ACET Junior Academies'

Scheme of Work for Science

Big Idea – Living Things

Year 3 – Plants

About this unit:

PoS – Plants

This unit builds on the work students did in Y2 when they looked at the life cycle of plants. They should have a fair idea of what the parts of plants do, but in this unit we will be looking more closely, and developing students' understanding that scientists know things because they investigate them. The intention is to get them to find things out about plants by exploring them themselves, rather than being taught facts. This should make the unit more interesting for them, and also continue to develop their scientific skills.

There are significant links here to the Y2 'Living things & habitats' unit, with opportunities to review and consolidate what all living things need to stay alive. This unit will help the students remain aware that plants are living things – they often default to thinking that only animals are 'alive'. This ties in with the general theme for the year of 'Observation and Patterns', as we will not only be studying plants, but looking back and identifying where there are similarities between the features and life cycles of plants and animals.

Unit structure

This unit is structured around seven science enquiries:

1. How has your local environment changed?
2. What do the different parts of plants do?
3. What does a plant need to stay alive?
4. How can a plant be like Goldilocks?
5. How are new plants made?
6. How does a plant 'leave home'?
7. Can you draw the life cycle of a plant?

Links to previous and future National Curriculum units

Y1 – Plants
Y2 – Living things & habitats
Y2 – Plants

- Y4 - Classification
- Y5 - Life cycles

<table>
<tr><th colspan="4">Enquiry 1: How has your local environment changed?</th></tr>
<tr><th>Links to previous learning</th><th>Scientific skills</th><th>Assessment criteria</th><th>Curricular links</th></tr>
<tr><td rowspan="3">Y2 – Living things and habitats</td><td>EA – Observation over time

Asking questions
Making predictions
Observing & measuring</td><td rowspan="3">Can your children:
- Describe some features of plants that can help us to identify them.
- Suggest a way of grouping the different plants they can see</td><td rowspan="3">Horizontal:

Vertical:
Y4 – Classification
Y5 - Life cycles</td></tr>
<tr><td>Key concepts:</td></tr>
<tr><td>Plants have lots of features that we can use as clues to tell us more about them.
We can group plants according to their features – e.g. similar leaves, or that they get flowers at the same time.</td></tr>
<tr><th colspan="2">Key terms</th><th colspan="2">Common misconceptions</th></tr>
<tr><td colspan="2">Plants, deciduous, evergreen, leaves, stem, trunk, flowers, pattern, shape, time</td><td colspan="2"></td></tr>
<tr><th colspan="2">Suggested activities</th><th>Resources</th><th>Useful links</th></tr>
<tr><td colspan="2">Go outside and photograph/make records of everything that is in the class year book. Compare what you find. What changes have happened?

Make a leaf collection – how many different leaves can you find? Are there any trees which don't have their leaves yet? Can you be a detective and find some leaves from last year which come from that tree? What features of the tree could you use to identify it, as it has no leaves?

You don't need to actually identify the trees! Encourage students to spot differences – do the branches all go up/straight out/random directions? Is the bark rough or smooth? Can they spot any buds? Can they spot any patterns about how the tree grows? What makes one tree different from another? Can they find two trees that are the same? How do they know that they are the same?

Collect information for the year book, but individual students can record what patterns they discovered, what questions they asked (see above), and whether they could find any answers.</td><td>Identification keys
Hand lenses
Rulers (mm)</td><td></td></tr>
</table>

Enquiry 2: What do the different parts of plants do?

Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y1 – Plants Y2 - Plants	EA – Pattern seeking Asking questions Making predictions **Recording data** **Key concepts:** Different parts of plants all have a different job to do. The stem/trunk carries water from the roots up to the leaves.	**Can your children:** - State the function of each part of a plant - Describe the interior of a stem as a lot of tubes that carry water from the roots to the leaves	**Horizontal:** **Vertical:** Y5 - Life cycles

Key terms	Common misconceptions
Roots, anchor, stem, trunk, leaves, flower, water, reproduce, light, food	*Misconception – the roots get 'food' from the soil. Roots anchor the plant in the soil, and absorb water and some 'extra' nutrients – just the same as us taking vitamin tablets. They make most of their food in the leaves, using sunlight (no extra information needed on this).*

