

Workshop - Plants and Energy



Plants – lesson 1

Outline:

A: 5 Intro (5 mins)

B: Card sorting task (20 mins)

C: Planting hanging baskets, and clear up (20 mins)

D: Write up/ assessment (5 mins)

Curriculum links for plants:

Living things and their habitats

Statutory requirements

Pupils should be taught to:

- describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
- give reasons for classifying plants and animals based on specific characteristics.

A: Intro: 5 mins

1. Introduce yourselves briefly (not too much information) e.g my name's Sarayu. I'm from a charity called Groundwork. We improve green spaces. Now, I've got a question for you....
2. Ask pupils 'If you could take one plant onto a desert island, which would you take?'
3. Tell pupils **WeAreLearningTo(WALT)** 'Categorise plants into groups' (Lesson Objective) and show them key vocab for the lesson.

Key Vocabulary: categories, algae, moss and fern, conifers, flowering plants

B: Card Sorting Task:20 mins

Who would like to be an expert? We're going to become experts in plants today.

Give out plant samples (one per table – join tables if more than 5). Let pupils look at plant samples. Ask them to guess which one they've got, pointing to the key vocab. When they get it correct, give them their category description.

Category cards

Algae give out more oxygen than all the other plants put together. They need water to live in; they are aquatic. They are the simplest of plant life- no roots, stems, flowers, or seeds.

Tip: Look for plants that live in water

Moss needs to be moist all the time. No roots or seeds. Moss likes cool, moist, dark shady places, e.g rock ledges tree trunks.

Tip: likes damp conditions, under trees or on rocks.

Ferns – reproduces through their spores (no seeds). Ferns were the first to add roots and begin to get fixed. Also like cool, damp, boggy areas to survive.

Tip: Look for green leaves but no flowers.

Conifers – first to produce seeds (found in cones). Trees that make cones, show them pine cones). Huge number of species and many forming forest areas of the earth supporting a rich ecological environment.

Tip: Look for needle like leaves and cones.

Flowering plants– most complex of all plants, to do with how they reproduce and germinate- to include all fruits, vegetables, grasses, bamboos, cacti and palms.

Tip: look for bright colours, fruit, veg, grasses, seeds.

Let each table look at the sample and category description and familiarise themselves their category. Label each person 1-5, and then ask all number one's to sit together, all number 2's and so on, so that you have one person from each category on a table. When they're quiet and in their new groups, give out the category cards, and ask them to split the cards into categories. Put the categories into descriptions on the board so that they can refer to them. Walk around the room assessing what children are discussing, listen to their reasoning. Pick up on misconceptions or children's strengths. Do not correct/change any of the children's answers yet. Let them collaborate.

Ask them to share with the rest of their group, why they chose the cards they did.

C: Planting Hanging Baskets (20 mins)

1. Intro to hanging baskets and Energy Gardens – in the previous task, we learnt about flowering plants. We're now going to plant some. These hanging baskets can be used in school and on overground stations to help create 'energy gardens' (picture). Ask pupils to guess what they think an energy garden is. Think of the two words. Tell them where their nearest station will be and ways they can get involved (prezi)
2. Pupils work in groups of 5 (x 3 hanging baskets) choose plants and learn the best way to plant up the hanging baskets. Pupils will be introduced to the light at the top of the hanging basket and will probably ask questions. Let them enquire.
3. Pupils work in groups to create the school name to stick on the bottom of the baskets (pair each name creating group with a hanging basket). Pupils design the school name to go on the hanging baskets (draw, paint, use collage, must be weather proof).
4. Pupils clear up

D: Assessment / Write up (5 mins)

1. Ask pupils to fill in the worksheet (section A)

Electricity – Lesson 2

Curriculum links for Solar:

Electricity

Statutory requirements

Pupils should be taught to:

- associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit
- compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches
- use recognised symbols when representing a simple circuit in a diagram.

