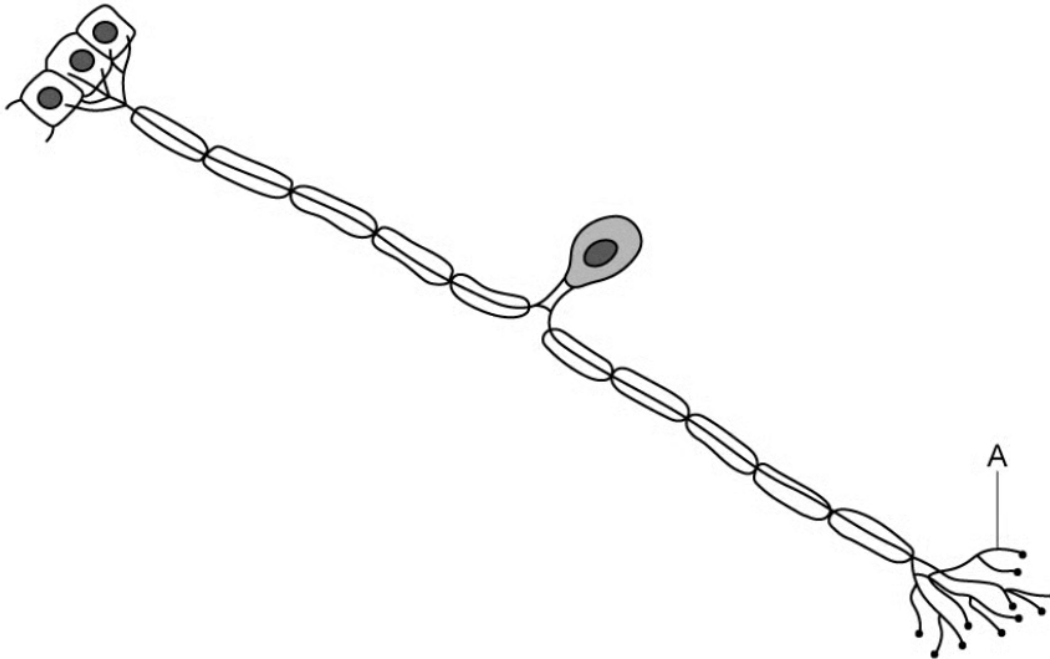
Which of the following best describes the events indicated by the label X?

	Sodium channels	Potassium channels	Membrane potential
<b>A</b>	open	closed	decreasing
<b>B</b>	closed	open	increasing
<b>C</b>	closed	open	decreasing
<b>D</b>	open	closed	increasing

[1 mark]

**Question 6**

The diagram below shows a sensory neurone connected to its associated receptor cells.



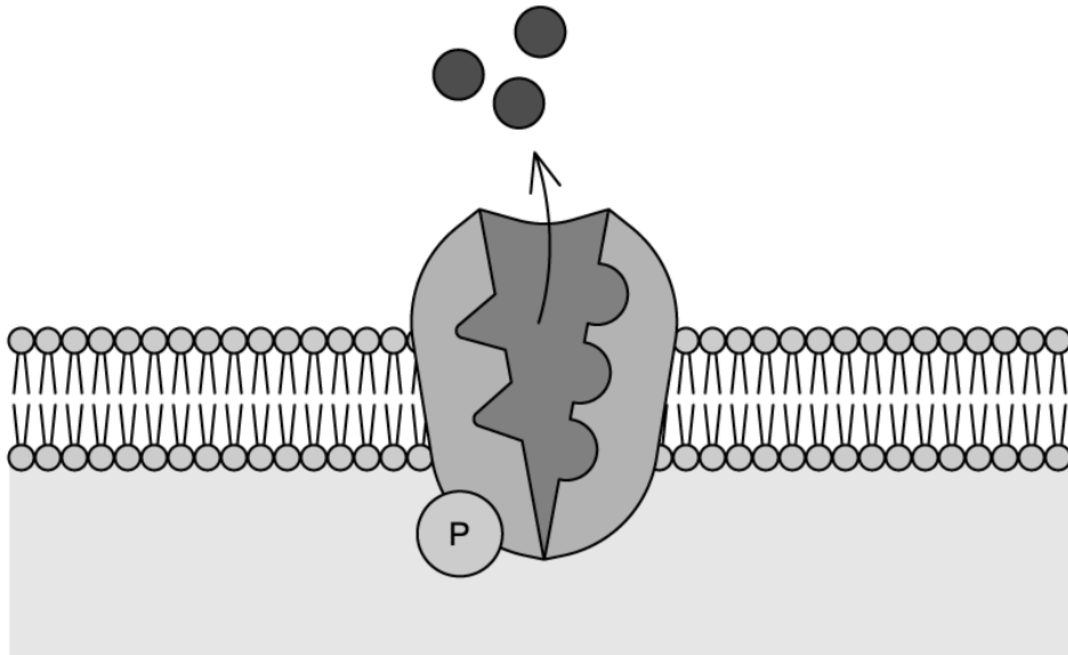
Which best describes the function of the structure labelled **A**?

- A** Contains most cellular structures
- B** Acts as an electrical insulator
- C** Transmit impulses to the spinal cord
- D** Transmit and receive impulses to other neurones

[1 mark]

**Question 7**

The diagram below shows a sodium-potassium pump within the axon membrane of a neurone.



What is the role of active transport in the transmission of nerve impulses by neurones?

- A** Establishes the resting potential needed for impulse transmission by pumping sodium ions out of the axon and potassium ions into the axon.
- B** Depolarisation of the axon by moving sodium ions across the membrane into neurone.
- C** Establishes the resting potential needed for impulse transmission by moving sodium ions into the axon and potassium ions out of the axon.
- D** Initiates the action potential needed for the transmission of an impulse by pumping calcium ions into the axon.

[1 mark]

### Question 8

Which line of the table represents a neurone at its resting potential?

	Concentration of ions inside neurone		Cell surface membrane permeability to Na <sup>+</sup>	Level of activity of Na <sup>+</sup> /K <sup>+</sup> pump
	Sodium (Na <sup>+</sup> )	Potassium (K <sup>+</sup> )		
<b>A</b>	high	low	high	active
<b>B</b>	high	low	low	inactive
<b>C</b>	low	high	high	inactive
<b>D</b>	low	high	low	active

[1 mark]

### Question 9

Membrane channel proteins are essential for the normal functioning of nerves.

Which process in nerves does not require a membrane protein?

- A** Active transport of sodium.
- B** Depolarisation during an action potential.
- C** Binding of neurotransmitters.
- D** Diffusion of neurotransmitters.

[1 mark]



**Question 10**

The use of pesticides is a cause of controversy due to its impact on pollinators such as bees.

What effect do these pesticides have on the nervous system of insects?

- A** They prevent acetylcholinesterase from breaking down acetylcholine.
- B** They inhibit depolarisation in the presynaptic neurone which increases the level of acetylcholine.
- C** They block synaptic transmission by binding with postsynaptic acetylcholine receptors.
- D** They produce an inhibitor that promotes the binding of acetylcholine.

[1 mark]