

1 In an investigation into dieting and obesity, mice were fed a restricted quantity of food. It has been found that the stress of having less food causes the release of the hormone noradrenaline. This causes the mice to hunt for food. These food-restricted mice will tolerate electric shocks in order to eat.

(a) Suggest why this investigation might be regarded as unacceptable.

(2)

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(b) Noradrenaline acts by increasing blood flow to the muscles.

(i) Suggest how this increase in blood flow is brought about.

(2)

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(ii) Suggest why this increase in blood flow would be of advantage to the food-restricted mice.

(2)

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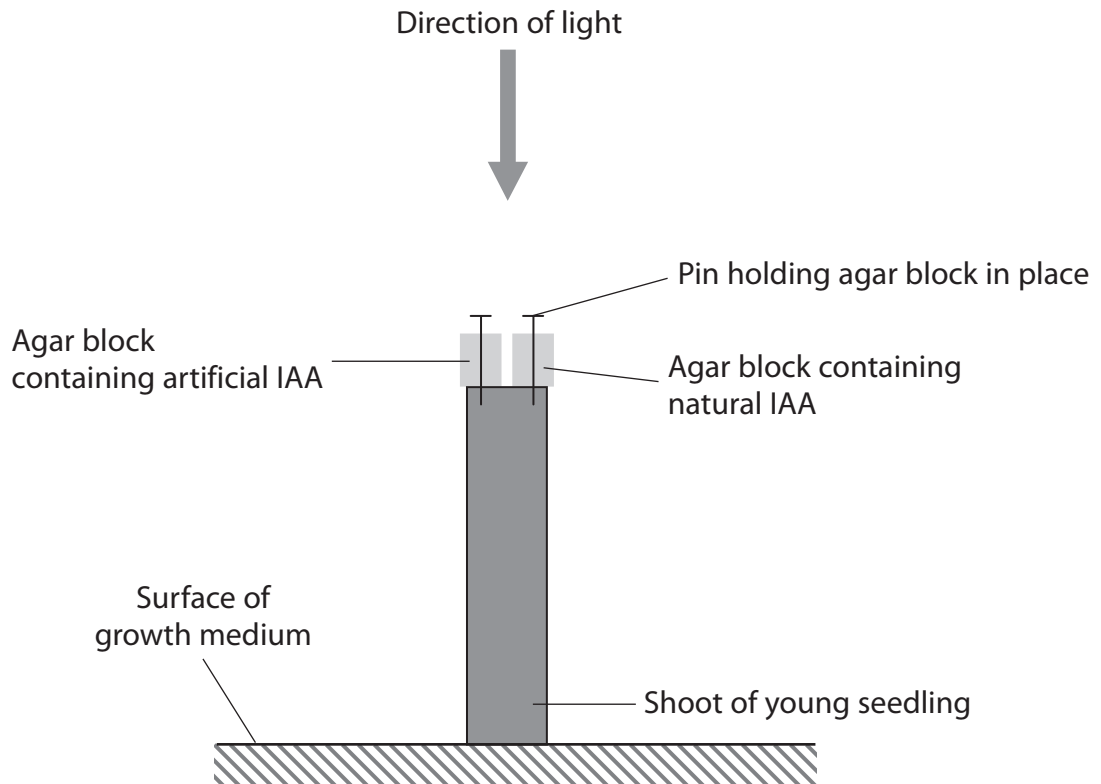
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**(Total for Question 1 = 6 marks)**

2 IAA (auxin) is a plant growth substance.

(a) A student investigated the effect of natural IAA and artificial IAA on shoot growth.

The diagram below shows how she set up her investigation.



(i) The student also set up a control.

Describe a suitable control for this investigation.

(1)

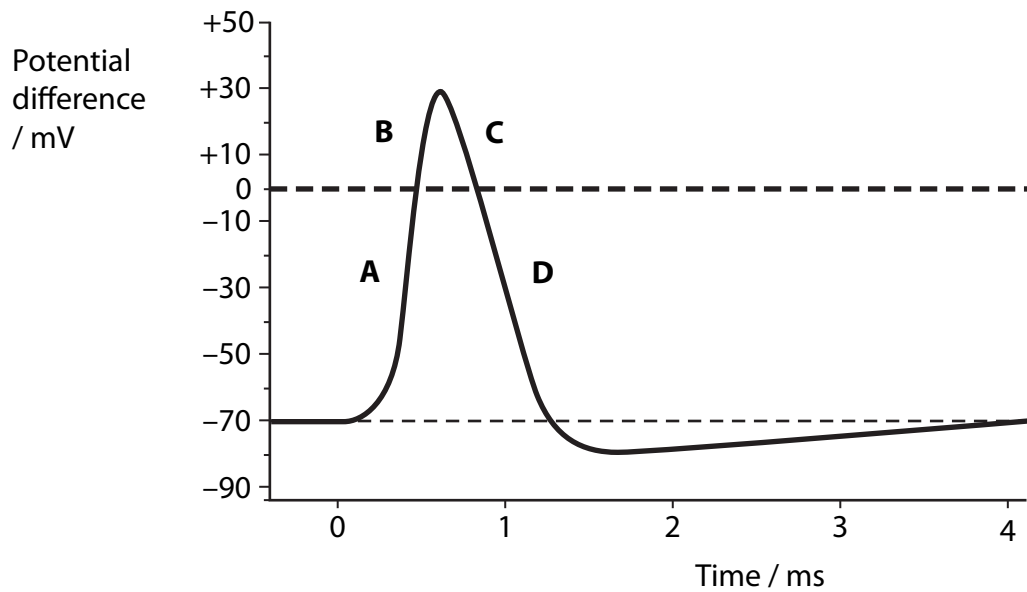
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3 The diagram below shows changes in potential difference across the membrane of a neurone during an action potential.



(a) Describe the events that begin the depolarisation of the membrane of a neurone. (2)

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(b) Complete the table below to show which ions are able to move across the membrane at positions **A** and **D** shown in the diagram.

Put a cross  in the box if the membrane is permeable to the ion.

(2)

Position on diagram	Permeable to sodium ions	Permeable to potassium ions
<b>A</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>D</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

(c) Give an explanation for the movement of ions at position **C** on the diagram.

(3)

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(d) Explain how the potential difference across the membrane is returned to the resting level in the time between 1.5 ms and 4.0 ms on the diagram.

(3)

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**(Total for Question 3 = 10 marks)**