1. Nov/2022/Paper_41/No.9

(a) A neuromuscular junction allows the transmission of an action potential from a motor neurone to a striated muscle fibre, causing it to contract.

Fig. 9.1 is a graph of an action potential in a motor neurone.

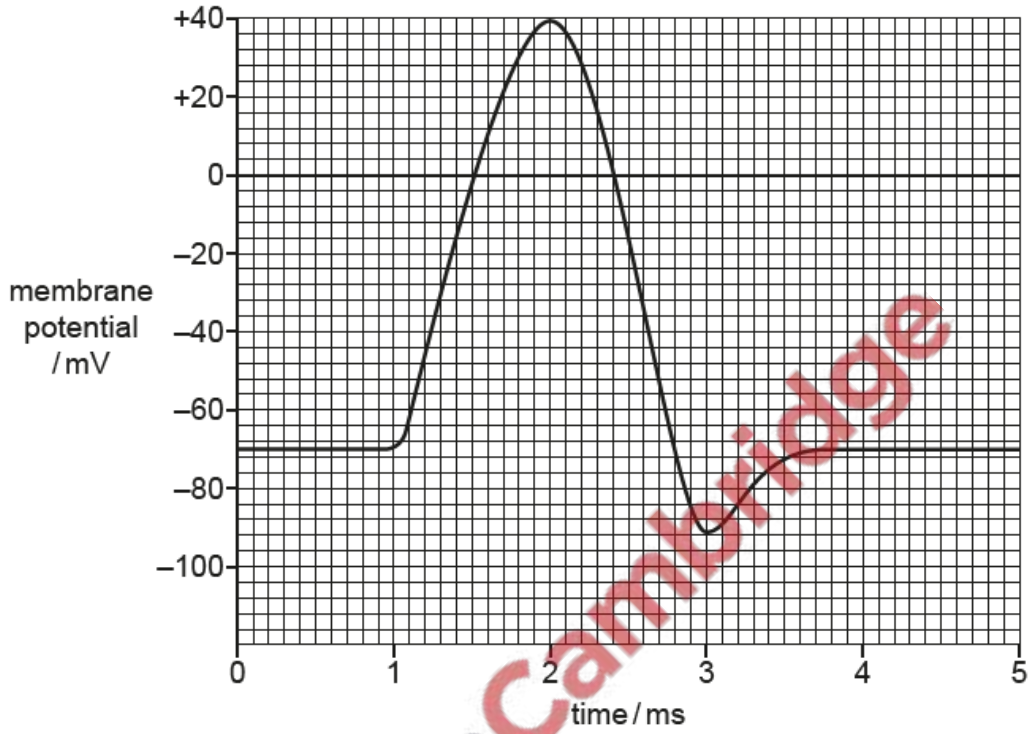

Fig. 9.1

Fig. 9.2 is a graph of an action potential in a striated muscle fibre.

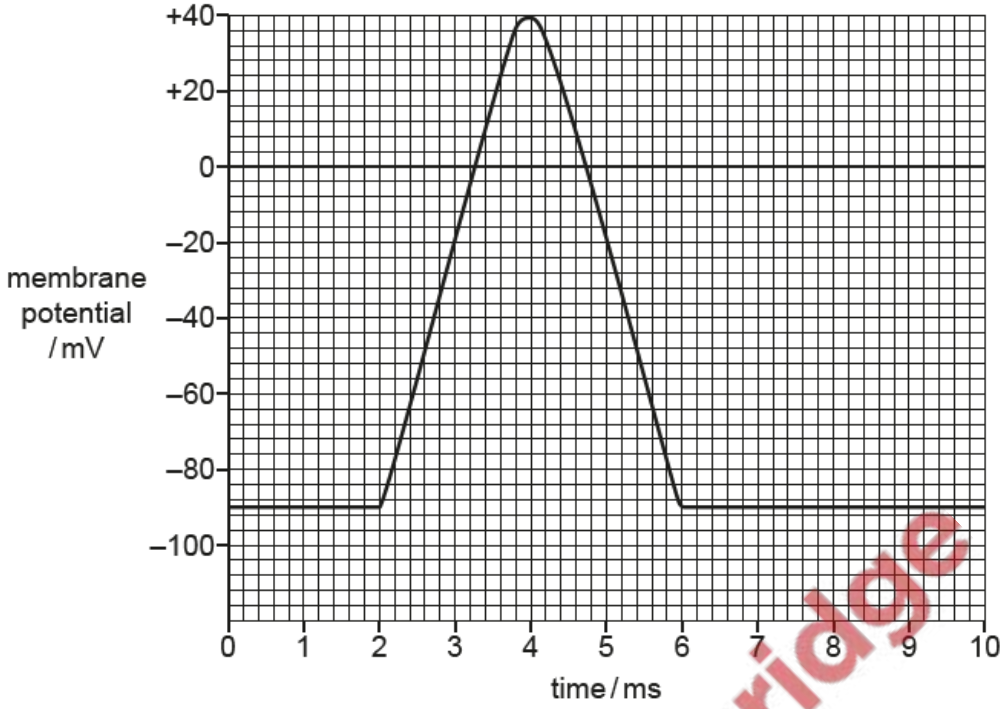

Fig. 9.2

With reference to Fig. 9.1 and Fig. 9.2, describe the differences between the action potential in a motor neurone and the action potential in a striated muscle fibre.

