Are you ready for Science Week?
This pack is designed to help your school make this year’s science week the best ever!

Your pack includes:
- Planning your science week
- Budgeting for science week
- Promoting your science week
- The main event!
- Useful links
- FREE sample of Switched on Science Second Edition for years 2, 3 and 5

9th – 18th March 2018
Planning your science week

Thanks to Will Reilly, science co-ordinator from Ealdham Primary School for the great advice on making the most out of your science week!

So you’ve been asked by your head teacher to plan, resource and run ‘Science Week’ in your school but do not know where to start? Don’t panic! I was in exactly the same position two years ago just after I was newly appointed as the science coordinator at my school. Running science week for an entire school is not as daunting a prospect as it may sound at first. With a little planning, research, fundraising and hard work you can deliver a successful science week that will be a highlight of your school’s year!

When I first sat down to plan science week I did not know where to start. After a little searching online I could not find any ‘How To’ guides so had to devise my own plan. This article, while not being a definitive guide, aims to guide science coordinators when planning science week. I hope to share invaluable resources, websites, possible funding and ideas for planning that will help you put on a real ‘showstopper’ in your school that will leave a lasting impression on children and staff alike.

Choosing a theme for your Science Week

The first important decision to make is which theme you want your school’s science week to follow. Choosing the correct theme can be crucial to the success of your science week and can allow you to either help other areas of your school’s curriculum or boost the profile of science in your school.

The theme you choose will vary depending on what suits your school. For my first Science Week I chose a ‘Healthy Me’ theme as my school was looking to boost its profile as a healthy school and to get the pupils to make healthy lifestyle choices.

If you feel that a healthy theme would suit your school then I would highly recommend the ‘In The Zone’ resources from the Wellcome Trust. In 2012 the trust sent over 32,000 free experiment kits to schools. However, if you don’t have any of these left, then do not worry, you can access all of the resources contained in the pack online. Download the pack. Both the kit and the website contain teacher’s notes, lesson plans, PowerPoints, online activities, videos for assemblies, printable resources and much more!
It is a brilliant resource and gives you all you need if you are planning to take a healthy approach to science week. Another benefit of this resource is that it is free so will allow you to use your science budget to fund anything else you may need.

The response from staff and children at my school to the activities was excellent and allowed the children to have fun while thinking scientifically to carry out experiments that made them think about their health.

Last year the theme I chose was ‘Fun Science’. I chose this theme as I found out through research that children at my school enjoyed carrying out experiments and wanted there to be more in science lessons. I think this is common in most schools but sometimes we become weighed down by curriculum objectives in science and science lessons can lose their fun. This certainly happened to me a few years ago and after some reflection and deciding to change my school’s approach to science, a fun science week seemed the perfect place to start. This is the theme I will discuss as it was the most successful and was delivered on a very tight budget, which I have found is a common issue that science coordinators have when planning science week.

If the two themes I have mentioned do not suit your school then here are some other ideas:

**Cracking Chemistry:** learning about different aspects of the science of materials and states of matter.

**Domestic Science:** investigating science in everyday life.

**Exploring Energy:** learning about recycling, sustainable energy and the greenhouse effect.

Ideas and activity packs for all of the ideas mentioned above are available at the excellent [National STEM Centre website](https://www.nationalstemcentre.org.uk).

To use the STEM Centre’s resources you need to create an account but it is absolutely free and provides a vast range of resources to support all areas of the new science curriculum as well as an excellent e-library. I would highly recommend visiting their site and making staff at your school aware of the great resources available.
Budgeting for science week

Each school’s budget for science varies greatly. The year I planned my school’s ‘Fun Science Week’ and I was on a very tight budget. In order to raise funds we held a ‘Silly Scientist’ dress up day during science week, asking for a £1 donation per family which would be put towards future science weeks or trips. I was stunned by the amount of children who dressed up, the creativity in their costumes and how much money was raised for science. We raised around £100 which more than covered the cost of science week that year (in total I spent about £90). You can take a look at some pictures from ‘Silly Scientist Day’ and ‘Fun Science Week’ at my school here.

Another way to help fund your science week is to apply for a ‘Kick Start Fund’ grant from the British Science Association. You can apply for between £300-600 to fund your science week. It does not take long to apply and this year my school received £300 which I have used to book two presenters during science week. More information can be found here.

This website is also a great resource for ideas and support when planning science week.
So now you have decided on your theme, how are you going to promote your Science Week?

Delivering a whole school assembly about two weeks before science week is a good way to make children and staff aware that it is approaching and can start the ‘buzz’ around science week. One of the best ways I have found to promote science week is to run a poster competition. After announcing the theme in your assembly introduce a competition to find the best poster that promotes science week in Key Stage 1 and Key Stage 2. Make the school aware of the theme and what key information will be required on the poster. The winners will get their posters printed and displayed around the school to promote science week. This garnered a massive response (over 180 entries out of approximately 250 pupils) at my school and is a great way to involve children in the initial stages of science week!

Also make an announcement in your school’s newsletter, on the website and email your school governors just in case they miss the wonderful posters that your school’s children produce! If you are feeling really adventurous (and brave) you can also contact the local press to come in and photograph some of the activities and interview staff and children about science week.
The main event!

Since your assembly the excitement has been building up to science week and now it is time for the ‘main event’. From my experience, I have found that the most successful curriculum days/weeks include an activity that has a ‘wow’ factor alongside all of the other fun learning activities the children will do in the classroom.

