Cross Curricular Learning

SCIENCE

This pack has been produced to help suggest ways that environmental topics can be integrated into curriculum teaching.

At a time when caring for our planet is an increasingly pressing concern, specific teaching about the environment and climate change has been eroded from the primary school curriculum (you can see a timeline of this happening here: **https://naee.org.uk/climate-change-still-challenge-english-schools/**)
Yet young people are passionate about the future of our planet and are campaigning to make education about climate change compulsory in all state schools. Millions of school children have taken part in school strikes for climate action globally. Young people are more engaged that ever before about the future of the planet.
A survey commissioned by Teach The Future found that 92% of the teachers they polled were concerned about climate change, but 41% said the subject was rarely or never mentioned in their schools. 70% of the 7,638 teachers questioned felt they had not received adequate training to educate pupils on issues around climate change.

At YPTE, we believe that young people deserve information about how humans can impact on the world around us. By inspiring pupils to care for the natural world, we can help them to build a better future.

At COP26 in 2021, the Secretary of State for Education announced that a new curriculum is on the way, which will have a greater focus on sustainability and climate change. But whilst it may seem difficult to cover environmental topics in the context of the current primary curriculum, it is absolutely possible to explore these key issues via cross curricular teaching. This pack has been designed to help facilitate this process.

What does the pack include?

- Links to complete lesson plans by YPTE
- Links to packs designed for home learning
- Practical activity ideas
- Links to other resources and lesson plans

Better Planet Schools

If your school is interested in embedding teaching about the environment into its curriculum, YPTE also offers the Better Planet Schools programme. Participating schools are provided with complete environmental education programmes for the whole academic year and there are lots of free places available. Find out more and register your school here:
https://www.betterplanetschools.org.uk

CONTENTS

HOME LEARNING PACKS

During the lockdowns of Spring and Summer 2020, YPTE produced a range of Home Learning Packs on environmental themes to support parents with activity ideas to do with their children at home. These packs are full of practical activities that you could use in the classroom or send home as suggestions for further learning.

Each pack contains experiments, art and craft ideas, research topics, maths and writing suggestions and further links to related online resources.

The topics covered are:

Animals and Habitats: https://ypte.org.uk/downloads/home-learning-pack-animals-and-habitats

Dinosaurs: https://ypte.org.uk/downloads/home-learning-pack-dinosaurs

Dramatic Earth: https://ypte.org.uk/downloads/home-learning-pack-dramatic-earth

Energy and Power: https://ypte.org.uk/downloads/home-learning-pack-energy-and-power

Food Chains and Food Miles: https://ypte.org.uk/downloads/home-learning-pack-food-chains-and-food-miles

Garden Birds: https://ypte.org.uk/downloads/home-learning-pack-garden-birds

Gardening For Nature: https://ypte.org.uk/downloads/home-learning-pack-gardening-for-nature

Maps and Directions: https://ypte.org.uk/downloads/home-learning-pack-maps-and-directions

Plants: https://ypte.org.uk/downloads/home-learning-pack-plants

Rainforest: https://ypte.org.uk/downloads/home-learning-pack-rainforests

Reduce, Re-use, recycle: https://ypte.org.uk/downloads/home-learning-pack-reduce-re-use-recycle

Rocks and Minerals: https://ypte.org.uk/downloads/home-learning-pack-rocks-and-minerals

Super Soil: https://ypte.org.uk/downloads/home-learning-pack-super-soil

Weather: https://ypte.org.uk/downloads/home-learning-pack-all-about-weather

LESSON PLANS

At Young People's Trust for the Environment, we have put together a number of complete lesson plan packs to meet the needs of specific topics in the science curriculum. These packs include engaging slides, activities and a full set of accompanying resources.

Lessons plans directly relating to specific science topics can be found by following the links below:

KEY STAGE 1: Sc1/2.1 **Plants** (Covers material from both Year 1 and Year 2 requirements)
https://ypte.org.uk/lesson-plans/plants-year-1-year-2-key-stage-1

Sc2/2.1 **Living things and their habitats**
https://ypte.org.uk/lesson-plans/animals-year-1-year-2-key-stage-1

YEAR 1: Sc1/4.1 **Seasonal Changes**
https://ypte.org.uk/lesson-plans/seasonal-changes-key-stage-1

YEAR 3 Sc3/2.1 **Plants**
https://ypte.org.uk/lesson-plans/plants-year-3

YEAR 4 Sc4/2.1 **All Living Things**
https://ypte.org.uk/lesson-plans/living-things-and-their-habitats-year-4