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..... [4]

(b) There are three phases in the contraction of a striated muscle: latent phase, contraction phase and relaxation phase.

The tension in a muscle represents the degree of contraction of its fibres.

Fig. 9.3 is a graph of the tension in a striated muscle during the three phases of contraction.

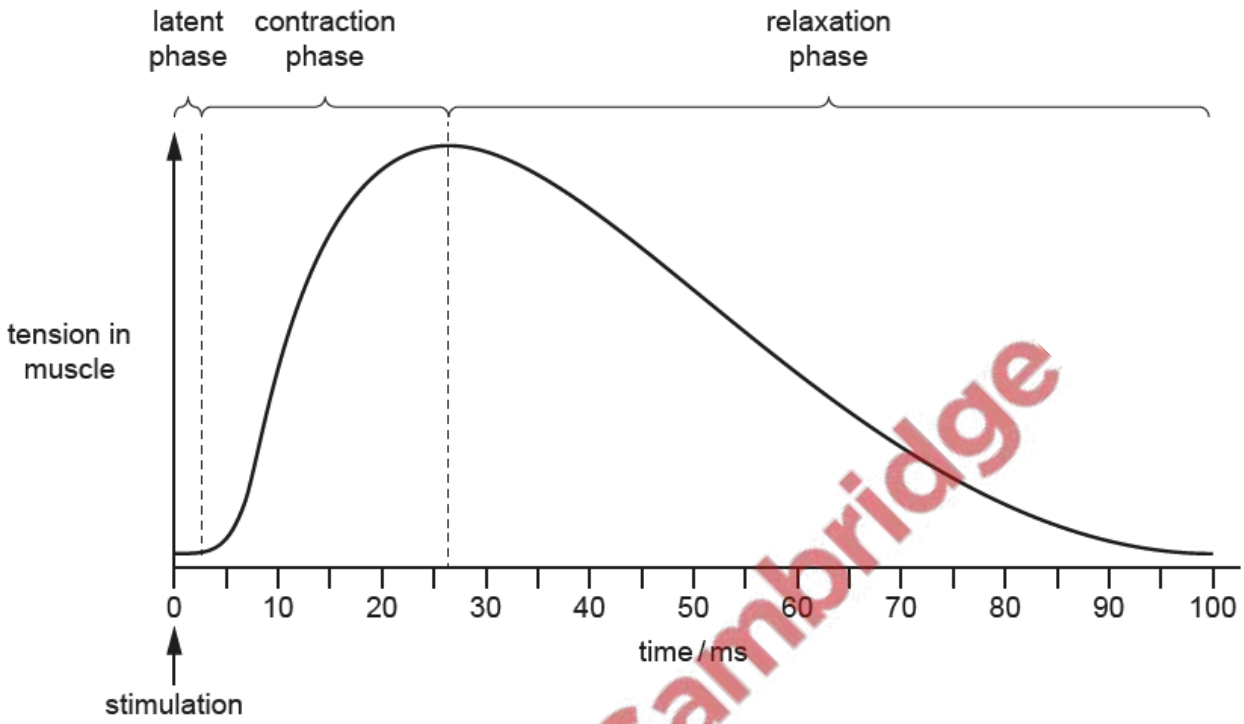

Fig. 9.3

(i) With reference to Fig. 9.3, explain what is happening in the striated muscle fibre during the latent phase.

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..... [3]

(ii) Suggest why the relaxation phase shows a gradual decrease in muscle tension.

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..... [1]

[Total: 8]

(a) Voltage-gated channels are involved in the generation of an action potential.

Fig. 9.1 is a diagram of the voltage-gated channels of sodium ions and potassium ions in the membrane of an axon. The channels are shown in three different states, **1**, **2** and **3**.

