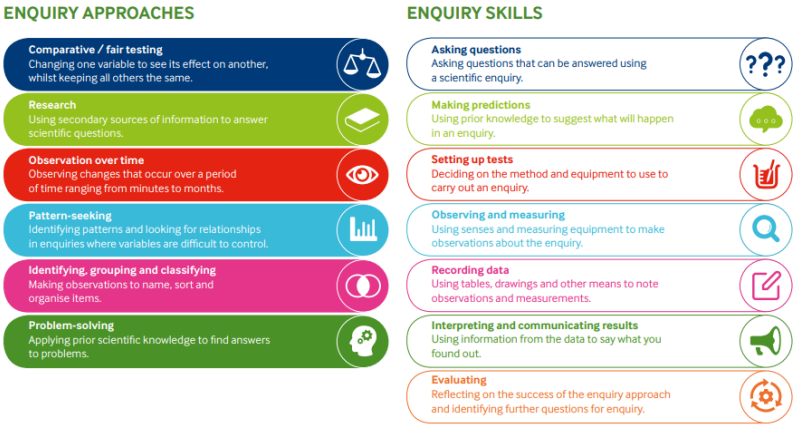
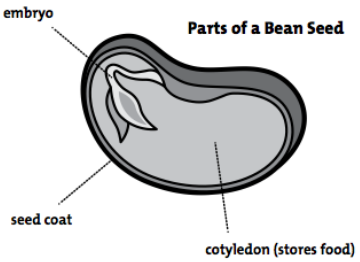
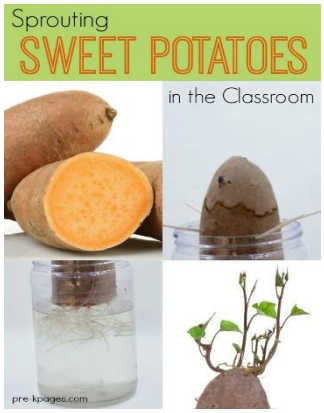
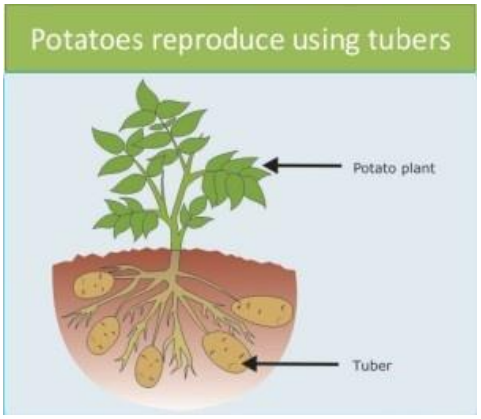
Year Group:	2	Strand: 2	How do plants grow?
BIOLOGY			
Key NC Reference and Objectives	• Observe and describe how seeds and bulbs grow into mature plants • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy		
Enquiry Approaches and Skills in Science			
Key Investigation	- Investigate the effect that heat has on the way a plant grows. **Enquiry Approach: Observing over time, comparative/fair testing** **Enquiry Skills: Making predictions, observing, gathering and recording data to help in answering questions, interpreting and communicating results, evaluating.** **Guidance:** Using two pots of germinating cress seedlings, place a clear plastic cup over one of the pots to create a mini greenhouse, place on a sunny window sill. (Use a thermometer/ temperature probe to see the difference between a plastic cup and the windowsill itself to demonstrate the different of temperature to the children before setting up the seeds). Children record the heights of the plants daily, dating all work. Data could be recorded in a table.		