For my school’s ‘Fun Science Week’ I set up a ‘laboratory’ in the school’s hall. I wanted the children to be able to make mess, blow things up and be amazed by quick science experiments that they can carry out themselves. To help with my experiments I used the wonderful Science Museum’s ‘Kitchen Science’ resource which is available here.

With a small amount of water, oil, film capsules, food dye, milk, balloons, a lot of bicarbonate soda, a lab coat and some ‘silly professor glasses’ I was able to amaze children all the way from Reception up to year 6. I booked the hall out for the day and drew up a timetable that allowed each class 20-25 minutes in my ‘laboratory’ which provided a real highlight to science week and showed children how fun science can be! I differentiated each session by adapting each activity and changing my questioning depending on which year group I was working with.

Running a workshop like this during science week is a lot of fun and can really boost your profile as the leader of your subject in your school, not only to the children but also the staff. It also keeps the cost of science week down. I spent roughly £40 at my local supermarket in order to run a workshop for 14 classes. That works out at £2.85 per class and a lot of the resources can be used again afterwards.

Some people may not be as keen to run and resource their own workshop. If you have money in your budget you might consider booking a presenter to come into your school to deliver the ‘wow’ factor to your science week. SciEnts is a great place to start. They have a wide variety of performers to suit any school’s science week. Make sure you book well in advance as a lot of them are fully booked for science week a year before!

Fun Scientists is also an excellent company that my school has used in the past and I have booked two of their ‘professors’ to run workshops during science week this year.

Find out more
Classroom & Whole-school activities

I gave each year group different activities for in the classroom. I used the Science Museum’s learning resources which are available here.

Each activity was appropriate to the year group and they were a huge success. The activities I used were:

**Nursery & Reception:** Bubble Trouble!

**Key Stage 1:** Ice cream – it’s in the bag!

**Key Stage 2:** Zero Waste Egg Drop Challenge.

Each year group also took part in the ‘Spaghetti challenge’ to see who could build the strongest spaghetti tower to support an egg using just 8 marshmallows and some spaghetti.

Make sure that teachers take lots of pictures as you can use this as evidence or to go on your school’s website. It is also a great idea to make a science week display afterwards in a prominent place to show what each year group did during the week.

At the end of the week it is great to bring the school together in an assembly to celebrate what they have achieved during science week. I announced winners of the ‘spaghetti challenge’ and ‘egg drop’ competitions & presented small prizes (Horrible Science books, experiment kits & annuals).
Useful links

British Science Week – for ideas, resources & grant funding:
www.britishscienceweek.org

Wellcome Trust ‘Get in the Zone’ resources for a healthy science week:
http://www.getinthezone.org.uk/schools/ages-4-11/

‘Kitchen Science’ activities for running your own ‘laboratory’:

Classroom activities for science week:

National STEM Centre – excellent resource for science:

Examples of experiments and activities for use in science:
http://www.risingstars-uk.com/sos

Science presenters:
http://www.scients.co.uk/science-shows
http://www.funscientists.com/

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Please note: before carrying out any practical work, please ensure you have carried out a risk assessment.

20% discount!

To celebrate British Science Week, we would like to offer you an exclusive 20% discount off *Switched on Science Second Edition*. Simply quote the code WY0002080 when you checkout on the website, www.risingstars-uk.com.

This voucher expires 31st May 2018.
SWITCHED ON Science
Second Edition

All the support you need to deliver amazing science lessons for the new curriculum!

THREE FREE TOPICS TO TRY!
Year 2: Mini Worlds
Year 3: Rocks
Year 5: Out of this World

Access your digital resources at www.risingstars-uk.com/sos
Inspiring lessons for the science curriculum

Switched on Science Second Edition has been fully updated to reflect the challenges of teaching the primary science programme of study and gives you all the tools you need to run exciting science lessons with confidence.

✓ Get children working scientifically with hands-on experiments
✓ Prepare inspiring lessons with the easy-to-use, flexible teacher guidance
✓ Deliver lessons with confidence with the support of bitesize CPD videos

What’s included in this sample?

Year 2 sample topic: Mini Worlds
Year 3 sample topic: Rocks
Year 5 Sample Topic: Out of this World

FREE online resources

To access your FREE online resources, go to www.risingstars-uk.com/ Series/sos
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SCIENCE IN ACTION TOPICS Extra end-of-year topics to consolidate learning and working scientifically skills

www.risingstars-uk.com/sos

One-off purchase – no subscription!
**Mini Worlds**

### About this topic

**Curriculum link:** Year 2, Living Things and their Habitats, Uses of Everyday Materials

**SUMMARY:**
In this topic, children use microscopes and other tools to observe, make sense of what they see and communicate their observations and ideas.

**UNITS:**
- 3.1: Making observations
- 3.2: Close up on nature

**ACTIVITY RESOURCES:** (pages x-x)
- 3.1: My Observations

**ONLINE RESOURCES:**
- Teaching Slides (PowerPoint)
- Interactive activity: Mini worlds
- CPD video: Science in Action
- Pupil video: Mini worlds

### Learning objectives:
- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.
- Explore and compare the differences between things that are living, dead or that have never been alive.

### Working scientifically skills:
- Observe closely.
- Identify and classify.
- Use observations and ideas to suggest answers to questions.
- Gather and record data to help in answering questions.

### CROSS CURRICULAR LINKS

**English And Literacy**
- Learn and use comparative language, e.g. big, bigger, biggest, small, smaller, smallest.
- Learn and use descriptive language. Discuss and clarify the meanings of words. Discuss favourite words and phrases to describe observations, e.g. incredible, unbelievable, awesome.
- Write narratives about personal experiences of using hand lenses and microscopes.
- Writing down ideas and/or key words, including new vocabulary, to describe and explain observations.
- Use present and past tenses correctly and consistently, e.g. ‘I looked at the bee’s wing’.
- Under the microscope, discuss observations, listen to another person; compare what they have seen.