Sc4/3.1 States of Matter
https://ypte.org.uk/lesson-plans/water-cycle

YEAR 5: Sc5/2.1 Living Things and their habitats
https://ypte.org.uk/lesson-plans/living-things-and-their-habitats-year-5-animal-life-cycles-reproduction

https://ypte.org.uk/lesson-plans/living-things-and-their-habitats-year-5-plant-reproduction

YEAR 6: Sc6/2.1 **Living Things and their habitats**
https://ypte.org.uk/lesson-plans/living-things-and-their-habitats-year-6-classification

Sc6/2.3 **Evolution**
https://ypte.org.uk/lesson-plans/evolution-and-inheritance-year-6

EYFS

In the Early Years Foundation Stage, there is huge scope for covering environmental issues as part of Early Learning Goal 14: Understanding the World, in all categories (people and Communities, The World and Technology).

ELG 14: *Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur, and talk about changes.*

Topics that lend themselves especially well to discussion of environmental issues might include:

Weather and Seasons

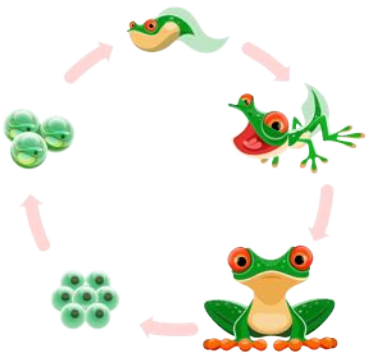
Talk about the 4 seasons and they types of weather associated with each. Find out about hot and cold places in the world. Learn words to describe different types of weather and notice patterns in the environment as the seasons change. YPTE has made a lesson plan pack for KS1 based on seasonal change, but the images would be appropriate for discussion in the Foundation Stage as well. You can find the lessons here: **https://ypte.org.uk/lesson-plans/seasonal-changes-key-stage-1**

Plants

Spend as much time as possible outdoors, noticing different features of the natural environment. Have opportunities to plant seeds and watch them grow and to re-pot plants, noticing the roots and talking about the different parts of a plant. If possible take part in gardening activities in a school garden or local allotment. Eat foods grown from seed.

Animals

Take care of a class pet, talking about what it needs in order to thrive and be happy and healthy. Observe insects and other small creatures in their natural habitats if possible, either in the school outdoor area or on a visit to a wood or nature reserve. Make small habitats for creatures such as a bug hotel: **https://ypte.org.uk/downloads/home-learning-activity-make-a-bug-hotel**



Observe the life cycles of butterflies or tadpoles and talk about how animals (including humans) change as they grow.

Talk about different animals from around the world, including those that are endangered.

Local Environment

Observe features in the surrounding area and talk about how these differ from other places the children have visited. Think about how different it is to live in a city, compared with the countryside. Talk about ways we can look after the place we live and link this to caring for the wider world. Take part in litter picking activities and talk about why we try to recycle things.

Materials

Explore a wide range of materials, investigating the different properties of each. Talk about the reasons that certain materials are good for certain purposes, whilst others would be unsuitable. Have opportunities to build, create and play with different materials including in water, sand and soil where appropriate.

Food

Talk about where foods come from before they arrive on our plates. Which foods can be grown locally and which need a different type of climate to grow? What are the foods we enjoy made from? Take part in cooking activities, discussing the ingredients and where they are from.

Transport

Talk about different types of transport and what they are used for. Discuss the ways that we travel to school or the way that we might travel on a long journey, or to go on holiday. Make maps and plans of different routes.

Electricity

Talk about keeping safe around electricity. Discuss types of toys and appliances that run on batteries or mains electricity. Explore solar powered toys and discuss how they work.

YEAR 1

Further activity ideas linked to learning objectives:

Sc1/2.1 Plants
Sc1/2.1a identify and name a variety of common wild and garden plants, including deciduous and evergreen trees

YPTE has produced a series of lessons to teach this topic which can be downloaded here:
https://ypte.org.uk/lesson-plans/plants-year-1-year-2-key-stage-1

This topic is the ideal opportunity to engage learners with growing their own plants from seeds, whether beans in a jar or more ambitious school garden projects.

For lots more cross curricular extension activities - see our Home Learning Packs linked to this topic. Ideal for sending as homework for the term, or for use in class.

Plants https://ypte.org.uk/downloads/home-learning-pack-plants

Gardening for Nature https://ypte.org.uk/downloads/home-learning-pack-gardening-for-nature

Sc1/2.2 Animals including humans
Sc1/2.2a identify and name a variety of common animals including, fish, amphibians, reptiles, birds and mammals
Sc1/2.2b identify and name a variety of common animals that are carnivores, herbivores and omnivores

For lots more cross curricular extension activities - see our Home Learning Packs linked to this topic. Ideal for sending as homework for the term, or for use in class.

https://ypte.org.uk/downloads/home-learning-pack-animals-and-habitats

https://ypte.org.uk/downloads/home-learning-pack-garden-birds

Sc1/2.2d identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.