Other suggestions for investigations and activities	- Investigate the effect that water has on the way a plant grows. **Enquiry Approach: Observing over time, comparative/fair testing** **Enquiry Skills: Making predictions, observing, setting up tests, gathering and recording data to help in answering questions, interpreting and communicating results, evaluating.** **Guidance:** Using two dishes of dry sand, split the cress seeds evenly between the two dishes. Discuss with the children that we use more than one seed in case one of the seeds was unhealthy or the plant inside the seed had died. Discuss with the children what should stay the same and what should change, which will help to make it a fair test. Lay the seeds on the sand. Place the two dishes in an undisturbed spot of the classroom. Water one tray and not the other. Children draw how the seeds change every two days and take photographs. It will take about two weeks for the cress to be fully grown. - Investigate the effect that light has on the way a plant grows. **Enquiry Approach: Observing over time, comparative/fair testing** **Enquiry Skills: Making predictions, observing, setting up tests, gathering and recording data to help in answering questions, interpreting and communicating results, evaluating.** Guidance: Have two yogurt/plant pots each containing a pea plant about 2cm tall. Discuss with the children what we need to keep the same/different for the experiment to measure how light can affect the way a plant grows (making the experiment a fair test). Label each pot and children record a drawing of current stage (dating all work). Discuss where plants could now be placed, explain that we couldn't put one on the sunny windowsill and one in the dark cupboard because this would make it unfair test because there would be a temperature difference. Explain how we could put them both on the windowsill, but cover one with a box that way we are creating a fair test as we are keeping temperature and amount of water the same. Draw and photograph their plants every three days, it could take		

	about 3 weeks. The should find that the plant in the dark has a long thin stem with pale leaves and the plant in the light has a shorter firmer stem with dark green leaves. - Observe and measure the growth of different plants from seeds and bulbs being able to identify and name the main parts of a plant, including explaining the life cycle of a plant. **Enquiry Approach: Observing over time, comparative/fair testing** **Enquiry Skills: Making predictions, observing, gathering and recording data to help in answering questions.** **Guidance:** **Bulbs:** In Autumn time, children can plant bulbs in the Year 2 planter in the garden for flowering in spring; it would be great for some plants to be flowering in March/April/May and the children can observe these taking drawings and photographs. See below for advice on bulbs to plant for spring time flowering. During the topic in the classroom, bulbs can be planted in clear cups with rocks and stones which enables the children to see the roots and look at how bulbs grow. See background knowledge below. **Seeds:** Using plastic cups and soil, all children could plant and grow a bean seed to take home. They could create a journal of its growth, dating each observation. To help demonstrate this process so the children can see what is happening in the soil (germination process), put some seeds in a wet paper towel, in a clear food bag and attach to a sunny window. See background knowledge below. **Extension for Greater Depth:** Potatoes are stem tubers. Their skin is bark and their eyes are buds. You could compare a potato with a pebble and discuss what is similarities/different. A good link to living things topic, questions with the children are either of the pebble or potatoes a living thing? Place the potatoes in a glass with water covering the bottom. Root will begin to grow from the bottom and buds will start to shoot upwards. **Note: There are lot of parts of this unit that may take a few weeks to grow and there are lots of observations to be recorded. It may be that all the experiments are set up at the beginning of the unit and plenaries aren't until the end. It may be that some parts are conducted as a whole class, some in small groups and some individual. Bulbs planted outside needed to be planted in Autumn (October) in allocated garden bed.**	
Plants to be grown:	Bean Sprouts Cress on sand Flowers from bulbs: Daffodils, Crocus, Tulips, Hyacinth, Bluebell	
Previously Taught Vocabulary	**Leaf, flower, petals, Moss, Fern, Conifer, Evergreen, Deciduous, Root, Stem, Blossom, Fruit, Seed, Bulb, Trunk, Branches, Plant**	
New Key Vocabulary	**Bud:** A growth on the stem which contains a side shoot with leaves, a leaf or a flower. These structures come out when the bud bursts open. **Germination:** the process of a seed breaking open to release a root then a shoot. **Greenhouse:** a structure in which plants are kept warm. Heat rays from the sun pass through the glass are absorbed by the walls and floor and reflected back to the glass but they are too weak to escape so they warm the air. **Temperature:** a measure of how hot or cold something is. **Thermometer:** an instrument for measuring the temperature using units called Celsius (^{O}C)	**Previously taught but now have more advanced definitions:** **Bulb:** a round shape made of leaves with a flat stem at the bottom with small roots. Inside the leaves is a bud from which a side shoot, a leaf or a flower may grow. The bulb may also contain side buds from which other bulbs can grow. **Seed:** a capsule which contains a tiny plant and a store of food for it to use as it germinates.