Suggested activities	Resources	Useful links
Look at pictures etc, naming parts of a plant. Use a 'classic' diagram of a plant – but make sure the students see a range of **different** plants too. They ALL have these features. All students should be able to name the structures, most students should be able to describe the functions of the parts, greater depth students should begin to **link** structure and function – '**why** is it good at doing its job?' *Flowers are used for reproduction – saying that they 'look/smell pretty' is a good answer – just link it to the fact that it is attractive to insects, which help the plant to reproduce.* A good way of completing the 'what jobs it does' column is to consider how the plant would survive without that part. Greater depth – get them to consider more difficult plants like grass, or non-blossoming trees (they have flowers, but they're not obvious or pretty). Flowers don't need to be pretty if the wind carries the pollen! **Moss and ferns are the only plants not to consider, as they are in a different group.** They are non-lowering plants (students don't need to know this).	White carnation Celery Container for water Blue food colouring Knife	

Name of part	What it looks like	What jobs it does

The stem transports water up to the leaves. Put a white carnation in some blue food colouring a few hours before you want to observe it. Do the same with some celery (you need a piece of celery which still has the leaves on top). Once the blue dye has moved up the stalk, you can cut the stalk and see the tubes which carry the water up the stem. The 'rings' you see on trees are the tubes which carry water – trees make a new set each year.		

<table>
<tr><th colspan="4">Enquiry 3: What does a plant need to stay alive?</th></tr>
<tr><th>Links to previous learning</th><th>Scientific skills</th><th>Assessment criteria</th><th>Curricular links</th></tr>
<tr><td rowspan="3">Y1 – Plants
Y2 – Plants</td><td>EA – Comparative/fair testing

Asking questions
Making predictions
Observing and measuring
Interpreting and communicating data</td><td rowspan="3">Can your children:
- State what plants need to stay alive
- Tell you why the different cress seeds grew differently</td><td rowspan="3">Horizontal:

Vertical:
Y5 - Life cycles</td></tr>
<tr><td>Key concepts:</td></tr>
<tr><td>Plants need air, water, light, space and some extra nutrients from the soil.
In this investigation, it was difficult to keep the temperature and the amount of water the same.
GD – Link the need for space with the need for light and air</td></tr>
<tr><th colspan="2">Key terms</th><th colspan="2">Common misconceptions</th></tr>
<tr><td colspan="2">Alive, dead, air, water, light, space, nutrients, soil, growing, healthy</td><td colspan="2">Misconception – the roots get ‘food’ from the soil. Roots anchor the plant in the soil, and absorb water and some ‘extra’ nutrients – just the same as us taking vitamin tablets. They make most of their food in the leaves, using sunlight (no extra information needed on this).
Plants don’t ‘breathe’, they ‘use air.</td></tr>
<tr><th colspan="2">Suggested activities</th><th>Resources</th><th>Useful links</th></tr>
<tr><td colspan="2">What does a plant need to stay alive?
Air, water, light, space, extra nutrients from the soil.

What happens if you take these things away? Set up some similar plants in different situations a 5-6 days in advance – in the dark, without water, on cotton wool, crowded together. Compare this with a well watered plant growing in soil on a sunny windowsill. This will work best with a fast-growing seed like cress. It’s difficult to demonstrate the effect of removing air without having an impact on the other factors.

What did you find out? How can you communicate this data to other people, to easily show them what you discovered? This can be difficult with non-numerical data such as this – there is no right/wrong, but students should be encouraged to come up with their own ideas.

Nutrients from the soil – look at the best growing seeds; will they continue to thrive on the kitchen towel? Compare plants needing soil to children eating potatoes. Potatoes give you lots of energy, and they will keep you alive – but you will be very unhealthy if you just eat potatoes! A plant makes its</td><td>Cress seeds grown in advance:
4 x 10* seeds, evenly spaced on a 5x5cm piece of wet kitchen towel. Keep them all together on a sunny windowsill until they begin to sprout, then separate them as below:
1 - kept evenly watered on a sunny windowsill
2 – light - in the dark, kept watered
3 – water - on a sunny windowsill but unwatered
4 * - space - on a sunny windowsill, but put 20 seeds on the 5x5cm kitchen towel</td><td></td></tr>
</table>

food in the leaves – this is how it gets energy to grow and reproduce, but it needs some extra nutrients to keep it healthy from the soil. Students should make detailed observations of the different seeds, and give reasons for any differences, linked to the needs of plants.		