The Rowett Institute of Nutrition and Health has produced a series of Key Stage 1 appropriate lessons under the name: Healthy People Healthy Planet.
These open with learning about senses and move from there into healthy eating and sustainable food production.

https://www.stem.org.uk/resources/collection/4117/healthy-people-healthy-planet

Sc1/3.1 Everyday materials

Sc1/3.1a distinguish between an object and the material from which it is made

Sc1/3.1b identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock

Sc1/3.1c describe the simple physical properties of a variety of everyday materials

Sc1/3.1d compare and group together a variety of everyday materials on the basis of their simple physical properties.

Sorting and grouping activities during this topic lend themselves to a range of basic issues around use of sustainable materials. At this stage, some children will be ready to address simple concepts such as whether a material comes from nature or whether it has been made by humans (eg. wood versus plastic).

Learners can discuss which materials they are able to recycle in their home or classroom bins and which they are not.

Sc1/4.1 Seasonal Changes

Sc1/4.1a observe changes across the 4 seasons
Sc1/4.1b observe and describe weather associated with the seasons and how day length varies.

YPTE has produced a series of lessons to teach this topic which can be downloaded here: **https://ypte.org.uk/lesson-plans/seasonal-changes-key-stage-1**

For lots more cross curricular extension activities - see our Home Learning Packs linked to this topic. Ideal for sending as homework for the term, or for use in class. https://ypte.org.uk/downloads/home-learning-pack-all-about-weather

Hamilton Trust also offers a topic bank of lessons for KS1 themed around weather and Climate: https://www.hamilton-trust.org.uk/topics/key-stage-1-topics/weather-experts/

There are opportunities during this topic to raise (at an age appropriate level) the fact that climate change is leading to more extreme weather events around the world.

YEAR 2

YEAR TWO

Sc2/2.1 Living things and their habitats

Sc2/2.1b 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

Make a bug hotel : https://ypte.org.uk/downloads/home-learning-activity-make-a-bug-hotel

Sc2/2.1c identify and name a variety of plants and animals in their habitats, including microhabitats

Sc2/2.1d 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.

Sc2/2.3 Animals including humans

Sc2/2.3a notice that animals, including humans, have offspring which grow into adults

Sc2/2.3b find out about and describe the basic needs of animals, including humans, for survival (water, food and air)

YPTE has produced a series of lessons to teach this topic which can be downloaded here:
https://ypte.org.uk/lesson-plans/animals-year-1-year-2-key-stage-1

Sc2/2.3c describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

There are opportunities during this science topic to touch on the fact that, globally, not everyone has the same access to sufficient food for nutrition or sufficient water for hygiene.

Links can also be made here to the food topics covered in our packs for history and geography.

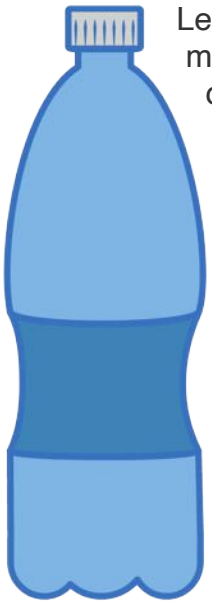
Sc2/2.2 Plants

Sc2/2.2b find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.

YPTE has produced a series of lessons to teach this topic which can be downloaded here:
https://ypte.org.uk/lesson-plans/plants-year-1-year-2-key-stage-1

Sc2/3.1 Uses of everyday materials

Sc2/3.1a identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for different uses



Learners can begin to extend the idea that some materials can be recycled and others cannot. They can discuss the idea that some materials are found naturally but that their use might have an effect on the environment (such as trees being cut down for wood or rock being dug from the ground.

There is scope here to link in with work on single use plastics. Plastic is suitable for a wide range of uses - but its production and disposal causes problems for the environment.

This useful lesson from RecycleDevon lends itself well to this topic and is a good starting point for further discussion.

https://zone.recycledevon.org/wp-content/uploads/KS1-Plastic-Worksheet.pdf

This series of lessons about plastics is aimed at learners in Key Stage 1:
https://encounteredu.com/teacher-resources/ocean-plastics-x-curric-ages-5-7

When learning about building materials, there is plenty of scope to discuss the idea of 'sustainable' resources.

Learners can link their work to Traditional Tales by considering the building materials chosen by each of the 3 Little Pigs. Where would the pigs have sourced their supplies?

A great follow up book is the 'Wonderwise' non fiction book "Let's Build A House" by Mick Manning and Brita Granstrom.