	Probe: an instrument which can be used to measure the temperature and other physical features such as humidity, moisture content of the soil, acidity of substances.	
Core Substantive Knowledge	Seeds: Most plants grow from seeds. Some are made in flowers after pollination and fertilisation. A seed has a tough outer coat enclosing a tiny plant with a store of food. The plant removed water from the seeds when they are made to reduce their weight. This helps them to be carried away and distributed over a wide area which in turn increased the chances of survival of the new generation of plants.  Seeds may remain dormant for a few weeks or even years before they germinate. In this process, the seed takes in water through a tiny hole in its coat then the coat splits and the root grows out which has lots of tiny root hairs near its tip. These greatly increase the water absorbing surface of the root and the water is used to stimulate growth of the shoot and further growth of the root. The shoot then bursts through the seed coat and grows up towards the light where it leaves make food. Note that seeds do not need light in order to germinate so can be buried in the soil. They should not be buried too deep and seed packets have instructions about planting the seeds. If a seed is planted too deeply the germinating plant may use up all the food stored in the seed before it reaches the light and can spread out is leaves to catch the light.  It is possible to grow plants without soil, as long as their roots are in water that is rich in minerals and nutrients. This is called **hydroponics**. Many industrial greenhouses use this method, and it has even been used to grow plants in space on the International Space Station! Place seeds on wet paper towel in clear bags and attach to a sunny window, to enable the children to see the growing process. <u>Bulbs</u> Some plants such as onions grow from bulbs. At the base of the bulb is a tough disc which is a flattened stem. In the centre is a bud from which a flower will grow. Around it are the bases of leaves attached to the stem. They are full of food that the long thin leaves above the soil made in the previous year. When the bulb started to grow a flower and new leaves, it uses the food store here. Between some of the lead bases are side buds. These are capable of growing into separate bulbs as seen in chives and garlic.  By planting a bulb in a clear container with stones, you'll be able to observe the roots growing, as well as observe the plant growing above the rocks. Fill a clear container with rocks and pebbles, place the bulb on top, root side down. Place the bulb on a sunny window and observe its growth.

	Interesting Fact: Cacti can store water inside their bodies and have a waxy skin to keep it in. They can survive without water for two months in deserts. Some cacti are known to have survived for two years without water. **Bulbs to plant at different times:** Plant spring-flowering bulbs, such as daffodils, crocus and hyacinths, preferably by the end of September Plant tulips in November Plant hardy summer-flowering bulbs, such as lilies, alliums and crocosmia, in September and October
Prior Knowledge	Plants Unit 1.2: Children can identify a range of common wild and garden plants and trees and explain the basic structure of a plant and tree. Children have observed a variety of flowers and plants grow from seeds. Children have made observations and recorded this in drawings and diagrams.
Assessment	Thorough assessment of outcomes in books and folders, quizzes and written scientific investigations, also supported by observations and questioning in lessons, assessing the following: Substantive Knowledge: - Pupils understand how bulbs grow into mature plants. - Pupils have an understanding that plants need water, light and a suitable temperature to grow and stay healthy. Disciplinary Knowledge: - Pupils have observed and measured plant growth. - Pupils have recorded data in diagrams and drawings. - Pupils have conducted a comparative test by changing a variable and are starting to use vocabulary relating to experiments being a fair test. - Pupils make prediction, interpret results and find simple conclusions.
Useful Planning Resources and Links	Growing Bulbs : https://buggyandbuddy.com/science-for-kids-planting-a-bulb-w-free-printable-science-invitation-saturday/ Potato Growth: https://www.pre-kpages.com/science-for-kids-observing-plant-growth-in-sweet-potatoes/ BBC Bite Size – What do Plants need to grow? https://www.bbc.co.uk/bitesize/topics/zpxnyrd/articles/zxxsyrd BBC Bite Size – What are the parts of a plant? https://www.bbc.co.uk/bitesize/topics/zpxnyrd/articles/z3wpsbk BBC Bite Size – What is the life cycle of a plant? https://www.bbc.co.uk/bitesize/topics/zpxnyrd/articles/z2vdjxs




Potatoes reproduce using tubers
Potato plant
Tuber