**Numeracy and mathematics**
- How can we measure really tiny objects?
- Using cm and mm.
- Using ml.
- Using seconds.
- Symmetry in objects.

**History**
- Who invented the microscope?
- What did the first microscope look like?
- Who uses microscopes today?
Art
- Making small things large. Hidden patterns.
- Using clay to make invertebrate models.
- Painting the pattern of the weave of fabrics.
- Using materials to make the pattern of the weave of fabrics – collage.
- Observational drawing; a dead bee, a fly’s leg, a butterfly wing.

Computing/ICT
- Using a digital microscope.
- Taking digital microscope photographs, storing in personal file.
- Annotating photographs.
- Using Easi-Speak™ mics and Talk Cards, Talk Tins.
- Science laboratory
- Lab coats (white shirts).
- Pictures of people at work who are scientists.
- Digital microscope.
- Range of hand lenses and viewers.
- Petri dishes.
- Objects for observation.
- Science observation sketch books.

PE and drama
- Making myself small.
- Tiny movements – sequences.
- Being shrunk to the size of an insect.

RE
- Caring for all living things no matter how small.
- Small actions – that can affect how people feel, make them happy or sad.

Geography
- Biggest and smallest country. Biggest and smallest island.
- Biggest animals – where do they live: land, water or air?
- Smallest and biggest birds - which country do they live in? How are they similar and different? What are their habitats like?

STEAM (SCIENCE TECHNOLOGY ENGINEERING ART AND MATHS) OPPORTUNITIES

Invite into class
- Parent or person involved with school who keeps invertebrates e.g. spiders.
- Scientists from local university or secondary who uses a microscope.
- ICT lead to show children how to use a digital microscope.

Visit
- Local secondary school to use their microscopes
- Local area to use hand lenses or digital microscopes to explore e.g. stones, tree bark.
- Local reserve for pond dipping

HEALTH AND SAFETY

Read ASE Be Safe! or log onto CLEAPSS science. cleapss.org.uk for information on using magnifying lenses and microscopes.
**Topic 3 : Mini Worlds**

**It is assumed that most children know, from their Foundation Stage experience, words such as observe, sort and magnifying lens although they might not know how to write and spell them. You can download a Word Mat of essential vocabulary for this topic from My Rising Stars’**

**Magnifying lens:** a special piece of glass that makes things look bigger when you look through it.

**Microscope:** the word microscope comes from two Greek words – micro meaning small and scope meaning to look or see. A microscope is a piece of equipment to look at things that are too small for our eyes to see.

**Observe:** to look at something using one or more of the 5 senses

**Key words:** crystals / eyepiece / hand lens / lens / magnifying glass / microscope / microscopic / miniature / naked eye / observe / fibres / small / smaller / air / alive / babies / breathe / compare / dead / grow / living / move / never / reproduce / sort / toilet / habitat / insect / bird / animal / plant / shelter / predator / prey / reproduce / eat / food / food chain / grass / hazel / hedgehog / mouse / nuts / plants / producers

**Suggestions for everyday items:** bark / bread / bugs / coffee granules / cork / fabric / feathers / flower / grass / hair / invertebrates / kitchen paper towel / leaves / lichen / moss / orange / peel / paper, different types / salt / sand / seeds, e.g. bean, beetroot, poppy, sunflower / soil / sticks / sugar / Velcro / wool

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**Prepare the Classroom**

**I am a scientist**

- White laboratory coats (white shirts) for children to wear. You could limit these to, e.g., four to regulate the number of children using the area.
- Easi-Scope™ digital microscope Different kind of magnifiers
  - Everyday items to observe
  - Invertebrates, e.g. dead spiders, wasps, bees that have been found around the school grounds
- Tweezers
- Petri dishes
- Books on microscopes
- Observational sketch book
This topic develops children’s ability to observe, make sense of what they see and communicate their observations and ideas. It provides the opportunity for children to explore the exciting world of things that cannot be seen with the naked eye.

Show children PowerPoint Slides X and X which includes pictures of the head of a fly and a close up of crispy rice from a breakfast cereal. Have a guessing game of perhaps 10 questions to see if children can work out what each picture is showing. Ask children to justify their ideas. Both look really amazing and like something from outer space.

### GET STARTED

**Mini Collection**

L.O. Observe closely, using simple equipment. Identify and classify.

- As a starting point give children a small canister, like a yoghurt or hummus pot. There are two possible ways you could begin this topic, one would be to send the canister home with children, with a note asking parents and carers to work with their child to fill the canister with as many ‘tiny things’ as possible (no repeat items), as part of Topic 3: Mini Worlds. An alternative would be to take the children into the school grounds for them to find as many items (not creatures) as they can to put in their pot (they cannot put something in twice) until their pot is full.
- If this is a home-school activity make sure that you accommodate those children who cannot complete this at home.
- When they have completed the challenge, children empty their canisters to find out:
  - How many items they have and what is the record number?
  - How many different ways can they sort their items? (plants, materials, colours, shapes, sizes, squash, twist, bend)
  - Sort them into living (e.g. grass, leaves) and not living.
  - How many different things can they identify and name?

### YOU WILL NEED

- Small canister for each child

### ASSESSMENT

- Em. Children require support to collect, identify and classify items.
- Exp. Children carry out the task independently and are able to identify and classify items according to given criteria.
- Exc. Children classify their items according to a range of criteria they have suggested.
L.O. Observe closely, using simple equipment. Identify and classify.

