

GCSE Biology Lesson Element

Roots and Shoots

Instructions and answers for teachers

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Lesson Element

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Student Task 1

For each of the scenarios you should:

- Decide on the behaviour of the auxins (plant hormones that stimulate or inhibit growth).
- Draw on the diagram the hormones in the correct location on the shoot or root.
- Amend the diagram by drawing what you would think the outcome would be in each case.

Auxins in Shoots

Plant shoot

OCR

Roots and Shoots

Exploring the action of auxins on the growth of roots and shoots.

GCSE Biology – Roots and Shoots

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The Activity:

Learning outcomes

- Be able to describe the distribution of auxins in shoots and roots to a stimuli
- Explain the behaviour of auxins within roots and shoots



This activity offers an opportunity for English skills development.

Associated materials:

'Roots and Shoots' student sheet and 'Roots and Shoots' PowerPoint presentation.

Introduction to the task

This lesson element contains a modelling activity to demonstrate the role that auxins play in plant growth. Learners should have prior knowledge of basic plant organs and their functions from Key Stage 3. Learners should have been introduced to auxins and their functions within plants, and be familiar with how roots and shoots respond to light and gravity.

Learners often have difficulties in understanding that the auxins in the roots and shoots are the same but their behaviour is different. In the roots the auxins prohibit growth and prevent growth in the area they are distributed. However In the shoots they stimulate growth on the regions they are distributed.

Notes for teachers

Learners will be modelling auxin distribution in shoots and roots using beads (or coloured circles provided) and a readymade layout. For this activity learners will require a white board/ student sheet, the readymade layout of roots and shoots and beads (you may wish to use the coloured circles). The key points of information which the learners need to know are included on the PowerPoint. Each task should be completed as a modelling task with beads and then followed by a drawing task on white boards/ student sheet. There is opportunity for discussion after each scenario.

Activity

Using the PowerPoint display the scenarios of the sun shining on roots and shoots. Learners are to use their basic layout and using 2 different coloured beads, buttons or circles which are provided, place them in the correct places. One colour will represent stimulation of growth and the second colour which represents inhibition of growth. This will help learners to understand that behaviour of auxins is different in shoots and roots.

Between each activity learners could then use the white board/student sheet they have been provided with to draw what would happen to the growth of the shoot or root and try to explain the behaviour.

Guidance and suggested answers to each scenario

Scenario 1:

Learners are to use the green coloured circles. They should be placed along the bottom of the shoots. On the white boards/student sheet the learners should have drawn the shoots growing upwards.

Explanation

The sun causes the auxins to be distributed in the shaded area along bottom of the shoots. The green coloured circles are used as in the shoots the auxins **stimulate** growth. The cells along the bottom will elongate causing the shoots to grow upwards.

Scenario 2:

Learners are to use the red coloured circles. They should be placed along the bottom of the roots. On the white board/student sheet learners should have drawn roots going downwards.

Explanation

Gravity causes the auxins to be distributed along the bottom of the roots. The red coloured circles are used as, in the roots the auxins **prohibit** growth. The cells along the top of the roots will elongate causing the roots to grow downwards.

Scenario 3:

Learners are to use the green coloured circles. They should be placed along the bottom of the shoots. On the white board/student sheet learners have drawn shoots growing upwards.

Explanation

Gravity causes the auxins to be distributed along the bottom of the shoots. The green coloured circles are used as in the shoots the auxins **stimulate** growth. The cells along the bottom of the shoots will elongate causing the shoots to grow upwards.

Supporting information

Teacher should ensure they understand the behaviour of auxins. In the roots auxins prohibit growth and prevent growth in the area they are distributed. However In the shoots they stimulate growth on the regions they are distributed. Rules to keep in mind are:

- In shoots to light – auxins distributed on shaded area away from light
- In shoots to gravity – auxins distributed on underside due to gravity acting upon it
- In roots to gravity - auxins distributed on underside due to gravity acting upon it.

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