For those learners who are ready, this topic can be extended by considering issues such as how much energy it takes to produce different building materials and where these materials are found. Do people all use the same building materials everywhere in the world? Are some building materials better for the planet than others? Which materials would be worst affected by floods or storms in the event of climate change?

YEAR 3

Sc3/2.1 Plants

Sc3/2.1a identify and describe the functions of different parts of flowering plants: roots, stem/ trunk, leaves and flowers

Sc3/2.1b 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

Sc3/2.1c investigate the way in which water is transported within plants

Sc3/2.1d explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

YPTE has produced a series of lessons to teach this topic which can be downloaded here: **https://ypte.org.uk/lesson-plans/plants-year-3**

When considering the importance of nutrients in the soil for plant growth, there is the opportunity to study soil health in more detail. Healthy topsoil is absolutely vital in a successful harvest and different farming methods have different effects on the soil. (See next page for Y3 activities specifically related to soil.

Sc3/2.2 Animals including humans

Sc3/2.2a identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat

There are opportunities during this science topic to touch on the fact that, globally, not everyone has the same access to sufficient food for nutrition.

Links can also be made here to the food topics covered in our packs for history and geography.

Sc3/3.1 Rocks

Sc3/3.1a compare and group together different kinds of rocks on the basis of their appearance and simple physical properties

For lots of cross curricular extension activities - see our Home Learning Packs linked to this topic. Ideal for sending as homework for the term, or for use in class. https://ypte.org.uk/downloads/home-learning-pack-rocks-and-minerals

Sc3/3.1b describe in simple terms how fossils are formed when things that have lived are trapped within rock

There are opportunities here to discuss the formation of fossil fuels. Relevant slides and teaching notes, which can be adapted to suit a KS2 class, can be found in the YPTE lesson plan on Energy Resources. See slides 1 - 8:
https://ypte.org.uk/lesson-plans/fuels-and-energy-resources

Sc3/3.1c recognise that soils are made from rocks and organic matter.

See worksheet section for soil jar observation.

The Natural History Museum has set up this additional Y3 activity related to healthy soils:
https://www.nhm.ac.uk/schools/teaching-resources/key-stage-2/rocks-fossils-and-dinosaurs/practical-observation-whats-in-soil.html

For lots more cross curricular extension activities - see our Home Learning Packs linked to this topic. Ideal for sending as homework for the term, or for use in class. https://ypte.org.uk/downloads/home-learning-pack-super-soil

YEAR 4

Sc4/2.1 All Living Things

Sc4/2.1a recognise that living things can be grouped in a variety of ways

Sc4/2.1b explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment

YPTE has produced a series of lessons to teach this topic which can be downloaded here:

https://ypte.org.uk/lesson-plans/living-things-and-their-habitats-year-4

Sc4/2.1c recognise that environments can change and that this can sometimes pose dangers to living things.

The Wellcome Trust have produced a unit linked to this objective called “SAVE OUR HOMES.” Find out about the link between biscuits and orang-utans, and the issues around the use of palm oil with this activity pack:
https://www.stem.org.uk/resources/elibrary/resource/133747/save-our-home

YPTE has also produced a range of fact sheets which cover the impact that changing environments and human activity can have on different creatures. You can look up relevant sheets (including one on palm oil) here:
https://ypte.org.uk/factsheets

The following lesson plans about Keystone Species also tackles the effect of changing environments on living things. In this series of lessons, learners can find out the positive effects on the environment that can be gained when certain species are reintroduced to a habitat.

https://ypte.org.uk/lesson-plans/food-chains-and-keystone-species

Sc4/3.1 States of Matter

Sc4/3.1a compare and group materials together, according to whether they are solids, liquids or gases

Sc4/3.1b observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)

Sc4/3.1c identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

YPTE has produced a series of lessons to teach this objective which can be downloaded here:
https://ypte.org.uk/lesson-plans/water-cycle

Sc4/4.2 Electricity

Sc4/4.2a identify common appliances that run on electricity

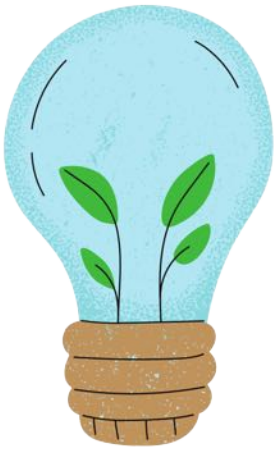
Although this topic is more geared towards the practical building of circuits, there is an opportunity here to explore learners' understanding of where electricity comes from.

As well as identifying appliances at home and school that run on electricity, you could extend this activity to explore ways in which that power is generated.