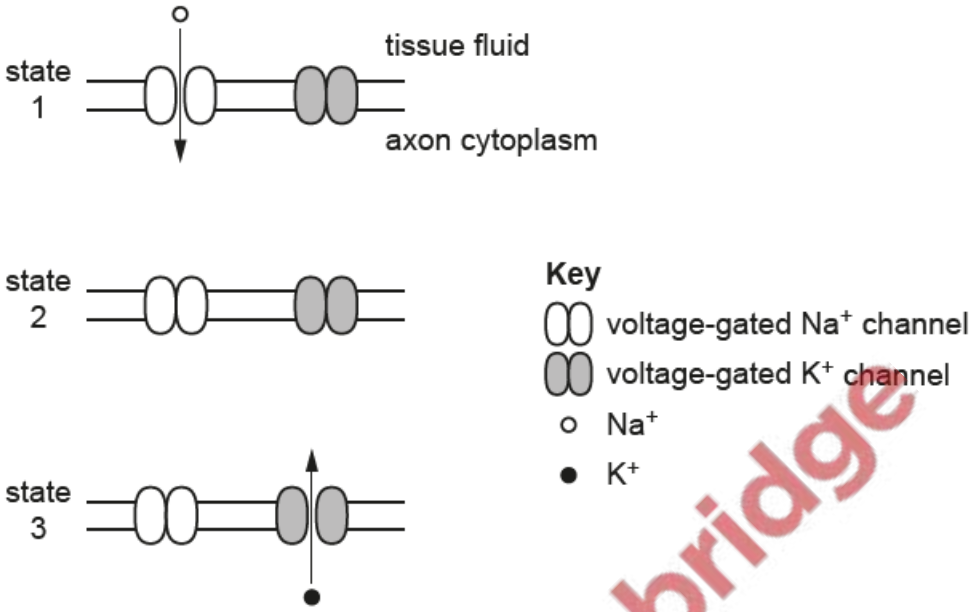

Fig. 9.1

Fig. 9.2 is a diagram of different phases of an action potential in an axon. The phases are labelled **A**, **B**, **C**, **D**, **E**, **F** and **G**.

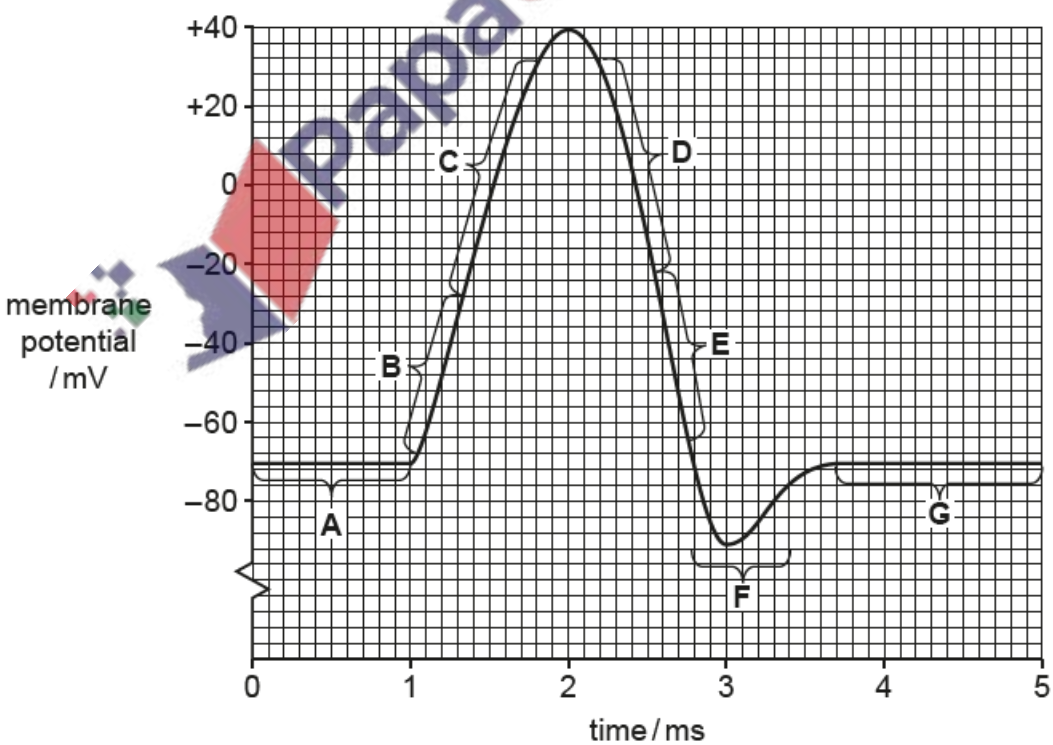

Fig. 9.2

Complete Table 9.1 to match each of the listed phases of the action potential with the appropriate state of the voltage-gated channels: **1**, **2** or **3**.

Table 9.1

phase of action potential	state of voltage-gated channels
A	.....
C	.....
E	.....
F	.....
G	.....

[3]

(b) Many neurones are surrounded by myelin sheaths.

Describe **and** explain the role of the myelin sheath in the transmission of an action potential.

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..... [3]

[Total: 6]