Unit 5B Life cycles

Science Y5
Mr Jennings' class

ABOUT THE UNIT

Through this unit children learn that plants and animals reproduce as part of their life cycle and that in every life cycle there are distinct processes and stages. They should begin to understand how reproduction is important to the survival of the species.

Experimental and investigative work focuses on:

- making observations and comparisons
- drawing conclusions.

Work in this unit also offers children opportunities to relate their knowledge and understanding of science to their personal health and to consider ways in which living things need protection.

Some of the work in this unit is likely to be undertaken in relation to the school's programme for personal, social and health education and must be consistent with the school's sex education policy.

This unit takes approximately 12 hours.

WHERE THE UNIT FITS IN

Builds on Units 2A 'Health and growth' and Unit 3B 'Helping plants grow well'

Children need:

- to understand the role of light and water in plant growth
- to be familiar with the structure of plants (excluding flower parts)
- to be able to use standard measurements of volume and length.

Links with Units 4A, 5B and personal, social and health education.

VOCABULARY

In this unit children will have opportunities to use:

- words and phrases associated with life processes *eg reproduction, life cycle*
- names for parts of a flower *eg stamen, style, stigma, sepal, petal, ovary, pollen*
- names for processes related to life cycles and associated verbs *eg reproduction/reproduce, germination/germinate, pollination/pollinate, fertilisation/fertilise, dispersal/disperse*
- descriptions and explanations using a sequence of ideas.

RESOURCES

- collection of pictures of plants with fruit *eg apple trees, vines, dandelions, beans, horse chestnut, tomatoes*
- hand lenses/microscopes
- examples of flowers *eg mallow, buttercup* and pictures of flowers
- collection of fruits and seeds including those dispersed by different mechanisms
- pictures illustrating the plants from which seeds come
- rapidly germinating seeds *eg radish, spring onion*
- thermometers
- containers in which to germinate seeds
- soils etc in which to germinate seeds
- secondary sources *eg video, CD-ROM, reference books* showing newly born animals and giving information about gestation periods

EXPECTATIONS

at the end of this unit

most children will:	name and explain the functions of some parts of a flower; describe the processes of pollination, fertilisation, seed dispersal and germination; explain how to carry out a fair test to find the conditions necessary for germination; explain that living things need to reproduce if the species is to survive and recognise stages in the growth and development of humans
some children will not have made so much progress and will:	name the parts of a flower and explain how pollen and seeds are dispersed; describe some of the conditions tested in investigating germination and recognise some stages in the development of humans
some children will have progressed further and will also:	explain why it is important to use a number of seeds or plants in an investigation into growth or germination

LEARNING OBJECTIVES CHILDREN SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES CHILDREN	POINTS TO NOTE
• that flowering plants reproduce • that a plant produces seeds that can grow into a new plant	♦ Remind children of earlier work on seeds and plant growth ♦ show them a series of pictures of flowering plants (or plants if these are available) with ripe fruits and ask children a series of questions to elicit their ideas about fruits *eg* – *Where are the seeds?* – *Where did the fruits grow from?* – *What will happen to the fruits?* – *Why are they important to the plant?* ♦ Remind children that flowering plants produce fruits and seeds from their flowers and that these grow into new plants ♦ ask them to draw a simple sequence of pictures to illustrate plant life cycles. Extension ♦ Investigate more unusual fruits, *eg strawberry*, with seeds on the outside. Find out differences between vegetables and fruits and which vegetables are really fruits, *eg tomatoes, runner or French beans, cucumbers, marrows*. More support ♦ Focus on a single, familiar fruit.	• recognise that flowering plants produce seeds from their flowers which grow into new plants	This unit is best carried out at a time of year when there are plants in flower or in the autumn when plants can be seen bearing fruit.