- This is a suggestion which offers an alternative to a whole afternoon of science. Instead the time is spread across a week. Sometimes children need time to ‘bottom out’ their interests, that is, to follow their questions, ideas etc. over a longer period of time, rather than be constrained by the length of a lesson. This works well as a cross curricular week, particularly when linked to literacy and art.
- Their collections could be the starting point for this or items provided by the teacher, brought from home by the children or found in the school grounds. Do give children access to digital microscopes or microscopes borrowed from a local secondary school or on loan from the Royal Microscopical Society. We need to offer children opportunities to enjoy exploring observations, sharing what they see and their ideas with peers and adults.
- Be creative in how their experiences are recorded, e.g., use Big Books, Floor Books or working walls to display their photographs, pictures and comments.

YOU WILL NEED
- Microscope
- Digital microscope
- Hand lenses
- PowerPoint Slides 4–6
- Resources for displaying images
MICROSCOPE MONDAY
Children explore using their hand lenses, microscopes and digital microscopes.
Use PowerPoint Slides 4, 5 and 6 to start discussion on how hand lenses and microscopes can help us look at small things that our eyes would find hard to see on their own.
Children learn how to use this equipment and use them to observe, take digital photographs and share their observations and what they learn with other people.

TALKING TUESDAY
Here children share what they have observed with other children, looking at the same observations under the microscope. They compare digital photographs that they have taken and talk about colour, form, what it reminds them of etc. They compare what they have observed with others and say:
- What object they observed?
- What was the most interesting thing about it?
- What surprised you?
- What colours and shapes could you see?
- What was the most important thing you learned about it?

WONDERING WEDNESDAY
Now the children think about what else they might like to look at and are able to choose from a range of items, e.g., sugar, fabric, dead invertebrates, plants, flowers. Encourage them to become experts in one thing, e.g. a flower, or different sugars, or an invertebrate. Encourage children to use the digital microscope and add text to the picture, or draw and annotate what they see.

THINKING THURSDAY
The children think about what they can find out about the objects or materials that they observed. Can they find objects to observe that are similar or very different, and compare and contrast?

FRAME IT FRIDAY
Children collect their observations, pictures and photographs alongside descriptions and additional information and place them in a class Big Book, working wall etc. to share with everyone in their own and other classes.

ASSESSMENT
- Em. Children require assistance to use the equipment and to make sense of their observations.
- Exp. Children independently use the equipment and confidently describe their observations.
- Exc. Children are able to make a range of links between their observations and their personal knowledge and experience and ask new questions and seek answers through further observations.
In this topic children work scientifically on a variety of quick investigations and longer tasks to learn about rocks. This topic covers the properties and uses of rocks, the rock family, soils and finally fossils.

### UNITS:
1.1: Rocks
1.2: Soils
1.3: Fossils

### ACTIVITY RESOURCES: (PAGES 94–100)
- 1.1: Testing rocks
- 1.2: The rock family
- 1.3: Soil investigation
- 1.4: Soil key
- 1.5: Fantastic fossils

### ONLINE RESOURCES:
- PowerPoint presentation: Rocks, soils and fossils
- Interactive activity: ‘Fantastic Fossils’
- CPD video: ‘Rocks, Soils and Fossils’
- Pupil video: ‘Earth Rocks’ (access on My Rising Stars)

### CROSS CURRICULAR LINKS
This topic develops the following working scientifically skills:
- **Mathematics**
  - Sort rocks.
  - Compare weight to size.
- **English**
  - Create verbal and written descriptions of rocks.
  - Use new technical vocabulary.
  - Read non-fiction texts about rocks and soils.
  - Use a scientific dictionary to find and check words.
- **Geography**
  - Describe and understand key aspects of physical geography, e.g. rocks, soils and volcanoes.
  - Locate active volcanoes using a world map or globe.
  - Locate famous rocks across the UK, e.g. The Needles, Stonehenge and Durdle Door.
  - Research local industry past and present, e.g. coal, lead and tin mining.
  - Locate local quarries, what they mine and uses of the rocks.

### ABOUT THIS TOPIC
- **Curriculum link:** Year 3, Rocks
- **SUMMARY:**
  In this topic children work scientifically on a variety of quick investigations and longer tasks to learn about rocks. This topic covers the properties and uses of rocks, the rock family, soils and finally fossils.

### Learning objectives:
This topic covers the following learning objectives:
- Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.
- Describe in simple terms how fossils are formed when things that have lived are trapped within rock.
- Recognise that soils are made from rocks and organic matter.
- Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

### Working scientifically skills:
This topic develops the following working scientifically skills:
- Ask relevant questions and use different types of scientific enquiries to answer them.
- Set up simple practical enquiries, comparative and fair tests.
- Make systematic and careful observations and, where appropriate, taking accurate measurements using standard units using a range of equipment.
- Gather, record, classify and present data in a variety of ways to help in answering questions.
- Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
- Research and retrieve information.
- Comprehend key facts.
- Write newspaper reports about, e.g. a volcanic eruption and new fossil finds.
- Write rock poems.
- Areas famous for fossils such as the Jurassic Coastline of Dorset.
- Famous rocks from around the world, e.g. Ayr’s Rock (Uluru), Immortal Bridge Mountain in China and the Grand Canyon.

**Art**
- Cave art, e.g. The Chauvet-Pont-d’Arc Cave, France and the Caves in the district of Maros, Indonesia.
- Draw rocks using a hand lens or computer microscope.
- Patterns in rocks and fossils, e.g. ammonites.