The following lesson pack on energy resources is designed for KS3, but has a series of useful slides showing different sources of electrical power that could be adapted.
https://ypte.org.uk/lesson-plans/fuels-and-energy-resources

You can also watch this video, made by YPTE, that explains how electricity is made:
https://ypte.org.uk/videos/how-is-electricity-made

Learners can be invited to explore ways of keeping energy use down both at home and at school.



YEAR 5

Sc5/2.1 Living Things and their habitats

Sc5/2.1a describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird

Sc5/2.2 Animals, including humans

Sc5/2.2a describe the changes as humans develop to old age.

YPTE has produced a series of lessons to teach these topics which can be downloaded here:
https://ypte.org.uk/lesson-plans/living-things-and-their-habitats-year-5-animal-life-cycles-reproduction

Sc5/2.1b describe the life process of reproduction in some plants and animals.

YPTE has produced a series of lessons to teach this topic which can be downloaded here:
https://ypte.org.uk/lesson-plans/living-things-and-their-habitats-year-5-plant-reproduction

Sc5/3.1 Properties and Changes of Materials

Sc5/3.1a compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets

Sc5/3.1c use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating

There is an excellent example of a STEM activity in this pack, where pupils are supported to develop a filter for removing harmful particulates from the air. Whilst quite an involved DT project, it would work as a whole class activity and would link very well to any work being done on cleaner air campaigns.

https://www.teachengineering.org/activities/view/cub_enveng_lesson07_activity2

The following pack from Dyson (makers of vacuum cleaners and fans) provides a design / DT focused look at how to produce an air filter.

https://www.jamesdysonfoundation.co.uk/content/dam/pdf/Air%20Pollution%20Resource%20Student%20Pack.pdf

Sc5/3.1d give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic

This objective lends itself to further study on issues surrounding plastics and recycling. You may find our resources on plastics useful:
https://ypte.org.uk/resources/query?title=plastic

Or, join in with a citizen science experiment to find out whether tea bags labelled 'compostable' or 'biodegradable' really do degrade in compost with the Big Compost Challenge here: ***https://www.bigcompostexperiment.org.uk***

There are also opportunities here to discuss the different types of building materials used in houses and the ways that these are evolving to become more sustainable.

Sc5/3.1f explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

The study of burning materials is another great opportunity to extend learning by discussing the by products that are released into the air during the burning process. This can be a starting point for discussion of particulate matter and for understanding why climate change is driving a move away from fossil fuels towards cleaner energy.

See YPTE's lessons on Climate change here:
https://ypte.org.uk/lesson-plans/climate-change

Sc5/4.1 Earth and Space

When studying space, you might like to consider thinking about the issue of 'space junk'. Litter left by humans isn't just a problem on Earth. Old, broken satellites, bits of machinery and other debris is orbiting Earth, and this 'space junk' can impact other objects at 22,300 mph, faster than a speeding bullet. Future space travel and use of satellites could be seriously affected by all this rubbish. Find out more in this Newsround clip: **https://www.bbc.co.uk/newsround/56902948**

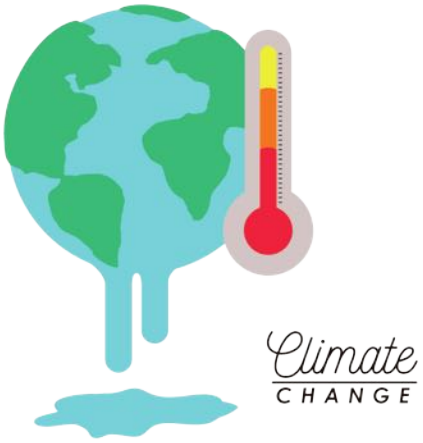
Sc5/4.2 Forces

Sc5/4.2b identify the effects of air resistance, water resistance and friction, that act between moving surfaces

There are opportunities to link this objective to studies on air pollution as friction from the tyres and brakes of cars cause a greater level of particulate matter to be emitted into the atmosphere than comes from the car's exhaust.

Learners may like to consider the range of conditions and driving behaviours that effect such friction (some suggestions here: **https://airqualitynews.com/2020/03/09/air-pollution-from-tyres-1000-worse-than-from-exhaust-claims-study/)** before suggesting ways that these could be reduced.

