

Year 1

Pupils should be taught to:

identify and name a variety of common wild and garden plants, including deciduous and ever-green trees

--- charts with plants from the school grounds + identifying plants outdoors or samples in the classroom. Also: A seasonal exhibition with interesting samples from the garden regarding different aspects: Surfaces, shapes, colours, scent.

identify and describe the basic structure of a variety of common flowering plants, including trees

--- drawings with labels for the children to attach + identifying structures outdoors or samples in the classroom.

Plants

Pupils should use the local environment throughout the year to explore and answer questions about plants growing in their habitat. Where possible, they should observe the growth of flowers and vegetables that they have planted.

--- growing bulbs over winter and peas or potatoes in spring (in pots near the classroom)

They should become familiar with common names of flowers, examples of deciduous and ever-green trees, and plant structures (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem). --- see above: chart --- Pupils might work scientifically by: observing closely, perhaps using magnifying glasses, and comparing and contrasting familiar plants --- pick different flowers from the garden and compare; describing how they were able to identify and group them, and drawing diagrams showing the parts of different plants including trees. Pupils might keep records of how plants have changed over time, for example, the leaves falling off trees and buds opening; and compare and contrast what they have found out about different plants.

--- keep record by photographing a tree (eg crabapple) and making notes on a checklist each week: colour of leaves, absence of leaves, budburst, flowers opening...

+ Children in year 1 can grow potatoes in the allotment garden. They will have to go into the ground in March and will be harvested and turned into a potato salad before Summer Holidays.

Year 2

Living things and their habitats

Pupils should be taught to:

explore and compare the differences between things that are living, dead, and things that have never been alive

--- inside: box from the garden for the class to explore (caution with the live animals) or venture out and collect samples in the garden

identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other

--- outside: visit interesting spots in the grounds where different habitats can be observed and explored throughout the year: Crows up in the tree, beetles under a log, worms in the soil, bees on flowers, caterpillars on leaves, spiders in the shed.

identify and name a variety of plants and animals in their habitats, including microhabitats

--- see above

describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food

--- outside: observe birds picking in the grass/beds/birdfeeders, dig up some worms and wait for the birds, explore fallen apples that have been chewed on in winter, watch worms burying into the ground, wait for a bee to come and drink nectar from a flower.

Notes and guidance (non-statutory)

Pupils should be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy. They should raise and answer questions that help them to become familiar with the life processes that are common to all living things. Pupils should be introduced to the terms 'habitat' (a natural environment or home of a variety of plants and animals) and 'microhabitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter). They should raise and answer questions about the local environment that help them to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other, for example, plants serving as a source of food and shelter for animals. --- outside: Place cardboard cut-outs around the school: Where would a bee, a bird, a fish, a worm, a spider, a bug, a human, a mouse, a tiger, a hedgehog, a squirrel make their home? Did every animal find a home? Are there places in school, where no living thing would make their home? ---- Pupils should compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest.

Pupils might work scientifically by: sorting and classifying things according to whether they are living, dead or were never alive, and recording their findings using charts. --- Box with samples from the school grounds (Leaves, wood, sticks, stones, feathers, plants, dry seedpods) They should describe how they decided where to place things, exploring questions like: 'Is a flame alive? Is a deciduous tree dead in winter?' and talk about ways of answering their questions. They could construct a simple food chain that includes humans (eg, grass, cow, human). They could describe the conditions in different habitats and microhabitats (under log, on stony path, under bushes); and find out how the conditions affect the number and type(s) of plants and animals that live there. --- outside:

the same spots in the grounds as mentioned above: take a checklist to each spot and tick off what you notice (light levels, humidity, temperature, which plants)

Plants

Pupils should be taught to:

observe and describe how seeds and bulbs grow into mature plants

--- experiment with hyacinths indoors in winter in a glass

--- experiment with germinating peas on wet paper

find out and describe how plants need water, light and a suitable temperature to grow and stay healthy

--- experiment with growing plants in different locations: in a cupboard, on a windowsill, outdoors

--- experiment with growing plants with different water regimes

Notes and guidance (non-statutory)

Pupils should use the local environment throughout the year to observe how plants grow. Pupils should be introduced to the requirements of plants for germination, growth and survival, as well as the processes of reproduction and growth in plants.

--- rescue some of the peas that were germinating in paper towels and plant them in pots outside.

--- if possible keep plants watered until they develop flowers and pods

Note: seeds and bulbs need water to grow but most do not need light; seeds and bulbs have a store of food inside them.

Pupils might work scientifically by: observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth; setting up a comparative test to show that plants need light and water to stay healthy.

--- see experiments above

+ Children in year 2 could grow hyacinths for christmas in glass vases and watch the roots and leaves appear. They can start their own pumpkins outside in May from seed. The plants will grow and be quite big after Summer holidays. The children, now in year 3, can learn about the plant's parts and functions (tendrils, flowers, fruit, seeds) and cook a pumpkin soup.