**Computing / ICT**
- Use a digital microscope to view rocks.
- Use branching databases to identify different rocks and fossils.
- Watch an animated video to show how fossils are formed.
- Photographing rocks and fossils.
- Using interactive classification Apps on rocks and fossils.

**History**
- Rock Art.
- The Stone Age.
- Mary Anning and other palaeontologists.
- Geological time scales.

**Drama**
- Role play and hot seating about, e.g. Mary Anning, a palaeontologist.
- Participating in a dig and discovering fossils.
STEAM (SCIENCE TECHNOLOGY ENGINEERING ART AND MATHS) OPPORTUNITIES

Invite into class
- Geologists from local universities or mining companies.
- Palaeontologists from local universities or historical sites.
- Artists to use rock, soils and fossils to create a range of artwork.
- Actors to role-play Mary Anning.

Visit
- Museums, such as the Natural History Museum or local museums.
- Quarries offering supervised visits.
- Archaeological digs.
- Safe coastal areas for fossil hunting.

HEALTH AND SAFETY

Use of plaster of paris when making fossils: the advice from CLEAPSS Health and Safety organisation is that it is safe to make a plaster cast of a fossil. A small amount of mixture should be made up, e.g. in a yoghurt pot and poured into the mould. A few splashes on the hand would be washed off with no injury. Injury only results when the plaster cannot be removed quickly. For further information see http://www.cleapss.org.uk/attachments/article/0/PS74.pdf?Primary/Resources/Guidance%20Leaflets/

Teacher subject knowledge

The Earth can be divided into three main layers, the core, mantle and crust. Rock is a natural material that is found in the Earth’s crust. The Earth is at least 4800 million years old and the oldest rock is about 4000 million years old. The age of a rock can be judged by radioactive decay and nearby fossil types. Younger rocks are usually on top of older ones.

Rocks

There are three main types of rock formation; sedimentary, igneous and metamorphic.

Sedimentary rocks are formed when sediment / rock is deposited from air, ice, wind or water (where the sediments are suspended in the water). These build up in layers. This is called sedimentation; hence the name. As the layers build up, water is squeezed out and the sediments are ‘cemented’ together. Chalk, shale, limestone and sandstone are all examples of sedimentary rock. Sedimentary rock contains fossils.

Igneous rocks begin as molten magma (liquid rock) from inside Earth. As the magma moves towards the surface it cools; the faster it cools the smaller the crystals (e.g. if it flows into water). Obsidian, which looks glassy, is an example of this. If the lava cools slowly the crystals are larger, e.g. granite. Igneous rocks do not contain fossils because the heat would have melted them.

Metamorphic rocks are rocks that have been changed by heat or pressure; the word morph means change. The rocks are heated (but not melted like igneous) or changed during great earth movements where rocks are squeezed and put under enormous pressure. Both sedimentary and igneous rocks can be changed in this way and that is why metamorphic rocks can contain fossils.

Different rocks can be identified by their properties, e.g. colour, texture, hardness and permeability. The study of rocks is geology and people studying rocks are geologists.

Rocks come in different sizes and there are lots of everyday words used for them, e.g. boulder, stones, pebbles, gravel and sand. Rocks can be weathered by the effect of: temperature, e.g. freezing and thawing; wind blowing tiny grains of rock (sand) against rock wearing it away; rain and waves.

Many rocks have different uses such as slate for roofs, marble as floor tiles, chalk in schools, toothpaste, polish and granite for buildings, paving stones and bridges.

Minerals from rocks are found in breakfast cereals (iron and zinc), bread (limestone), ice creams and cheese (gypsum). Salt is dissolved from rocks and even water contains minerals from rocks.

Soils

Soil is formed by weathering, which breaks the rocks into small particles of rock/mineral that are then mixed with dead and decaying plants and animals (humus) as well as water and air.
Soil helps to support plant life by providing plants with nutrients, water and air. It keeps plant roots in the ground.

The characteristics of the soil depend on the rock it is formed from. There are different kinds of soil, e.g. clay, sandy soil, loam. Clay soil has very small particles, which can hold water. It is sticky to the touch when wet, but smooth when dry. Sandy soil has the largest particles. It feels dry and gritty and water drains through it quickly. Loam is a soil that is a mix of different soils and it is high in humus (decaying plants and animals) so it is popular with gardeners. Different plants grow better in different types of soil.

Fossils
Fossils are the prehistoric remains of plants or animals that have been preserved usually by being buried under layers of mud or sand, which is then changed into sedimentary rock. Fossils can also be made when animals and plants living things are frozen in ice or become stuck in tree resin that hardens to form amber.

A palaeontologist studies fossils and palaeontology is the study of fossils. By studying fossils palaeontologists can learn a lot about the environment the plant or animal lived in and their links to other living things. They can also see how living things, have evolved, which is why children return to fossils in Year 6.

Children’s misconceptions

Children may believe …

- that all rocks are large, heavy and jagged: stones and gravel are actually smaller pieces of rock.
- that rocks are made of one substance: in fact, some rocks contain crystals and are made of more than one mineral.
- that concrete is a rock.
- that fossils are actual animals and plants.
- that only bones can be fossils.
- that humans can make rocks: in fact, rocks are naturally occurring.
- that rocks form when pebbles stick together: in fact, pebbles are fragments of rock.
- that all sedimentary rocks form under water: in fact, they can be formed on land, e.g. desert sandstone.

Children already know...

- how to identify everyday materials including rock (Year 1).
- how to identify and compare everyday materials including rock (Year 2).
- Fossils are not met in Key Stage 1 at all: however, a lot of children will already have an interest in, and may know quite a lot about, fossils.