YEAR 6



Sc6/1 Working Scientifically

Sc6/1.7 identifying scientific evidence that has been used to support or refute ideas or arguments

In Year 6, Pupils are expected to learn about the above concept. The topic of climate change is an ideal opportunity to consider a wide range of arguments and to weigh up evidence in a time when it is sorely needed to counter "fake news". Our suite of lessons on climate change can be used to introduce the topic.

https://ypte.org.uk/lesson-plans/climate-change

and NASA has a useful section on evidence to start the discussion:
https://climate.nasa.gov/evidence/

The Open Air Laboratories (OPAL) surveys collection consists of six field work investigations, in including a climate survey questioning how we affect our weather and climate. Each survey includes a workbook, field guide and identification guide where appropriate.
https://www.stem.org.uk/resources/collection/3860/opal-surveys

Sc6/2.1 Living Things and their habitats

Sc6/2.1a 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

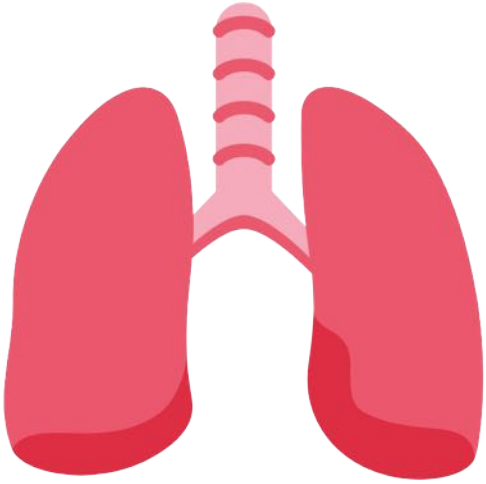
Sc6/2.1b give reasons for classifying plants and animals based on specific characteristics.

YPTE has produced a series of lessons to teach this topic which can be downloaded here
https://ypte.org.uk/lesson-plans/living-things-and-their-habitats-year-6-classification

Science and Plants for schools (SAPS) have produced a learning resource about classification suitable for class work or follow up home based learning. It includes images and sorting activities designed to lead towards the creation of classification keys.
https://www.stem.org.uk/resources/elibrary/resource/34255/grouping-and-classification-suitable-home-teaching

Hamilton Trust have produced a pack which invites learners to take part in 'classification training' following Linnaeus' system. Once 'qualified' they design a new creature which fits into the classification system!
https://www.hamilton-trust.org.uk/science/year-6-science/classification-connoisseurs/

Linnean Learning projects from the **Linnean Society of London**, are designed to help explain and extend understanding of explaining Linnaeus's system of classification. A fantastic range of activities including those that extend to KS3 level.
https://www.stem.org.uk/resources/collection/3940/linnean-learning?page=1



Sc6/2.2 Animals including humans

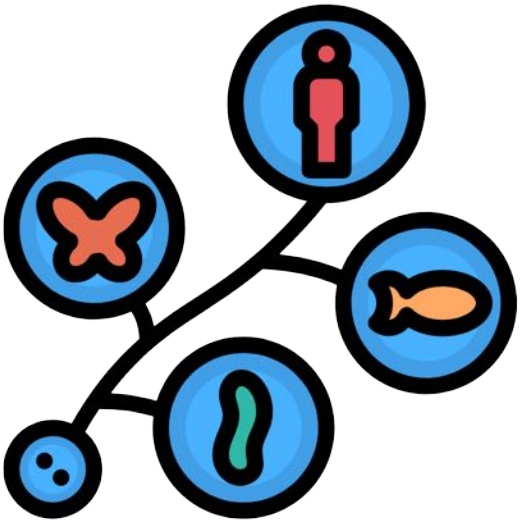
Sc6/2.2a identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood

Sc6/2.2b recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function

Sc6/2.2c describe the ways in which nutrients and water are transported within animals, including humans.

This unit is ideal to link to work on air pollution and the effects that particulate matter can have on people's bodies and health. The YPTE Better Planet Schools program offers a unit on this topic area. Information about the program can be found here:
https://www.betterplanetschools.org.uk

Sc6/2.3 Evolution



Sc6/2.3a recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago

Sc6/3.2b recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents

Sc6/2.3c identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

YPTE has produced a series of lessons to teach this topic which can be downloaded here:
https://ypte.org.uk/lesson-plans/evolution-and-inheritance-year-6

Sc5/5.2 Electricity

Although at Year 6, this topic doesn't specifically focus on how electricity is generated, there is an opportunity to link the topic with an exploration of different energy resources.

The following lesson pack on energy resources is designed for KS3, but has a series of useful slides showing different sources of electrical power that could be adapted.
https://ypte.org.uk/lesson-plans/fuels-and-energy-resources

You can also watch this video, made by YPTE, that explains how electricity is made:
https://ypte.org.uk/videos/how-is-electricity-made

and this YPTE video on renewable energy:
https://ypte.org.uk/videos/renewable-energy

ACTIVITIES

The following sample activity sheets are examples of those that you can find in the YPTE lesson plan and learning packs listed in this document. They are designed as starter or demonstration activities to help children better understand certain scientific processes or concepts.