Year 3

Plants

Pupils should be taught to:

identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers

--- in- and outside: in the school grounds, have a look at plants and see whether you can remember the names of different parts of plants. Bring some plants inside and present them to the class. Talk about its parts (stems, leaves, ...) and have a guess, what these parts are for. Whole class, ask why- Questions about plants and try to guess the answers.

explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant

--- inside: experiment over 6 weeks: germinate pumpkin seeds in some wet kitchen paper. Observe how the roots and the shoots grow and the hard seed case is split. You will notice the root hairs that absorb the water. There is no soil for the roots to grow into. Make predictions about the future of the seedling, then observe: What happens to it?

--- Do plants need sunlight to grow? Can you think of an experiment that puts this theory to the test?

--- cover some grass with black plastic for 2 weeks/ place plants in the cupboard

investigate the way in which water is transported within plants

--- in and outside: stand a fresh celery stalk in 5 cm of water mixed with ink for a couple of hours. Investigate the top of the stem after the time is up.

Try to explain how a tree takes up water and transports it up to the leaves. Now have a look at a split twig and take note of the green layer between wood and bark. We can go outside and investigate a tree that has a damaged trunk and how this affected its growth.

explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal

--- in and outside: Pick flowers for your studies and bring them inside. Present your flowers to the class and describe them. Can you spot petals, stems, anthers, stigma, pollen and ovary?

--- Have a look at the marigold/Calendula. It flowers the whole summer and usually has all different stages from buds to ripe seedheads. What do you notice about the color and shape of the flower over time?

We can brake apart a seadhead and investigate with the video-scope: Can you spot the seeds?

--- Go back to the flowers you picked: Can you guess, where the seeds will develop when the flower wilts?

--- have a look at strawberries, beanpods, peapods, blueberries, apples, cherries, gooseberries. Make predictions about what is inside. Cut them open and investigate. Any seeds inside? Do you eat the seeds? What happens to the seeds, after animals have eaten them?

--- Exhibition of different seeds and fruits. From the shape of the fruit , can you guess how the seed is spread? (Explosion, gravity, wind, animals - squirrels, birds...)

Notes and guidance (non-statutory)

Pupils should be introduced to the relationship between structure and function: the idea that every

part has a job to do. They should explore questions that focus on the role of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction.

--- Connect functions and plant parts from a scrambled up display: bark-attracts bees, petals - collect energy from the sun, pollen - anchors plant in the ground, roots - hold leaves

--- Find functions of plant parts, when they are missing in a picture: Flower without petals, tree without trunk

Note: pupils can be introduced to the idea that plants can make their own food, but at this stage they do not need to understand how this happens.

--- From light, water, soil and air, plants produce sugar and store it inside their 'bodies'. The green cells in the plant are the 'factories' that produce sugar. The plant can store this sugar in its body and use it later, it also feeds all animals.

List any food and discover which plant it is based on. (eg. milk: cows - grass/grain; sugar: sugar beet; or more complex foods like a cake: eggs - chicken - grains... etc)

Pupils might work scientifically by: comparing the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser; --- see above: experiment with light, cover grass --- discovering how seeds are formed by observing the different stages of plant life cycles over a period of time; --- see above: calendula flowers. --- looking for patterns in the structure of fruits that relate to how the seeds are dispersed. --- see above: seed dispersal --- They might observe how water is transported in plants, for example, by putting cut, white carnations into coloured water and observing how water travels up the stem to the flowers. --- see above: celery stalk

+ Children in year 3 can harvest pumpkins that they sowed in year2 and make a pumpkin soup in autumn. We also collect seeds from flowers and vegetables (eg. beans and peas). From the following spring, year 3 has the main of the allotment garden to grow flowers, herbs and veg. Starting with carrots, artichokes and tomatoes and going through to the last batch of peas to be sown before the end of the school year. If possible they set up a market stall during summer term to sell their produce.

Year 4

programme of study

Living things and their habitats

Pupils should be taught to:

recognise that living things can be grouped in a variety of ways
explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
--- use seasonal ident key in the school grounds

recognise that environments can change and that this can sometimes pose dangers to living things

Notes and guidance (non-statutory)

Pupils should use the local environment throughout the year to raise and answer questions that help them to identify and study plants and animals in their habitat. They should identify how the habitat changes throughout the year. Pupils should explore possible ways of grouping a wide selection of living things that include animals, flowering plants and non-flowering plants. Pupils could begin to put vertebrate animals into groups, for example: fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects.

Note: plants can be grouped into categories such as flowering plants (including grasses) and non-flowering plants, for example ferns and mosses.

--- look at the school grounds and find plants with no flowers. Research whether these plants are flowering at any time and how their flowers look like.

--- quiz: guess the vegetable (pictures or samples of flowers which ought to be connected to their plants)

Pupils should explore examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation.