**Scientific Vocabulary: Rocks, Soils and Fossils**

- **fossil**: the prehistoric remains of a plant or animal
- **humus**: part of soil made from dead plants and animals – gives soil a dark colour
- **igneous**: rock formed from magma
- **impermeable**: does not allow water to pass through
- **magma**: hot liquid rock
- **metamorphic**: rock that has been changed by heat or pressure
- **mineral**: a natural substance that makes up rock
- **permeable**: allows water to pass through
- **rock**: made from one or more minerals
- **sedimentary**: small bits of rock
- **sediment**: rock made from sediment
- **soil**: small particles of rock mixed with decayed plant and animal material

**Key words**: Names of some rocks: granite / marble / sand / clay / limestone
Many schools do not have a collection of the same kind of rocks so it can be difficult to teach children the geological properties. A great way to do this is to use a collection of sweets, which, if stored in small plastic containers, can be kept and used another year. The sweets should show properties found in rocks, e.g. crystals, hard, soft, layers, holes, crumbly. Include in the sweet mix: sweets covered in sugar, Polo Mints, boiled sweets in transparent wrappers, lips, shrimps, laces, flumps / marshmallows, Love Hearts, liquorice allsorts and mint imperials.

GET STARTED

Many schools do not have a collection of the same kind of rocks so it can be difficult to teach children the geological properties. A great way to do this is to use a collection of sweets, which, if stored in small plastic containers, can be kept and used another year. The sweets should show properties found in rocks, e.g. crystals, hard, soft, layers, holes, crumbly. Include in the sweet mix: sweets covered in sugar, Polo Mints, boiled sweets in transparent wrappers, lips, shrimps, laces, flumps / marshmallows, Love Hearts, liquorice allsorts and mint imperials.

LET’S THINK LIKE SCIENTISTS

Use these questions to develop research skills and speaking and listening:
- What do all rocks share and how do we distinguish between them?
- Can rocks be recycled?
- Is a rock always a rock?
- Why are rocks important to us?

ACTIVITIES

In these activities, the term rock is used rather than mineral. A rock is usually composed of a number of different minerals.

1. SORTING ROCKS

L.O. Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.
- Give each pair a set of ‘Sweetie Rocks’ and explain that they are going to use them to learn about the properties of rocks, what rocks are like. Remind children that they are going to work like scientists and therefore should not eat the rocks for Health and Safety reasons.
- Ask the children to find out as much as possible by sorting (classifying) their ‘Sweetie Rocks’ into as many different groups as possible, every time they have sorted them, e.g. hard, soft. Tell them to write their classification down and then begin a new sort. Give children a target, e.g. beat ten sorts, and when a group gets to ten stop everyone and share the language that they have used, which might include, shape, size, colour, texture, writing on it, squash, stretch, melt, bounce.
- This initial sort is useful to find out the language that the children remember and use from Year 2 and how comfortable children are carrying out independent sorting activities.

YOU WILL NEED
- A collection of different sweets that can be used to represent different types of rock (see Get started)
- Hand lenses / magnifying glasses
- Bowls or pots for sorting ‘Sweetie Rocks’

ASSESSMENT
- Em. Children sort their ‘Sweetie Rocks’ into a limited number of categories, e.g. colour.
- Exp. Children sort their ‘Sweetie Rocks’ into a wide range of groups according to obvious characteristics.
- Exc. Children group according to scientific properties, e.g. melt, dissolve, crystals.
HOW ARE ROCKS MADE?

GET STARTED

The activities in this section model how rocks are formed and are extensions to the statutory curriculum requirements. Start by explaining to children they are going to watch a video clip showing how different rocks are formed and, when it has finished, in their groups they are going to talk about what they learned under the headings sedimentary, igneous and metamorphic. For some children this helps to both make it interesting but also more accessible.

Tell children some geologists like to explain how rocks are formed using food and that they are going to try out this idea to see it helps them understand about rocks. Use PowerPoint Slide 7 to start a discussion to find out how children think rocks are made.

ACTIVITIES

1 SEDIMENTARY SANDWICHES

L.O. Compare and group together different kinds of rocks on the basis of appearance and simple physical properties.

- Sedimentary rocks are laid down in layers; often rocks that have been worn away by the sea or rivers to create sand, shells and the remains of tiny animals as well as plants. An easy way to illustrate this is for children to make a sedimentary sandwich. Show children a sedimentary sandwich you have made and explain what each part represents:
  - White bread = sand
  - Chocolate spread = bones of animals
  - Brown bread = dust
  - Lettuce = plants
  - Granary bread = mud with stones and rocks

Over time as more and more layers are created the bottom layers get squashed and become rock. Show this by placing a plate on top of the sandwich and exerting pressure.

You can also show how the layers can be changed if they are squashed (pressure applied) from below, the sides or in the centre. Show how this works by gently pressing down and upwards on the middle of the sandwich and pushing gently from the sides.

This model is used to help children to visualise how this happens. It is hard for young children to understand that this happens on a massive scale and over incredibly long periods of time.

Now let children make their own sandwiches. They could create a short video to explain what they are doing or take and annotate a photograph.

Give children sedimentary rocks to handle and compare so that they are given the opportunity to link the model with rocks.

Use PowerPoint Slide 12 to show children an example of a sedimentary rock.

YOU WILL NEED

- PowerPoint Slides 7 and 12
- Ingredients for a sandwich, e.g. different types of bread, chocolate spread, lettuce or other ingredients
- Plate

ASSESSMENT

- Em. Children with support make a sedimentary sandwich and describe what they did.
- Exp. Children are able to state that their sedimentary sandwich shows how rocks are made.
- Exc. Children apply what they know and decide on the composition of their rock (as opposed to a ‘sandwich’).
2 CHOCOLATE METAMORPHIC ROCKS

L.O. Compare and group together different kinds of rocks on the basis of appearance and simple physical properties.

