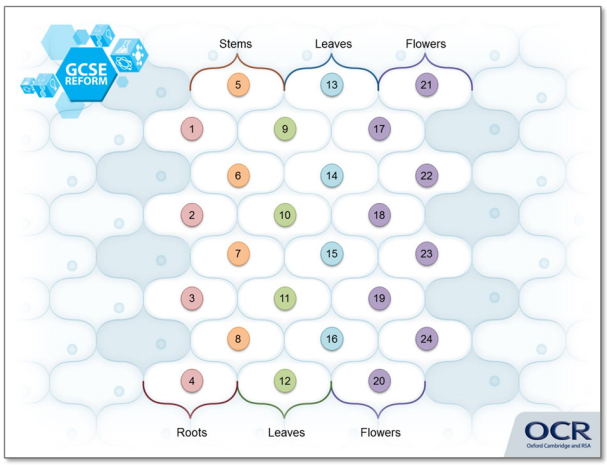
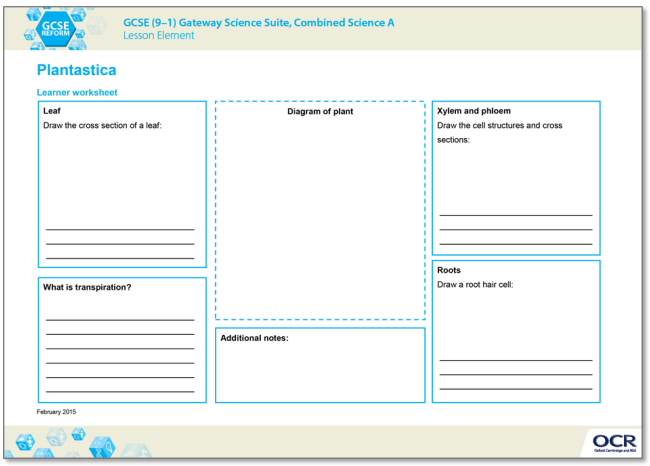
Plantastica

PROVISIONAL

Instructions and answers for teachers

These instructions should accompany the OCR resource 'Plantastica' activity *which supports OCR GCSE (9–1) Gateway Science Suite, Combined Science A.*





The Activity:

Learning outcomes

- Describe how the structure of different plant cells are linked to their function
- Describe the processes of transpiration
- Explain the environmental factors that affect the rate of water uptake by a plant including light intensity, air movement, and temperature

This activity offers an opportunity for English skills development.

This activity offers an opportunity for maths skills development.

Associated materials:

- Plantastica Student Task Sheet
- Plantastica PowerPoint Game

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This resource is an exemplar of the types of materials that will be provided to assist in the teaching of the new qualifications being developed for first teaching in 2016. It can be used to teach existing qualifications but has been designed to be used for the content in the new qualifications. Please check the OCR website for updates and additional resources being released. We would welcome your feedback so please get in touch.

February 2015

Introduction to the task

This activity can be used as a revision tool or for consolidation at the end of a lesson. Before undertaking this activity, learners should have a clear understanding of plant organs, their structure and their functions; specifically root hair cells, xylem and phloem and guard cells. Knowledge of the processes of transpiration, osmosis, diffusion and use of a photometer are also needed for this activity.

Common problems that learners face are differentiating between the processes of osmosis and diffusion, and the difference between humidity and temperature. Learners sometimes confuse the structure of the xylem and phloem; substances in the xylem allow water and dissolved substances to travel upwards whereas the phloem allows substances to travel both upwards and downwards.

Activity

This is a game where learners are to work their way across the board by answering questions and build up a picture of a plant as they do so. The Student Task Sheet allows space for them to do this. Learners should be placed into two equal groups and the teacher is the question master. Questions provided with this resource get progressively more difficult as learners move across the board; the questions for flowers being quite challenging.

1. Learners are to select the pathway across the board by choosing a different coloured nucleus to build up a picture containing roots, a stem, two leaves and a flower.
2. The PowerPoint is set up so if a coloured nucleus is clicked then the question appears on the screen. The answers to each of the questions are provided below for the teacher.
3. By clicking on ‘reveal answer’ it will appear and cannot be reset.
4. If the question was answered correctly, return to the board and click on the cell around the nucleus to reveal the picture. The background colour can be changed from blue to pink (to differentiate between groups) by clicking on the cell.
5. Learners cannot move onto the next coloured nucleus until a question has been answered.

Extension

Once the diagrams are complete, on the Student Task Sheet, learners can annotate them with researched information or information gained from the questions in the game.

Supporting information

Learners may want to investigate the rate of transpiration as part of this topic and will therefore benefit from using or at least seeing a photometer, to understand how it works.

Suggested answers

Roots

1. Other than water, what else is taken up by a plants root hair cells?

Mineral ions

2. What name is given to the tissue through which most water moves up the stem?

Xylem

3. What is the name of the specialized plant cell that absorbs water from the ground?

Root hair cell

4. What direction do substance travels in the xylem?

Upwards/from the root to the leaf

Stem

5. What specialised plant cells control the opening and closing of the stomata?

Guard cells

6. Which organ contains the xylem?

Vascular bundle/vein

7. What direction do substances flow in the phloem?

Upwards/downwards

8. What is transported in the phloem?

Dissolved food e.g. sugars and amino acids

Leaf 1

9. What layer is between the upper and lower epidermis of a leaf?

Mesophyll

10. What name is given to the process of water moving through a partially permeable membrane, from a higher water potential to a lower water potential?

Osmosis

11. How are the xylem and phloem arranged in the stem?

In vascular bundles

12. What is a transpiration stream?

Movement of water up a plant

Leaf 2

13. What factors affect the rate of water uptake by a plant?

Light intensity/air movement/temperature/humidity

14. How is water pulled up the xylem?

Due to water evaporation from the leaves

15. What is between the cells of the spongy mesophyll?

Air

16. What happens to the sugars made from photosynthesis?

Converted to starch and stored or used to make other substances

Flowers

17. What piece of equipment can be used to investigate water uptake by a plant?

Potometer

18. What material supports the structure of the xylem?

Lignin

19. Are xylem made of dead or living tissue?

Dead

20. What has happened to cells when the plant has lost water and become soft?

It has become flaccid

21. Why would water stop flowing up the xylem if it contained an air bubble?

Continuous chain of water is broken/loss of cohesion

22. Why does a cut stem release sap?

Root pressure

23. What theory can be used to explain transpiration pull?

Cohesion-tension

24. How does evaporation occur in the mesophyll?

Some water molecules have sufficient energy to leave the liquid


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