YEAR 5: PLANT REPRODUCTION

Links to National Curriculum

Science

- Describe the life process of reproduction in some plants and animals (Living things and their habitats, Year 5).
- Planning different types of scientific enquiries to answer questions, taking measurements, recording data and results, reporting and presenting findings from enquiries (these are all requirements for Working Scientifically, Upper Key Stage 2).

Key Learning Objectives

1. What is the life process of reproduction in plants?
2. How do plants reproduce sexually?
3. How do plants reproduce asexually?

Notes to Teachers

- Lesson plans are not intended to be of equal length and can be amalgamated or split to suit timings.
- Activities given are suggestions only. The main purpose of the lesson plans and presentation is to provide key information and visual aids for teachers to adapt to their needs.
- The PowerPoint presentation runs alongside the plans and all slides are referred to in the lesson plans. Please feel free to modify the presentation by adding your own slides or deleting those you don't need.
- We suggest having a class charter (example shown below) to ensure safety and respect when handling plants.

Plant Handling Charter

- Always wash your hands after handling plants, soils, compost etc.
- Remember that plants can be poisonous or cause allergic reactions in some people.
- NEVER eat plants found in the wild or your school grounds, unless you have been given instructions by a teacher that they are edible and you may do so.
- Wild flowers should not be picked. In fact it is illegal for anyone (without permission from the landowner or occupier) to uproot any wild plant.

1.HOW CAN PLANTS REPRODUCE SEXUALLY?

SUGGESTED STARTER ACTIVITIES

Quiz

A quiz to recap on what the children learned in Year 3 about the main parts of a plant and the life cycle processes of pollination, seed production, seed dispersal and germination.

Sequencing Task (please see page 7)

Ask the children to cut out the statements. Can they organise them in the correct order so that they explain the life cycle of plant growth. They could glue them into their books or onto a sheet of paper, perhaps with a diagram for each statement.

Planting

It is a nice idea at the start of the topic for children to plant a bean, pea or sunflower seed. This will enable them to follow the whole lifecycle of a flowering plant. Ensure that there are ideal conditions for germination and growth (covered in Lower Key Stage 2 Plants lesson plan). You may choose to begin in the classroom and then move the plants outside when growth is established (plants may need supports to grow). The children will hopefully be able to look after their plants responsibly, but it is probably a good idea to remind them to water them! They could measure the growth of their plant and record heights and changes in appearance on an observation chart (see page 12).

TEACHER INPUT

Reproducing is vital for all living things. If a species does not reproduce, it cannot survive and will become extinct.

Slide 4: In year 3 children will probably have studied the life cycle of a plant. This diagram shows the different stages in the cycle. They will now be learning about the pollination and fertilisation stages in more detail and the specific parts of the flower where these stages take place.

Slide 5: This shows the different parts of a flower. Flowers have male and female parts inside them. Each has a unique job to do (function). In different species the number, shape and size of each part of a flower may be different.

Slide 6: If possible find a flower that has prominent reproductive organs e.g. tulip or lily and show the children the different parts.

To reproduce, pollen from one flower must first be transferred to another flower, either by insects or the wind.

Slide 7: Petals - they lie inside the sepals and help protect the male and female parts of the flower. But their main function in flowering plants is to attract insects and provide a landing platform.

Slide 8: Sepal - special type of leaves that form a ring around the petals. Their job is to protect the flower whilst it is still a bud. When the flower opens, you can still see the sepals behind the petals.

Nectaries - the parts of the flower that make nectar. They are usually right in the centre of the flower, so insects have to reach deep into the flower to find the nectar. As they do, their bodies pick up pollen and carry it to the next flower.

Slide 9: Stamen - the male part of the flower. Its job is to make pollen; it has 2 parts:
Anther - releases pollen onto insects entering the flowers.
Filament - thin stalk that holds up anther.

Slide 10: Carpel - the female part of the flower has 3 parts:
Stigma - covered in a sticky substance that catches grains of pollen.
Style - stalk that raises stigma away from the plant to stop it fertilising itself.
Ovary - where seeds are made.

When the flower is pollinated, the pollen grains stick to the stigma and produce a pollen tube which grows down through the style until it reaches the ovule inside the ovary. This enables the male pollen cell and the female ovule to join together - this process is known as fertilisation.