- In this activity, the children use chocolate firstly to model sedimentary rocks, then to model how metamorphic rocks are made. This is a safe activity for children; the water does not have to be boiling, just very hot but not scalding.
- Use small foil cake tins and scrape pieces of milk and white chocolate with a knife so that they form three or four layers (milk, white, milk, white). Use some cling film to press the layers firmly together so the chocolate joins together.
- Children try this part to see how the different layers form a sedimentary rock when pressed together. Ask children to compare this with the sedimentary sandwich: how is it the same?
- Show the children how to place a piece of their sedimentary rock into a piece of cling film and make sure that it is sealed so it does not leak. Use your hands show how to massage the rock and how it changes because of the pressure and heat from your hands. Try not to melt the rock completely, roughly keep its shape.
- Leave it to cool and explain that heat and pressure (force) can change rocks. These are called metamorphic rocks, e.g. slate and marble.
- Show children PowerPoint Slide 13, which shows a metamorphic rock.

YOU WILL NEED
- PowerPoint Slide 13
- Milk chocolate
- White chocolate
- Foil tins
- Cling film

ASSESSMENT
- Em. Children with support make their metamorphic rock and describe what they did.
- Exp. Children are able to say that heating and squashing the sedimentary chocolate rock shows how metamorphic rocks are made.
- Exc. Children apply what they know and use scientific/geological language to describe how to make a metamorphic rock.

3 CHOCOLATE IGNEOUS ROCKS

L.O. Compare and group together different kinds of rocks on the basis of appearance and simple physical properties.

- In this activity, you model how to use chocolate chips to make igneous rocks. Use hot but not scalding water so that the children can try out this activity for themselves.
- Place some white and milk/dark chocolate chips in a transparent plastic bowl so that the children can see what is happening. Point out that the individual pieces (chocolate chips), are just like the rock in the ground. Place the bowl in a larger bowl of very warm water, explain that this is like rocks being melted by the high heat at the centre of the Earth: the Earth’s core.
- Mix well until all signs of individual chips are gone and the colours are completely blended. Show the children the bowl again so they see the individual chips are no longer visible and the minerals (rocks) they started with have melted. This is similar to the liquid rock, called magma, in the Earth’s core.
- Pour the melted rock (chocolate) onto a tray and explain that this is molten rock coming from the inside of the Earth. When it gets to the Earth’s surface (the tray) the molten rock solidifies (harden) and forms a new rock, which is called igneous rock. Pumice, obsidian, basalt are all examples.
- Children use Activity Resource 1.2 to reinforce their knowledge about rocks.
- Show children PowerPoint Slide 11 on igneous rocks.

YOU WILL NEED
- PowerPoint Slide 11
- White and dark chocolate chips
- Bowl
- Tray
- Warm water
- Activity Resource 1.2

ASSESSMENT
- Em. Children with support make their igneous rock and describe what they did.
- Exp. Children are able to say that heating the chocolate rock and then cooling it shows how igneous rocks are made.
- Exc. Children apply what they know and use scientific/geological language to describe how to make igneous rock.
Topic 1
Out of This World

SUMMARY:
In this topic, children learn about space. Starting with the Solar System, they look at how ideas about space have changed over time before finally exploring what causes us to experience night and day on Earth.

Units:
1.1: The Solar System
1.2: Meet the scientists
1.3: Night and day

ACTIVITY RESOURCES:
- 1.1: What’s in our Solar System?
- 1.2: Let’s make a Solar System
- 1.3: Galileo, Galileo!
- 1.4: Universe address cards
- 1.5: Night and day card clock
- 1.6: Solar System data

ONLINE RESOURCES:
- PowerPoint presentation
- Interactive activity: The Solar System
- CPD video:
- Pupil video: (access on My Rising Stars) ‘Out of this World’

Learning objectives
This topic offers the following cross-curricular opportunities:
- Describe the movement of the Earth and other planets relative to the Sun in the Solar System.
- Describe the movement of the Moon relative to the Earth.
- Describe the Sun, Earth and Moon as approximately spherical bodies.
- Use the idea of the Earth’s rotation to explain day and night and the apparent movement of the Sun across the sky.

Working scientifically skills
This topic develops the following working scientifically skills:
- Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
- Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- Use test results to make predictions to set up further comparative and fair tests.
- Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
- Identify scientific evidence that has been used to support or refute ideas or arguments.

CROSS CURRICULAR LINKS

English
- Create mnemonics for planets in our Solar System.
- Ask questions about space and answer them.
- Write instructions to make a model of day and night.
- Use headings and subheadings to organise text – create fact files on planets.
- Research and represent information on planets.
- Write poetry linked to the Solar System.
- Research information about living on the International Space Station.

Mathematics
- Create an excel spreadsheet of planetary data.
- Big numbers – calculate distances between planets, day lengths etc.
- Big numbers – what is a billion?
- Use precise measurements when making a card clock, i.e. angles.
ICT / Computing
- Research the internet for information about planets.
- Use search engines to find out information about the Solar System and present it to classmates.
- Log onto Astronomy Picture of the Day (see Useful Websites on My Rising Stars).
- Access interactive space puzzles.
- Create a PowerPoint presentation, e.g., International Space Station, Pluto.