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LEARNING OBJECTIVES CHILDREN SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES CHILDREN	POINTS TO NOTE
• that seeds can be dispersed in a variety of ways • how a seed is adapted to a particular form of dispersal • to make careful observations of fruits and seeds, to compare them and use results to draw conclusions • that many fruits and seeds provide food for animals including humans	♦ Help children to look at a collection of fruits with seeds (or pictures of such fruits) *eg apple, tomato, cherry, strawberry, avocado, mango* and some seed cases and seeds which are not fleshy fruits *eg wheat, maize (sweet corn), dandelion, poppy, winged seed cases (ash and sycamore)* together with pictures of the parent plant. ♦ discuss differences between fleshy fruits and those which are not fleshy ♦ Talk with the children about seed dispersal and use observation and secondary sources to find out and record how the seeds are dispersed including the role of humans and other animals in the process. ♦ Using examples or pictures ask children to suggest how an unfamiliar seed is dispersed. ♦ ask children to sort examples or pictures according to the way they think they would naturally be dispersed. ♦ Ask children to suggest why plants produce so many seeds. Talk with them about reasons why seeds may not grow into new plants *eg including humans growing some plants to provide food.* Extension ♦ Use internet to research seed dispersal in more unusual plants. Create a presentation to rest of class or teacher. Import pictures and annotate them. More support ♦ Use one clear example of each method of wind and animal dispersal initially. Play a matching game using cards with pictures of animals and wind.	• explain why seeds need to be dispersed *eg to have the best chance of growing into a new plant* • explain that seeds are dispersed by water, wind, explosion and animals *eg coconuts are dispersed by seawater and dandelions have parachutes and are dispersed by wind* • identify by observation how an unfamiliar seed might be dispersed • suggest reasons why some seeds may not grow into plants	**SAFETY** – Children should not taste any of the seeds and fruits provided. Avoid using nuts, especially peanuts, as some children are allergic to these.

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LEARNING OBJECTIVES CHILDREN SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES CHILDREN	POINTS TO NOTE
• that plants reproduce • to consider conditions that might affect germination and plan how to test them • how to alter one factor at a time in order to carry out a fair test • that several seeds should be used in each set of conditions in order to get reliable evidence • to make careful observations and comparisons and use these to draw conclusions • that seeds need water and warmth (but not light) for germination	♦ Remind children that once seeds have been dispersed they need to germinate. ♦ If it is spring, look for new plants and ask children to describe where they grow. ♦ Ask children to suggest what seeds need in order to germinate and how they could investigate this. ♦ Use an investigation planning sheet to think about how they could set up an investigation and what factors would have to be kept the same. ♦ Help children to set up their investigation and ask them to write an account of how they set up the work. ♦ Discuss how many seeds should be used to obtain reliable results. ♦ Set investigation up, with different groups of children looking at different aspects, eg *light, warmth, water.* ♦ Discuss children's results with them and relate their findings to seeds germinating in the spring after the cold winter. If possible use secondary sources to show the germination and flowering of plants in a desert after rain. Extension ♦ Plan and carry out an investigation to prove or disprove the statement 'small seeds germinate more quickly than large seeds'. ***OR*** ♦ Some seeds say they need to be soaked before planting. Devise an investigation to show whether soaking these seeds makes a difference. More support ♦ Teacher-led investigation with less able group, focusing on only one aspect such as need for water (one damp seed, one dry seed).	• suggest suitable factors *eg light, warmth, water, soil* to investigate and how they will carry out a fair test of these • use several seeds in each set of conditions in order to get reliable results • state that the seeds in the dark germinated as well as those in the light • state that water and warmth are also needed for germination	Some seeds take a long time to germinate. Radish, lettuce and spring onion seeds which germinate in 7 – 14 days can be obtained. Cress and broad beans can also be used. As the germinated seeds do not need to grow into adult plants this investigation can be carried out over a relatively short period. This work focuses on germination not on growth. Many children think that because light is needed for growth it is also needed for germination. This activity offers children the opportunity of carrying out a whole investigation. It may be helpful to focus on the aspects of investigation highlighted in the learning objectives. **SAFETY** – Seeds from garden centres are usually treated with pesticides but those from health food shops should be safe to handle. Avoid red kidney beans.

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LEARNING OBJECTIVES CHILDREN SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES CHILDREN	POINTS TO NOTE
• state that water and warmth (but not light) are needed for germination • state results and try to explain why	♦ Discuss findings from the investigation and write up the investigation. ♦ Discuss what conditions are needed for germination and how we deduced this from our investigation. ♦ Discuss how the light was not needed and why (most seeds under ground) and how this will be different when the plant actually starts to grow. Extension ♦ Allow children to explain their investigation and what they found out to the class. More support ♦ Children explain how they know if water is needed for germination by looking at their seeds. Use simple or pictorial template for write-up.	• to collect data throughout the week to analyse • to use data and information collected from investigation to draw conclusions about conditions needed for germination • that seeds need water and warmth, but not light, to germinate	

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• the parts of a flower and the function of each part	♦ Talk with children about what happens to seeds once they have germinated and refer back to what they know about the conditions needed for healthy growth. ♦ Look at a drawing of a flower to highlight and name the parts. Children label their own drawing. ♦ Use real flowers and magnifying glasses to identify the parts. ♦ Dissect a simple real flower, separating, mounting and labelling the separate parts. More challenge ♦ Dissect a range of real flowers, including more complicated examples. ♦ Using a range of flowers, prove or disprove the statement 'larger flowers have more stamens than smaller flowers'. Create a database to collect data and then use this data to support findings. ♦ Use a digital camera or microscope to create a detailed information page about the parts of a particular flower. Use the internet to research that chosen flower further. More support ♦ Use picture cut-outs for labelling. Support in dissection. Use the internet to search for flowers and information about parts.	• name the parts of the flower, *eg stamen, stigma, style, petal, sepal*, and explain the function of each	**SAFETY** – All off-site visits must be carried out in accordance with LEA/school guidelines. Some children may be allergic to pollen (hay fever). Simple flowers *eg buttercup and mallow* are suitable. It is essential to avoid composite plants *eg daisy,* and those with coloured sepals *eg tulip* because at this stage, they are confusing.