World's Worst Spoon Activity

This starter activity can be used with children in the Early Years Foundation Stage, or Key Stage 1, to help explore the idea that different materials are suitable for different purposes. With an opportunity to make observations, sort and group materials and use scientific vocabulary, the activity also lends itself to discussing single use materials as appropriate.

Greenhouse Effect activity

This simple activity allows children to begin to understand how the greenhouse gases in the Earth's atmosphere can lead to a rise in temperature. This activity can be a helpful addition to any unit that covers the ways in which human activity has an impact on the environment.

Solar Power Activity

The following activity gives a very simple explanation of the albedo effect, or the concept that dark colours absorb more heat, whilst light colours reflect them. This demonstrates the basic concept of a simple solar heater system. Children can use it as an activity when finding out about the sun and the planets, to highlight how the sun is a source of heat energy.

Soil Erosion observation

This simple and very visual demonstration helps children to understand the effects of water run-off over different types of terrain. It can be used to help explain the effects of deforestation, to model the possible benefits of re-wilding areas that have been cleared, or to show the effects of different farming techniques.

Water Cycle Bracelet Activity

Useful as either a starter or assessment activity, the children can be provided with fewer pieces of information when building their bracelet, depending on whether you want to use the activity as a demonstration or as a problem solving exercise. It can be used as a simple threading and reminder activity during a Key Stage 1 weather topic, or to check the understanding of the water cycle in Key Stage 2.

World's Worst Spoon Activity

This activity is a great starter for an Early Years or Key stage 1 topic on materials. Learners will explore the idea that some materials are better suited to certain uses than others. They can discuss issues around 'single use' materials, and will show their understanding by suggesting materials that would be very obviously unfit for a set purpose!

You will need:

A wide range of different spoons in different materials, such as:

Wooden cooking spoons

Metal serving spoons and tea spoons

Plastic spoons (include single use spoons to discuss problems with these!)

Spoons from ice cream tubs (wooden and plastic)

Instructions:

1. Encourage children to hold and discuss the spoons. Describe them using scientific vocabulary (hard, smooth etc.)

2. Ask the children to sort the spoons into different groups and discuss reasons for their choices.

3. Discuss the reasons that we might make the same object (a spoon) from different materials. Some learners will be able to say what would happen to a metal spoon if we used it in a hot pan, and why a wooden spoon might be used for cooking instead.

4. Once the children have explored, played with and used the spoons in a range of contexts, ask the children to suggest materials that would make a ***terrible*** spoon! You might like to model this by cutting a spoon shape out of paper.

6. Children draw (or make models of) their ideas for the 'World's Worst Spoon Awards' labelling the material they have chosen for their spoon. Add any comments that the children have made regarding their choices.

Greenhouse Effect Activity

You will need:

2 Thermometers
A clear container such as a jar
A sunny area, either outside or inside
A watch or clock
A pen and paper to record your findings

Instructions:

1. Put the thermometers in direct sunlight for 5 minutes so that they can heat up.

2. On a piece of paper, draw two columns - one labelled “Thermometer A” and one labelled “Thermometer B”.

3. After the 5 minutes is up, read and record the time and thermometer temperatures on your record sheet.

4. Now place one of the thermometers in the jar or container and seal it, making sure that any lid does not create a shadow over either thermometer. (The easiest way to do this is to place the jar upside-down over the thermometer on a flat, level surface).

5. Record the temperature of each thermometer every minute for ten minutes.

6. Look at your findings and discuss why and how the container affected the temperature of the thermometer. How did the temperature inside the container change compared to outside the container?

Explanation:

The thermometer not in the container is exposed to air that is constantly changing temperature, as warm air mixes with passing cooler air. But the air inside the container is trapped and can’t mix with the cooler surrounding air - it just gets warmer as the sunlight heats it up. A greenhouse works in a similar way, as heat that has come from the sun is trapped and cannot escape back through the glass.

Although the greenhouse effect that is taking place in the Earth’s atmosphere is more complicated, the basic idea is the same - the layer of greenhouse gases in the atmosphere acts like the glass in a greenhouse and stops heat from escaping.

Solar Power Activity

You Will Need:

Three empty CD cases Black paper
White paper

Instructions:

1. Cut two pieces of black paper and one piece of white paper to fit inside the front of each CD case.

2. Close one of the black CD cases and the white one. Leave the other black CD case open.

3. Leave all three CD cases face-up in a sunny place, such as a windowsill, for one hour. Try to do this on a sunny day if possible. But if it is not sunny, you could leave the CD cases under a reading lamp instead (be careful not to put the CD cases too close to the lamp or they will melt).