Outline:

A: 5 Intro (5 mins)

B: Background (5 mins) Activity (5 mins)

C: Circuits (25 mins)

D: Final Discussion and Assessment (5 mins)

A: Intro: 5 mins

1. Put on the board:
Learning Objective/WALT: We are learning to measure solar electricity
Key Vocabulary during the lesson: photosynthesis, Photo' means 'light', voltaic' is from the name Volta, energy, kilowatt peak (kWp)
2. Draw me a machine that catches the sun. Give out post it notes or paper and ask them to draw for 3 mins then stop (time them).
3. Put a flower on each table. Ask pupils 'How is the flower moving?' (concept question)



B: Background and Activity: 10 mins

Some background info.... (put into prezi)

The sun provides most of the world's energy. It makes the wind blow, the rain fall and creates waves in the sea. All plants grow and make food using the sun's energy (photosynthesis- ask pupils to give description). We can capture some of the sun's energy using solar panels that can create electricity and heat water (using Photovoltaic panels) History - Humans have been using solar energy for thousands of years to light fires, cook and heat water. However, solar panels that turn the sunlight into electricity are quite new. They were invented only about 50 years ago. Have a look at the flowers on your table. Can you see the PV panels, how do you think they work?

Photovoltaic (PV) panels

PV panels change light energy straight into electricity. 'Photo' means 'light' and 'voltaic' is from the name Volta, who was an Italian who worked on explaining electricity 200 years ago. Link to key vocab on the board.

Activity (5 mins): Has anyone seen PV panels before? Where? In groups, write a list of all the things that can have solar panels on them. Share their answers

They can be fitted onto the roofs or walls of buildings, and produce energy from daylight, not only direct sunlight, so they can still work on cloudy days. Lots of things are powered by solar panels. Solar cells are often grouped. As a result, if any part of the panel is under shade then some other part may still be able to generate useful electricity.

C: Circuits: 20 mins

How do the photovoltaic panels work?

The solar electric panel works like a battery, so to make it power something you will need a complete circuit. The optimum performance of a PV cell is measured in kilowatt peak (kWp).

Divide pupils into groups of 5, to complete two tasks using the solar circuit kits:



Task 1 (5 mins)

Set a challenge for pupils to make the propeller to spin at 3 different speeds.

We need to make these blue propellers to spin at 3 speeds but we have lost our instructions. Experiment with the circuit to see how you can make the propeller spin at 3 different speeds.

They will need to make a circuit and change light level, distance of light, or cover PV cells. Let them discover. Do their findings apply to the light and buzzer also?

Task 2 (15 mins)

Connect the PV cell to a voltmeter, position under a lamp and record the voltage output. The lamp and the cell must be kept in the same position throughout the experiment to ensure the light level is constant. For the same reason, artificial light should be used, because sunlight varies (cloud cover etc). Discuss which other variables could affect the results.

Now take a piece of card, and cover $\frac{1}{4}$ of the cell's surface. Record the voltage.

Repeat for $\frac{1}{2}$, $\frac{3}{4}$ and all the cell's surface.

Ask pupils to record the results in a table (give out tables for them to fill in).

Ask the students to consider how PV technology could be useful and where this technology could be applied? Work in groups to write their ideas.

D: Final Discussion and Assessment: 10 mins

Prezi - Link to Energy Gardens – show pictures of how solar and green space will be used together (e.g notice boards, solar irrigation, lights etc) and talk about their local energy garden.

Introduce the banner design competition, show the pupils the flowers again (from the start of the session) and say that three of these will go to the winners of the poster competition. Leave the flowers with the teachers and a self addressed envelope so that the teacher can send you the posters.

Some of the winning designs will be displayed in their nearest Overground station.

End with pupil assessment of what they have learnt (section B of worksheet).

Additional work if time:

Give out a word search including key words covering plants and solar power (particularly available to children who complete work quickly and need additional tasks).

If time: Use the solar power robot for further demonstration of creating a circuit to create electricity/power.

Opportunity for pupils to connect up the red and black wires as the last stage of the solar robot.