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LEARNING OBJECTIVES CHILDREN SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES CHILDREN	POINTS TO NOTE
• that insects pollinate some flowers • that the wind pollinates some flowers • that the pollen from one flower must get to the stigma of another so the ovum can be fertilised • that plants produce flowers which have male and female organs, seeds are formed when pollen from the male organ fertilises the ovum (female) • how fertilisation takes place and how this is different to pollination	♦ Discuss why the pollen needs to get from one flower to another and how pollen grains are recognised by a particular flower. ♦ Talk about why insects visit a flower and how they can pollinate the flower. ♦ Discuss and list characteristics of an insect-pollinated flower. ♦ Talk about how the wind disperses some pollen grains and list characteristics of these. Look at grasses under microscope or with magnifying lenses. ♦ Look at images or real examples and group them, listing reasons why. ♦ Talk to children about how pollination takes place early in the year when there are few insects about. Relate to hay fever and pollen count. ♦ Using pictures and other secondary sources, explain to children the process of fertilisation and the distinction between pollination and fertilisation. ♦ Using a hand lens or microscope or using secondary sources, observe stamen with pollen and pollen grains from a number of different sources. Challenge children to speculate how the differences might be useful. More challenge ♦ Use the internet to research how plants use other ways to help insects to pollinate them (adapt shape to mimic insect, nectar production, landing pads for insects to land on). Copy pictures and annotate examples. More support ♦ Look at story books or descriptions of how bees pollinate flowers. Get children to enact or retell the sequence.	• explain that pollen has to be transferred from one flower to another during pollination *eg by insects, wind* • explain that seeds are formed after pollination when pollen fertilises the ovum • state that pollen can be transferred by different means *eg by wind, by insects* • identify differences between pollen grains and suggest a reason for differences *eg pollen from one flower can't pollinate flowers of other types of plant, pollen from some flowers needs to stick to insects' bodies*	

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LEARNING OBJECTIVES CHILDREN SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES CHILDREN	POINTS TO NOTE
• about the life cycle of flowering plants including how pollination, fertilisation, seed production, seed dispersal and germination fit into the lifecycle of a plant	♦ Review with children their knowledge of flower structure, pollen dispersal, pollination, fertilisation, and seed development and dispersal. ♦ introduce the term 'life cycle', ♦ Ask children to create a display sheet to illustrate the complete life cycle of a plant. ♦ With the children compare the life cycles of different plants pointing out similarities *eg in the processes* and differences *eg in the types of fruit or the mechanism for seed dispersal.* More challenge ♦ Create life cycle cards for a more unusual plant, using the internet to research. More support ♦ Simple card games to sequence the main stages of a plant life cycle.	• distinguish between pollen dispersal and seed dispersal and the mechanisms for these • order correctly the steps in the life cycle of a plant	

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LEARNING OBJECTIVES CHILDREN SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES CHILDREN	POINTS TO NOTE
• that adults have young and that these grow into adults which in turn produce young • that human young are dependent on adults for a relatively long period	♦ Talk with children about the growth and development of humans and discuss different stages *eg babyhood, childhood, adolescence, adulthood.* ♦ Ask children to devise a time line to demonstrate stages in the growth and development of humans and talk with them about the relative lengths of each stage. Use secondary sources to compare lengths of stages *eg gestation period* for different animals and to illustrate the differences between newly born animals of different species in terms of dependence on their parents, ask children about the implications of these differences.	• recognise stages in the growth and development of humans • describe differences in capabilities of newly born humans and other animals *eg in movement, feeding* • recognise differences in the length of time humans and other animals are dependent upon parents	This section of work is likely to be undertaken in relation to the school's programme for personal, social and health education and must be consistent with the school's sex education policy.
• that if living things did not reproduce they would eventually die out	♦ Review work on life cycles of plants and animals asking children why it is important for both plants and animals to reproduce. ♦ Discuss some examples of animals *eg panda, tiger, cheetah* that are facing extinction and how conservationists attempt to deal with the issue.	• identify one or two species facing extinction and describe a programme *eg breeding in captivity* which tries to overcome the problem	

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