14.5 Tropic responses

Name: _____ Class: _____ Date: _____ **Total: 19 marks**

KEY WORDS shoot • auxin • tropism • phototropism • gravitropism

Objective

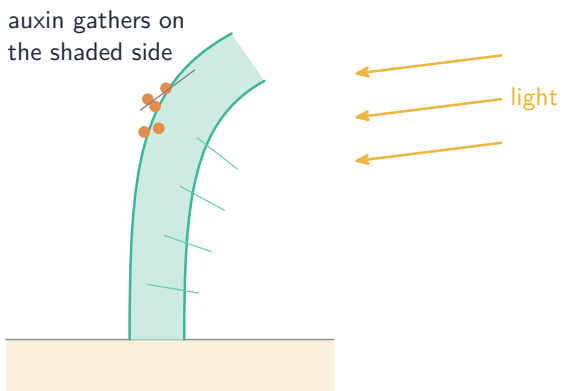
Build the skills to answer exam questions on **tropic responses** – **phototropism** and **gravitropism**, and the role of **auxin**.

You must be able to:

- define phototropism and gravitropism
- describe how auxin controls a shoot's response to light
- predict the direction of growth

1 Key knowledge and worked examples

Phototropism and auxin



cells on the shaded side grow longer, so the shoot bends towards the light

Auxin from the tip gathers on the shaded side; those cells grow longer, so the shoot bends to the light

- **phototropism:** growth towards light (shoots positive). **gravitropism:** roots down, shoots up.
- auxin made in the shoot tip; it makes cells elongate.

2 Practice

2.1 Define phototropism. [1]

2.2 State the direction a root grows in response to gravity. [1]

3 Exam-style questions

3.1 A shoot lit from one side bends towards the light because auxin: [1]

- ☐ **A** is destroyed by light
- **B** gathers on the shaded side and makes those cells grow longer
- **C** stops the shoot growing
- **D** gathers on the lit side

3.2 Auxin controls phototropism.

(a) State where auxin is made. [1]

(b) Explain how unequal auxin makes a shoot bend towards the light. [3]

3.3 A seedling was left in a box with a hole in one side, so light reached it from one direction only. After three days the shoot had bent towards the light and the root had grown straight down.

(a) Name the response shown by the shoot and the response shown by the root, and state whether each is positive or negative. [4]

(b) Explain, using auxin, why the shoot bends towards the light. [4]

(c) Explain how each response helps the seedling survive. [2]

(d) The tip of a second shoot was cut off before the experiment. Predict what happened to that shoot, and explain why. [2]

Solutions

Each answer shows the steps, then the **result**.

2.1

- phototropism is a plant's **growth response towards (or away from) light**

2.2

- a root grows **downwards** (towards gravity)

3.1 B

- auxin gathers on the **shaded side** and makes those cells **grow longer**
- A, C and D would not bend the shoot towards the light

3.2

(a)

- auxin is made in the **shoot tip**

(b)

- light makes auxin spread to the **shaded side**
- auxin makes those cells **elongate**
- the shaded side grows faster, so the shoot **bends towards the light**

3.3

(a)

- shoot: **positive phototropism** – towards light
- root: **positive gravitropism** – towards gravity

(b)

- auxin is made in the **shoot tip**
- it moves to the **shaded** side
- auxin makes cells **elongate**, so the shaded side grows longer
- uneven growth makes the shoot **bend towards the light**

(c)

- towards light: more light for **photosynthesis**
- downwards: **anchors** the plant and reaches water and minerals

(d)

- it grew **straight up** without bending
- the tip makes auxin, so with it removed there is **no uneven growth**