<table>
<tr><td colspan="4">Enquiry 4: How can a plant be like Goldilocks?</td></tr>
<tr><td>Links to previous learning</td><td>Scientific skills</td><td>Assessment criteria</td><td>Curricular links</td></tr>
<tr><td>Y1 – Plants
Y2 – Plants</td><td>EA – Pattern seeking

Asking questions
Making predictions
Observing and measuring
Key concepts:
Different plants need a different amounts of space and water.
How much they need is usually related to how big they are.</td><td>Can your children:
- Tell you that plants need light, space, air, water and some nutrients
- Explain why an oak tree needs more space than a daisy plant</td><td>Horizontal:
Maths
Geography

Vertical:
Y5 - Life cycles</td></tr>
<tr><td colspan="2">Key terms</td><td colspan="2">Common misconceptions</td></tr>
<tr><td colspan="2">Air, water, space, light, nutrients, enough, too much</td><td colspan="2"></td></tr>
<tr><td colspan="2">Suggested activities</td><td>Resources</td><td>Useful links</td></tr>
<tr><td colspan="2">How much is enough? Consider a huge tree, and a small plant - ideally a small plant growing outside.

How much space do they take up? Do they need that much space? Consider how much room their roots take. Could another similar plant grow next to them? How close? How spaced out are the big trees around the school compared to the grass? They may have been planted that way, but it is for a reason – large trees have to have enough space around them.

Look at pictures of a variety of fallen trees – look at how much their roots spread. Greater depth students should have an understanding that this is because a bigger tree needs more water, so needs its roots to spread a long way. It also needs more anchoring, and more food, so its leaves will spread out a long way.

Students could calculate how many oak trees they could grow along a 20m line (or an easily measurable distance in the school grounds), compared with how many daffodils (or other small familiar plant) – Maths/measuring link</td><td>3 similar plants set up a week in advance – preferably a small plant in a pot, larger than cress, although cress will do. One plant over watered for the week before, one watered ‘enough’, and one not watered at all.

Long tape measure
Metre rulers</td><td></td></tr>
</table>

How much is enough water? See resources – set up in advance. The students should make detailed observations of the plants – saying that they 'die' is not enough. They can act out/narrate/write the story of the Goldilocks plant – it needs just enough water. They could talk about the other factors that plants need (air, light, space, nutrients), but bear in mind that there is not a really an issue with having too much of those things. Have a look at different plants from different climates. Pine trees, large-leaved rainforest trees, cacti, grasses from the grasslands of Africa and some from the tundra in the Arctic. Can the students match the leaves to the climate they're from?		

<table>
<tr><th colspan="4">Enquiry 5: How are new plants made?</th></tr>
<tr><th>Links to previous learning</th><th>Scientific skills</th><th>Assessment criteria</th><th>Curricular links</th></tr>
<tr><td rowspan="3">Y1 – Plants
Y2 - Plants</td><td>EA – Pattern seeking

Asking questions
Making predictions
Observing and measuring</td><td rowspan="3">Can your children:
- State that seeds are made when pollen from one flower is taken to the centre of another flower
- Insects pick up pollen from one flower and take it to another flower</td><td rowspan="3">Horizontal:
Art

Vertical:
Y5 - Life cycles</td></tr>
<tr><td>Key concepts:</td></tr>
<tr><td>Seeds are made by taking pollen from the centre of one flower, and passing it to the centre of another flower.
Bees and other insects pollinate plants, when they visit them to collect nectar.</td></tr>
<tr><th colspan="2">Key terms</th><th colspan="2">Common misconceptions</th></tr>
<tr><td colspan="2">Pollination, flower, centre, nectar, insects, attractive, seed</td><td colspan="2">Students often confuse pollination with seed dispersal (next lesson).
Pollen is a ‘powder’ used to make seeds. Nectar is a sweet liquid the plant makes to tempt the insects in to the centre.</td></tr>
<tr><th colspan="2">Suggested activities</th><th>Resources</th><th>Useful links</th></tr>
<tr><td colspan="2">Reproduction – pollination. The flowers are used for reproduction. Beware of how you use the words ‘flower’ and ‘plant’ in this lesson in particular.

Dissect a flower and look at the parts inside. If possible, have the students compare two different flowers – e.g. a daffodil and a tulip or a lily. See if they can notice similarities and differences. Noticing the common features is more important than naming all the different parts inside.

Show pictures of sunflowers with seeds in their centres, and other flowers where the flowers have developed into seeds.

Pollination game – you will need an A4 sheet with 5 simple flower pictures for each student, laminated, and a bee ‘puppet’ with cutout holes for their fingers.

Students put coloured paint in the centre of the flowers – different colour for each flower. They put the bees on their fingers, and ‘visit’ the flowers according to which they think is the prettiest. Their fingers will pick up paint</td><td>A4 laminated sheets with 5 flowers drawn on them
Bee ‘puppets’ with cutout holes for fingers.</td><td></td></tr>
</table>

with each visit, and eventually each flower should have a mix of paint in the middle. This illustrates that insects help the pollen from different flowers mix together to make seeds.		