After fertilisation , the female parts of the flower develop into a fruit - the ovules become the seeds and the ovary wall becomes the rest of the fruit.
Slide 11: In an apple, the fleshy part is the top of the flower stalk (the receptacle), the fleshy part encloses the ovary and seeds which form the apple core.

Receptacle - the thickened top part of the stem from which the flower organs grow. The receptacle sometimes becomes part of the fruit, as seen in the apple.

Key Words

Reproduction - the process that produces babies, young animals or new plants.

Flower - the part of the plant where seeds are made.

Fruit - the part of the plant that contains the seeds.

Pollen - visible to the naked eye as dust like powder, often yellow.

Nectar - sugary solution which insects drink to give them energy.

Ovule - found in the ovary and develops into a seed after fertilisation.

Fertilisation - joining of male and female cells.

Pollination - the transfer of pollen from the stamen to a stigma.

Self pollination occurs when pollen lands on the stigma of its own flower or another flower on the same plant.

Cross pollination occurs when pollen is transferred to the stigma of a flower on another plant of the same species.

SUGGESTED ACTIVITIES

Labelling Activity: Plant Parts (see page 8)

Ask the children to neatly label the different parts of the flower. Or they could draw their own plant diagram and label it.

Dissection Task

Scientists learn about living things by dissecting them (cutting and separating parts of animal or plant specimens for scientific or medical study).

1. Find a suitable flower for each child. What you choose will depend on the time of year and what is available. Here are some suggestions of plants where the structure is easy to see and understand and that are usually readily available at certain times of year:
   Winter - snowdrop, winter jasmine.
   Spring to early summer - paeony, perennial geranium, wild garlic, wallflower.
   Summer and autumn - lily, sweet pea.
   Flowers that are best avoided at primary level (because their structure is difficult to see or unusual) - daisy, dandelion, buttercup, daffodil, iris, poppy, rhododendron.

2. Children can push their flower stalk into a lump of blue tack as this may make it easier for them to examine and dissect.

3. Ask the children to look carefully at their flower (perhaps using a magnifying glass) What can they see? What can they smell?

4. Starting at the base, ask the children to remove the sepals (using fingers or tweezers).

5. Continue removing parts in the following order: petals, stamens, carpels.

6. There are various ways of mounting/displaying the parts of the flowers that the children have dissected. They could use double sided sticky tape or a piece of sticky tape that has been looped over. The parts can be arranged in a line from left to right or right to left. Or they can be arranged as they are in the flower, in a series of rings. Alternatively, one example of each flower part can be stuck to a piece of card and labelled.

7. When laid out, the flower parts can be covered with sticky backed plastic to keep them protected.

Plant Parts Enquiry (link with Numeracy)

Are there the same number of petals, sepals, stamens and carpels on each flower? Or is there a pattern?

Challenge the children to plan their own enquiry to answer this question. They will need to be systematic in their method and ensure they record their results

carefully. They could then write a short report on their enquiry and its findings. Their results can be displayed in tables or graphs.

The number of sepals, petals, stamens and carpels are often (but not always) multiples of a prime number.

Virtual Dissection

If it is not practical or you would rather not ask the children to dissect a plant, they can have a go virtually! On the BBC Bitesize website you will find games which involve the children labelling the parts of a flower and pulling away the different sections:
www.bbc.co.uk/bitesize/ks2/science/living_things/life_cycles/play/

Create a Flower (link to Art and Design)

Challenge the children to make their own flower. Possible materials to use for the different parts of the flower include:
Sepals and petals: coloured paper/card
Filaments - pipe cleaners, straws
Anthers - cotton wool, small pieces of sponge
Pollen - rice stained yellow
Ovary - small water bottle (cap can be the stigma)

Design a Flowering Plant

Challenge the children to design their own flowering plant. They should label the parts and annotate their drawings with information on the features and functions e.g. colouring and patterns on the flower to attract insects, large leaves to get lots of sunlight for photosynthesis, juicy fruits to attract animals for seed dispersal.