4. After one hour, ask the children to feel the paper in each CD case. Which is the warmest? Can they explain why?

Explanation:

This experiment gives an idea of how solar heating panels work. Simple solar heating panels are essentially shallow metal boxes filled with tubes and coated with thick black glass. Water in the tubes heats up when the sun shines on the collector and the hot water is passed to the hot water tank inside the home using a heat exchanger.

The closed CD case with the black paper should feel the warmest. It is closest in design to a simple solar collector and it works because black surfaces absorb heat very well, rather than reflecting it, and the clear plastic cover acts as a mini greenhouse, by preventing the heat from escaping.

Extension Task

The children could then investigate locations for solar panels and decide where the best place would be to put them at their school.

Soil Erosion Activity

Soil erosion refers to the way that topsoil is worn away by exposure to weather conditions. In this demonstration, you can see how different types of ground cover and planting affect the amount of soil that is eroded by rainwater runoff.

You Will Need

3 plastic bottles or drinks cartons
3 glasses or jars
water
soil planted with plants / grass
soil with leaf litter
plain soil

Instructions

1. Cut a slice off the top of each bottle or drinks carton and remove the lid.

2. Fill one carton with soil, one with soil covered in leaf litter and in the final one, use soil that grass is growing in. The roots are important, so don't just sprinkle grass on the top!

3. Place the three bottles up where you can position a glass or jar under the openings of each one.

4. Next, pour water into each of the containers and allow it to trickle through and pour into the glass.

5. Observe what happens - which bottle contained soil that was most easily washed away? How could we use that information to stop a field from being eroded too easily?

Explanation

This demonstration helps show the effect that the roots of plants have as they help bind soil and hold it in place. It can be used to model the effects of clearing land for logging or agriculture, leaving bare, exposed soil. It can also be useful to explain why conservationists are trying to regenerate mangroves and other coastal planting to avoid flooding.

Water Cycle Bracelet Activity

You will need:

Thread
Beads in the following colours:
light blue
green
darker blue
yellow
clear
white

Instructions:

1. Give each child a piece of thread and one each of the coloured beads as above. Explain that the beads represent parts of the water cycle and ask children to suggest what these might be.

2. Begin by threading a light blue bead to represent the rain falling.

3. Next, add a green bead to stand for the ground that the rain falls on to.

4. The following bead is dark blue to represent bodies of water that the rain falls on, such as lakes, the sea, or rivers. (It's positioned after the green bead so that you can discuss run-off if appropriate)

5. Thread the yellow bead to stand for the sun shining on any bodies of water.

6. The clear bead represents evaporation.

7. Finally, add a white bead, to stand for the clouds and tie the bracelet up to show that the cycle begins again.

Explanation:

As the children thread each bead in sequence, explain what each bead stands for. The children can then work in pairs or small groups, moving the beads round on their bracelets and discussing what they understand by each part of the process. This can be a useful assessment activity.

RESOURCES

TEDEd have an excellent series of 30 Nature Quests that form their 'Earth School' Challenge. By completing each task, learners gain a better understanding of issues affecting the environment. All sessions are supported by talks and videos and registration is free:
https://ed.ted.com/earth-school

The environmental Curriculum - Cross Curricular guidance document from the **National Association of Environmental Education** contains further suggestions for linking topic areas to the environment, together with case studies and a useful list of websites and further reading.:
https://naee.org.uk/wp-content/uploads/2015/06/NAEE_The_Environmental_Curriculum.pdf

The **Open Air Laboratories (OPAL)** surveys collection consists of six field work investigations which relate to the curriculum areas habitats, interdependence and adaptation and the environment. Each survey includes a workbook, field guide and identification guide where appropriate.
The surveys are:
* Bugs Count - what bugs are living near you?
* Climate survey - how do we affect our weather and climate?
* Biodiversity survey - what wildlife is supported by your hedge?
* Water survey - what creatures are lurking in your pond?
* Air survey - what can lichens tell us about air quality?
* Soil and earthworm survey - which earthworms are living in your local area?

https://www.stem.org.uk/resources/collection/3860/opal-surveys

Learning through Landscapes offer a range of cross curricular activities based outdoors that can be adapted to suit different age groups. Many of them are excellent starter or extension topics for each year group's science objectives.
https://www.ltl.org.uk/free-resources/

Find out all about 'mini-beasts' with the **Amateur Entomologists' Society** at:
https://www.amentsoc.org/bug-club/

Plantlife provides a range of 'spotter sheets' to help identify British plants and is especially helpful on meadow habitats. Some of these resources be transferred well to studies on a school field if you have access to one.
https://www.plantlife.org.uk/uk/discover-wild-plants-nature/learning-and-volunteering/schools