--- what benefit does the school pond bring to the environment? Are there any limitations? What benefit do new houses bring and are there any limitations? How could you make new housing more environmentally friendly? How do you know what is better for a certain species? --- hedgehog survey

Pupils might work scientifically by: using and making simple guides or keys to explore and identify local plants and animals; making a guide to local living things; raising and answering questions based on their observations of animals and what they have found out about other animals that they have researched.

--- choose five living things from the grounds and put them into your own identification key.

+ Year 4 can choose a spot in the grounds to plant overwintering bulbs that flower in spring. They use the hedgehog tunnel to track the presence of an animal that is nocturnal. We can build nestboxes for different birds or bats, they all have different preferences for shape, materials and placing. We can set up a bee-observatory in the garden. We could have a bird bath, which needs topping up and cleaning regularly.

Year 5

programme of study

Living things and their habitats

Pupils should be taught to:

describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird

describe the life process of reproduction in some plants and animals

Notes and guidance (non-statutory)

Pupils should study and raise questions about their local environment throughout the year. They should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall.

--- plants have different life-cycles and all of them include juvenile, adult and old age-stages. We can find out about different life-stages by investigating plants in the school grounds.

Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals.

--- we can clone plants by taking cuttings from the garden. Plants do this naturally: have a look at brambles and bindweed or anemones in the garden. Inspect flowers and their reproductive parts with a magnifying glass, consider how pollen is moved and deposited on the stigma and how seeds develop. Cut open a bean and discover the embryo inside. Discuss the advantages and disadvantages of propagation methods for the plant.

Pupils might work scientifically by: observing and comparing the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times) --- when there is no winter: do plants 'overwinter'? --- did dinosaurs live along flowering plants? , asking pertinent questions and suggesting reasons for similarities and differences. They might try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. They might observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow.

+ Each pupil in Year 5 can choose a plant in autumn which we can propagate via cuttings. They are allowed to take their new plants home in spring or plant it out into the school grounds. Year 5 are allowed to pick flowers for their classroom or reception each week during spring and summer.

Year 6

programme of study

Living things and their habitats

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

--- classification keys for plants at school are available on request

give reasons for classifying plants and animals based on specific characteristics

Notes and guidance (non-statutory)

Pupils should build on their learning about grouping living things in year 4 by looking at the classification system in more detail. They should be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. Through direct observations where possible, they should classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). They should discuss reasons why living things are placed in one group and not another. Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification.

--- lesson about Linnaeus: He introduced the binominal system which gives each species a 'forename and surname' (genus, species). Interesting examples of plant names before Linnaeus, we can try and make up ridiculously long names ourselves, eg. „Plantago foliis ovato-lanceolatus pubescentibus, spica cylindrica, scapo tereti“ - *Plantago media*

Some famous binominal examples: *Tyrannosaurus rex*, *Homo sapiens*.

The same plant: periwinkle - Immergrün - bigaro - *Vinca major*. twitch grass (engl.) - couch grass (engl.) - Quecke - *Elymus repens*

Pupils might work scientifically by: using classification systems and keys to identify some animals and plants in the immediate environment. They could research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system.

Pupils should be taught to:

recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago

recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents

identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution

Notes and guidance (non-statutory)

Building on what they learned about fossils in the topic on rocks in year 3, pupils should find out more about how living things on earth have changed over time. They should be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different breeds of dogs, and what happens when, for example, labradors are crossed with poodles. They should also appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox. Pupils might find out about the work of palaeon-

tologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution.

Note: at this stage, pupils are not expected to understand how genes and chromosomes work.

Pupils might work scientifically by: observing and raising questions about local animals and how they are adapted to their environment; comparing how some living things are adapted to survive in extreme conditions, for example, cactuses, penguins and camels. They might analyse the advantages and disadvantages of specific adaptations, such as being on 2 feet rather than 4, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers.

--- we have examples of adaptations at school: plants that are adapted to different pollinators, their flower form, scent and colour has co-evolved with pollinators (flies, beetles, moths, wasps, bees, wind).

--- From an array of plant samples: guess the function of different features like thick bark, spikes, thorns, tendrils, wings, fleshy fruit, fleshy leaves, variegated leaves, tubers, pine needles.

--- Interesting and weird adaptations: eg. fire opens jack pine cones in central North America, snapdragons open for the correct weight of bee, nectar in crocosmias and other tropic flowers only available to birds with a bent beak, Akacia trees releasing tannins and warning their neighbours when they are attacked by giraffes, Horsechestnut changing flower colour after pollination.

+ year 6 could be allowed to plant a tree or introduce a new plant into the school's garden. Or they could choose (in autumn) a certain fruit or veg they want to grow together in their own area in the garden. They could collect ideas, have some advise what different choices will involve and proceed with a vote to decide.