

1 Plants can respond to environmental cues using IAA (auxin) and photoreceptors.

(a) A plant was kept in a cycle of 12 hours in the light and then 12 hours in the dark. This plant did not flower.

It was then placed in an environment with 15 hours in the light and 9 hours in the dark. The plant then flowered.

Explain how this change in light conditions stimulated this plant to flower.

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(b) IAA in the stem of the plant is involved in phototropism.

(i) Give **three** similarities between IAA and animal hormones.

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- (ii) Auxins can be used to kill unwanted plants such as weeds growing in grass. The auxin stimulate the weeds to grow rapidly.

Suggest an explanation for how auxins stimulate the weeds to grow rapidly but not the grass.

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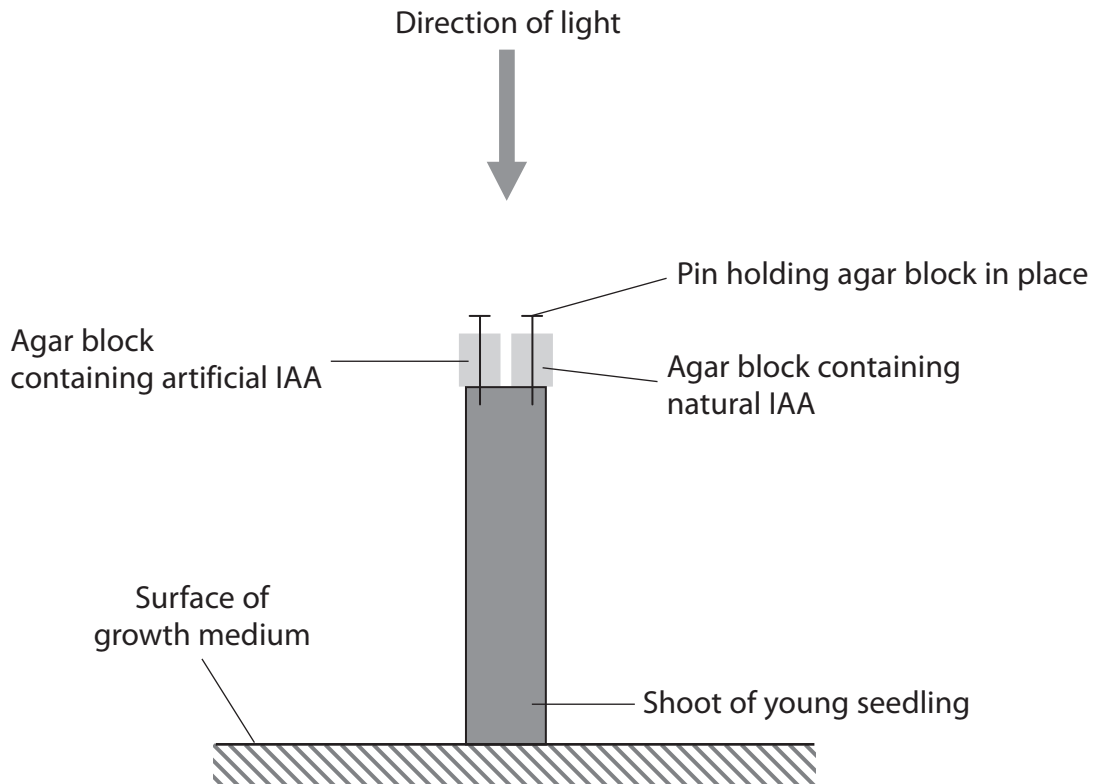
**(Total for Question 1 = 8 marks)**

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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)

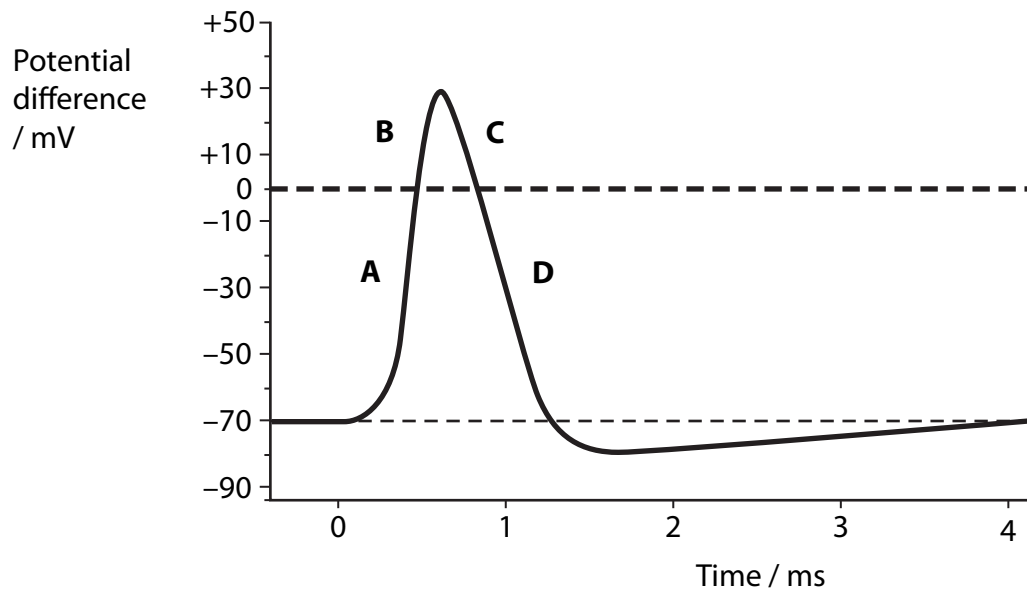
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3 The diagram below shows changes in potential difference across the membrane of a neurone during an action potential.



(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.

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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.

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

4 The nervous system is made up of many different neurones including those involved in reflex actions.

(a) The table below shows features of three types of neurone in a spinal reflex. Place a cross  in the box if the feature is present in any of the named neurones.

(4)

Feature	Type of neurone		
	Sensory	Relay	Motor
Found only in the central nervous system	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Cell terminates at the effector	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Pre-synaptic membrane not found in the central nervous system	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Impulse stimulated by the receptor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

(b) Rod cells and muscle cells in the eye both require ATP.

(i) Name the chemical reaction that occurs when ATP is broken down.

(1)

(ii) Describe the function of ATP in a rod cell soon after a person has moved from an area of bright light to an area of low light.

(2)