SEQUENCING ACTIVITY: PLANT LIFE CYCLE

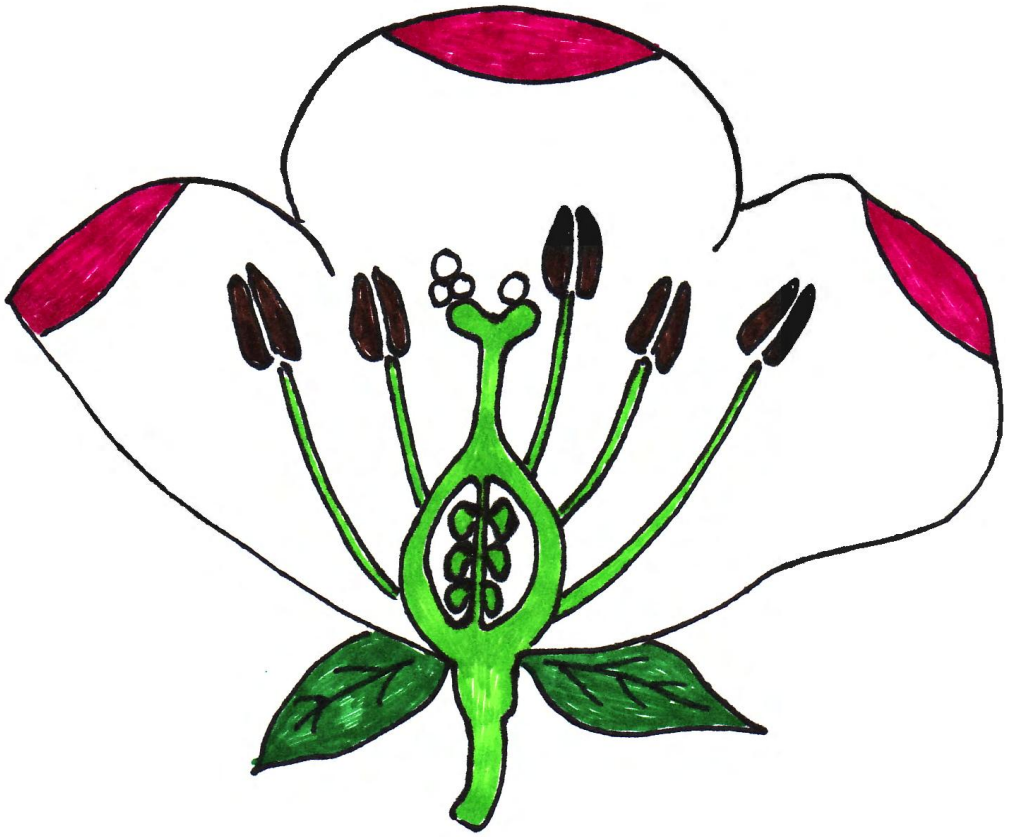
Cut out the boxes below and see if you can organise the statements into the correct order.

The plant starts to grow - the stem grows up and leaves unfold.	Seeds are scattered away from the parent plant by animals, wind, water or by self-dispersal.
Insects carry pollen with them to the next flower they visit.	As insects collect nectar from the flower, pollen brushes onto their legs and bodies.
Some of the seeds that have been dispersed start to germinate.....and so the cycle begins again.	Pollen travels to the female part of the flower where seeds are made.
The male part of the flower produces pollen.	A seed is planted or falls in the soil.
A flower bud forms and the flower opens up.	Brightly coloured petals and the scent of the flower attract insects.
With water and a suitable temperature the seed swells and begins to make a new plant.	Seeds form in the female part of the flower.

LABELLING ACTIVITY: PARTS OF A FLOWER

Can you clearly label the following parts on this diagram of a flower:

Petal	Sepal	Nectaries
Stamen	Stigma	Style
Ovary	Receptacle	



2. HOW CAN PLANTS REPRODUCE ASEXUALLY?

SUGGESTED STARTER ACTIVITIES

Question and Answer

Do the children know any other ways of growing new plants other than from seeds? They may suggest bulbs e.g. daffodils or tubers e.g. potatoes. What do they know about them?

TEACHER INPUT

Whilst some plants create offspring using sexual reproduction, others do so using asexual reproduction. The main difference is that whilst sexual reproduction needs 2 parent plants, asexual reproduction needs only one parent.

