

**Response to Stimuli - Questions by Topic**

Q1.

The scientific article you have studied is adapted from several sources.

Use the information from the scientific article and your own knowledge to answer the following questions.

'The hunger system is mediated by hormones from the gut and from fat cells' (paragraph 6).

Describe how these fat cells could release hormones.

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**(Total for question = 2 marks)**

Q2.

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.

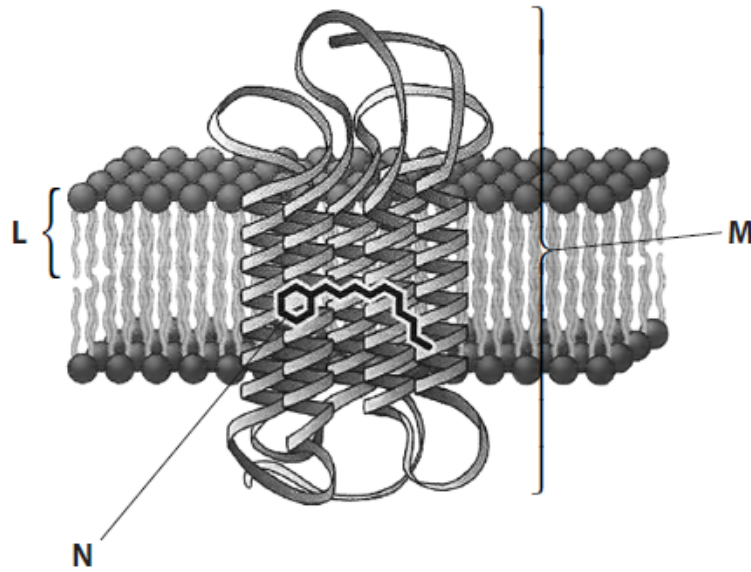
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**(Total for question = 8 marks)**

Q3.

The diagram shows part of the membrane of the outer segment of a rod cell.



(a) Which of the following is the part labelled **L**?

(1)

- A** fatty acid tail
- B** phosphate head
- C** phospholipid
- D** phospholipid bilayer

(b) (i) Give the name of the visual pigment labelled **M**.

(1)

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(ii) Give the name of the light-absorbing part of the visual pigment labelled **N**.

(1)

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(c) Describe how the absorption of light by the part labelled **N** results in an action potential in the optic nerve.

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**(Total for question = 6 marks)**

Q4. Rod cells in the eye are linked to the brain by neurones.

(a) Place a cross in the box  to identify the answer that correctly completes each statement.

(i) The pigment in a rod cell is made of opsin and

**(1)**

- A** retina
- B** retinal
- C** retine
- D** retinol

(ii) When light stimulates a rod cell the pigment changes.  
This pigment is

**(1)**

- A** iodopsin
- B** phytochrome far red
- C** phytochrome red
- D** rhodopsin

(iii) Once the pigment has changed, the concentration of sodium ions inside the rod cell

(1)

- A** decreases
- B** does not change
- C** increases
- D** reaches equilibrium with the outside of the cell

(iv) After changing, the pigment takes time to become functional again. This is because

(1)

- A** it has to bleach
- B** the membrane has to be polarised
- C** the rod cell needs to reset
- D** two components have to be rejoined

(v) The cell that links a rod cell to a sensory neurone is

(1)

- A** a bipolar neurone
- B** a multipolar neurone
- C** a unipolar neurone
- D** an optic nerve

(b) Decreasing the intensity of light entering the eye causes pupil dilation. Describe the roles of the circular and radial muscles in pupil dilation.

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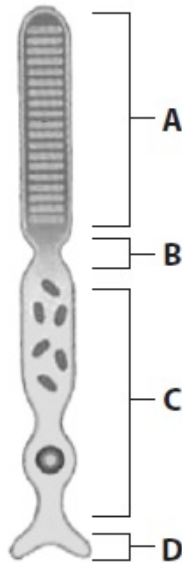
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**(Total for Question = 7 marks)**

Q5. The retina of the eye is sensitive to light. It contains rod cells.

The diagram below shows a rod cell. Parts of this cell are labelled **A**, **B**, **C** and **D**.



(a) The table below gives three descriptions of parts of the rod cell. Place a cross  in the box to identify the part of the rod cell described.

(3)

Description	Part of the rod cell			
	A	B	C	D
Nearest the pupil of the eye	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Containing the photosensitive pigment	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Has a pre-synaptic membrane	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

(b) When light reaches a rod cell the voltage across the cell surface membrane can change. This can lead to the formation of an action potential in an optic neurone.

(i) Describe how light causes a change in the voltage across the cell surface membrane of a rod cell.

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(ii) Suggest why a change in voltage across the cell surface membrane of a rod cell may not lead to the formation of an action potential in an optic neurone.

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**(Total for Question = 9 marks)**