Enquiry 6: How does a plant 'leave home'?			
Links to previous learning	**Scientific skills**	**Assessment criteria**	**Curricular links**
Y1 – Plants Y2 - Plants	EA – Comparative/fair testing Asking questions **Recording data** Evaluating **Key concepts:** Plants have ways of getting their seeds away from them, so that they all have enough space. We always take measurements more than once in science. If we don't get a similar answer each time, we do it again, to make sure we're doing it correctly. *GD – evaluate any differences in results. Can they think of anything they should be controlling/keeping the same in order to get a similar result each time?*	**Can your children:** - State that plants disperse seeds so that the parent and offspring all have enough space - Tell you that when they are taking repeat measurements, they should get a similar answer each time	**Horizontal:** **Vertical:**

Key terms	**Common misconceptions**	
Flower, seed, dispersal	*Students often confuse 'pollination' (previous lesson) with seed dispersal.*	
Suggested activities	**Resources**	**Useful links**
Once a seed (a baby plant) has been made, it needs to leave the parent plant. Consider lesson 4 – each plant needs its own space to grow. If the seed fell directly under the parent, they wouldn't have the space they need. Look at different methods of dispersal. Look at lots of examples of fruit and vegetables, and consider how they help the seed to spread. *Remember that some vegetables – most root vegetables like potatoes – are just a way of storing energy for the following year, and are NOT reproductive structures like seeds.* Look at videos of explosive seed dispersal, and look at wind dispersal – grass, dandelions. *Misconception – beware of confusing wind dispersal of pollen with dispersal of seeds.*	Y3 helicopter activity Card Metre rulers	

Wind dispersal – helicopters activity. This is an opportunity for a measuring and data collection lesson. See the Y3 helicopter activity lesson plan pack. **Students should focus on 'distance from start point', and not get confused with different directions.** Students should work on getting 10 similar results. *Should they be looking at mean? - maths skills? If 'mean' is not appropriate then in terms of the science, they should just know that the results should all be similar. If they get a result that doesn't fit the pattern they expect, they should repeat it, to see if it fits the pattern better. If the results they get don't fit a pattern, they should consider their method – are they keeping as much as they can the same?* *GD – They should know that it's ok to get bad/wrong results in science. Repeating tests isn't about getting the 'perfect answer', it's about working out whether you're doing something wrong, or whether there is a reason you're getting unexpected results.* Focus – this is how some plants get their seeds away from the parent. The longer they take to fall, the more chance there is that the wind will blow them away to their own space, so the 'best' seeds will be the ones that take longest to fall. Of course, the wind could take them to an inappropriate place – this is why the plant makes so many seeds.		

<table>
<tr><td colspan="4">Enquiry 7: Can you draw the life cycle of a plant?</td></tr>
<tr><td>Links to previous learning</td><td>Scientific skills</td><td>Assessment criteria</td><td>Curricular links</td></tr>
<tr><td>Y1 – Plants
Y2 – Plants
Y2 - Life cycles</td><td>EA - Problem solving

Asking questions
Making predictions
Key concepts:
Plants have a life cycle which involves seeds, plants, flowers.
Different plants take different amounts of time over their life cycle.</td><td>Can your children:
- Describe the basic life cycle of a plant.
- Tell you how the life cycle of a daisy or a dandelion would be different to a large tree.</td><td>Horizontal:
Art

Vertical:
Y5 - Life cycles</td></tr>
<tr><td colspan="2">Key terms</td><td colspan="2">Common misconceptions</td></tr>
<tr><td colspan="2">Life cycle, grow, reproduce, time, pollination, seed</td><td colspan="2"></td></tr>
<tr><td colspan="2">Suggested activities</td><td>Resources</td><td>Useful links</td></tr>
<tr><td colspan="2">Review Y2 – life cycles of humans. Show illustrations of how human life can be put into a cycle, with the adults reproducing to complete it.

Students should take everything that they have done in this unit to make a life cycle of a plant. This could be generic, or for a specific plant – e.g. one in the class year book (although they may not have enough information about those plants yet). They should use a native British plant that they are familiar with from the local environment. It should involve a seed, a plant (with an idea of how long this takes), and production of a flower for reproduction. They should incorporate pollination from another plant at the ‘reproduction’ stage.

Compare an oak tree (or another large tree growing locally), with a daisy or a dandelion – a small, common flower with which the students are familiar. Would their life cycles take the same amount of time? GD – the large tree will use its energy to grow to begin with – then it can make hundreds of flowers at once. A small plant makes a few flowers at a time, but can make them as soon as it has started to grow and has a few leaves.

This is a good opportunity to use Art skills to depict the life cycle.</td><td></td><td></td></tr>
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