Natural Methods of Asexual Reproduction

It is possible for plants to naturally produce offspring from one parent, without flowers or fertilisation. There are a number of ways plants can do this, but 3 important methods are:

Slides 13 & 14: Runners - a slender fast growing stem that grows sideways (horizontally) over the soil surface and pushes down roots to form new plants e.g. spider plant and strawberry. The new plants are called plantlets.

Slides 15 & 16: Tubers - many plants naturally develop underground food storage organs that later develop into the following year's plants. The tuber is the swollen, fleshy underground stem of a plant, bearing buds from which new plant shoots grow. These new shoots use stored food in the tuber to grow.

The potato plant produces large numbers of potatoes, each with several buds that can form new shoots. If possible show children a sprouting potato and one that hasn't sprouted yet. Look carefully at the one that hasn't sprouted - can they see the "eyes" from where shoots would grow in the right conditions?

Slides 17 & 18: Bulbs - a bulb is an underground short stem which has one or more buds enclosed in special thick leaves (or scales) which are full of stored food - this gives energy to the buds when they start to grow in the Spring. Examples of bulbs are onions, garlic and tulips.

Artificial Methods of Asexual Reproduction

Slides 19 & 20: Humans can produce new plants asexually by artificial propagation. A simple method, used by many gardeners, is to use a cutting. A cutting is a section of a plant that when put into suitable soil or compost will produce roots and grow into a new plant. This can involve using different parts of the parent plant e.g. root cuttings, leaf cuttings or stem cuttings.

KEY TERMS

Plant propagation - the process of creating new plants from a variety of sources (natural and artificial).

Artificial propagation - the creation of new life using a method that does not occur in nature.

SUGGESTED ACTIVITIES

Artificial Propagation: Stem Cutting

You will need: pot, compost, scissors, geranium plant, pencil, water, label, plastic bags and elastic band.

1. Place the compost in a pot. Make sure you leave enough room for watering.
2. Cut off a shoot tip from the geranium plant (about 5cm long). Cut just below the leaf node (point where the leaf joins the stem) as this is where the new roots will grow from.
3. Remove all the lower leaves but leave 1 or 2 at the top of the cutting.
4. Use a pencil to make a hole in the compost and put the cutting in. Lightly press the soil back against the stem (you could dip the cutting in rooting powder before potting as this will encourage growth).
5. Water the cutting.
6. Place the pot on a plastic bag and secure with an elastic band - this will keep the air around the cutting moist and warm.
7. Place the pot on a window sill that gets plenty of light and observe what happens (hopefully after a few weeks, new roots will develop and a new plant will grow).

Comparison of Propagation Methods

Children could have a go at growing new plants from different parts of a parent plant, for example:

1. Stem cutting e.g. geranium
2. Root cutting e.g. oriental poppy
3. Leaf cutting e.g. African violet
4. Tuber e.g. potato
5. Bulb e.g. daffodil
6. Runner (horizontal stem) e.g. spider plant

Predictions
Before planting, ask the children to predict what will happen. Will a new plant grow and how quickly?

Taking and Recording Measurements
When a new plant starts to grow (hopefully!), the children can measure growth and observe changes regularly, recording their results on an observation chart.

Results
Children can compare how the different methods have worked. Were their predictions correct?

It is important the children understand that this is not a scientific comparison as they are comparing different plants and growing conditions may vary. In a scientific enquiry all variables need to be controlled.

PLEASE NOTE: DIFFERENT PLANTS GROW BEST USING DIFFERENT GROWING MEDIUMS AND PROPAGATION METHODS. THE ABOVE PLANTS SHOULD ACHIEVE GOOD RESULTS USING THE METHODS THEY ARE LINKED WITH. THERE ARE MANY GUIDES ONLINE THAT GIVE PRECISE ADVICE ON HOW TO PROPAGATE SUCCESSFULLY.

IF YOU WISH TO CARRY OUT A SCIENTIFIC COMPARISON YOU WILL NEED TO USE DIFFERENT PARTS OF THE SAME PLANT AND ENSURE THAT ALL VARIABLES SUCH AS GROWING CONDITIONS ARE CONTROLLED.

We value your feedback!

Let us know what you thought of this lesson plan by completing this Google Form https://forms.gle/cGAwi9AWXfSZgrYa9. **Thank you!**

PLANT GROWTH OBSERVATION TABLE

Plant type: Date of planting:

Date	Description	Drawing	Height