History
- Research the history of space exploration.
- Create a timeline of the history of space exploration.
- Research how ideas have changed, e.g., prior to Galileo, Newton.
- Research the dates when the planets were each discovered and find out who discovered them if possible.
- Create a class timeline of events or a discoveries fact file for others to use as a reference.

Geography
- Locate space centres around the world.
- Create a map of day and night across the world.
- Use a map of the Moon.
- Mapping the stars – locating stars and constellations.
- Plotting the orbit around the Earth and locating the International Space Station.

P.E.
- Exercise and nutrition for astronauts.
- Design a fitness routine for astronauts on the International Space Station.
- Implications of Zero Gravity in space – movement.

Music
- Children create their own space music.
- Children listen to Nasa Sounds from Saturn (see Useful Websites on My Rising Stars).
- Children write their own space songs / rap.
- Children listen to a range of space themed songs and music
  - Elton John – ‘Rocket Man’
  - David Bowie – ‘Space Oddity’
  - Gustav Holst – ‘The Planets’ suite

Design Technology
- Build a model of the Solar System.
- Design a planet.
- Design and make a rover for Mars or a lunar vehicle.

MFL
- Learn a language for working on the International Space Station – naming things, e.g., in French.

Art
- Papier-mâché planets.
- Use different media to paint planets, e.g., oils, pastels, watercolours based on NASA’s Astronomy picture of the day.
- Collages of planets using different materials.
- Hot colour collages.

P.S.H.E.
- Recognise how scientific discoveries affect how people think, create, behave and live.

STEAM (SCIENCE TECHNOLOGY ENGINEERING ART AND MATHS) OPPORTUNITIES

 Invite into class
Someone from the local community who remembers watching the first Moon Landing in 1969 – children interview the person.
- Astronomer from a local university or amateur astronomy group.
- Book inflatable planetarium into school.
- ESERO-UK network of space ambassadors.
- Artists to create a range of art work linked to the planets.
- Local Astronomers / STEM ambassador to run a night sky family evening.

Visit
- Local planetarium
- National Space Centre, Leicester
- Science museums, e.g., London, Manchester
Our Solar System has a large star, the Sun, at its centre, and eight planets and their moons that orbit the Sun. All planets have almost circular orbits that lie within an almost flat disc called the ‘ecliptic plane.’ The vast majority of the Solar System’s mass is in the Sun, with most of the remaining mass contained in Jupiter.

The planets in order of their distance away from the Sun are:

Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

The four smaller inner planets, Mercury, Venus, Earth and Mars, are mainly composed of rock.

The four outer planets, called the ‘gas giants’, are substantially more massive. The two largest, Jupiter and Saturn, are composed mainly of hydrogen and helium. The two outermost planets, Uranus and Neptune, are composed largely of substances with relatively high melting points (compared with hydrogen and helium), called ‘ices’. These include water, ammonia and methane. Uranus and Jupiter are often referred to separately as ‘ice giants’.

The Solar System also contains many other objects such as the Asteroid Belt. This sits between the orbits of the planets Jupiter and Mars. It is made up of thousands of objects too small to be considered planets. Some are no larger than a grain of dust, whilst others, like Eros, can be more than 160 km across. A few, like Ida, even have their own moons. Some large objects, like Pluto, are now classified as dwarf planets.

Discovering the Solar System

The model of the Solar System has been refined over many centuries.

Aristotle (384 BC–322 BC) proposed the geocentric model, with Earth at the centre of the Universe. The five known planets (Mercury, Venus, Mars, Jupiter and Saturn), the Moon, the Sun and the stars moved around Earth in perfect spheres.

Ptolemy (c. 90–168 AD) refined the geocentric theory. Ptolemy said they did not travel in exact spheres but moved around the spheres on elliptic orbits, turning around on themselves.

Alhazan (965–1038 AD) first used maths to describe the motions of the planets.

Nicolaus Copernicus (1473–1543) made accurate observations of the Moon and the planets. He used maths to show that their movements could be explained much better if he put the Sun at the centre of the Solar System. Johannes Kepler (1571–1630) used maths to show that the orbit of a planet is an ellipse with the Sun at its focus and that it moves faster when it is closer to the Sun than when further away.

Galileo (1564–1642) championed the heliocentric model and used telescopes to show that Jupiter had moons. A devout Roman Catholic, Galileo came into conflict with the church by challenging its doctrines. Hence the biggest argument in history.

In medieval times and before it was commonly accepted that Earth was flat. Nowadays, we have photographic and other evidence to show that, like other planets and the Moon, Earth is spherical in shape.

Earth and the Moon both move. Earth orbits the Sun once every 365¼ days and spins on its axis once a day. Although when you look up into the sky the Sun seems to move around the Earth, this is an illusion: in fact, the Earth spins and causes night and day. The part of the Earth that faces the Sun is in daylight, and the part that is not facing the Sun is in darkness.

Before modern calendars, people used to keep track of the days by watching the phases of the Moon. One full cycle of the Moon’s phases is approximately 28 days, which is very close to the amount of time we now know as one month. Its regular movement around Earth, as seen by its phases, gives rise to a ‘month of time’.
### CHILDREN’S MISCONCEPTIONS

**Children might think...**
- that there is only one Solar System – there are lots.
- that the Earth is at the centre of our Solar System.
- that there are stars in our Solar System other than the Sun. In fact, the Sun is the only star.
- that all planets have rocky surfaces. Some do but the outer planets are gas giants.
- that planets can’t be seen without a telescope. In fact, you can see Mercury, Venus, Mars, Jupiter and Saturn without a telescope.
- the Sun moves around the Earth and causes day and night (the spinning Earth causes it).
- we do not always see the same side of the Moon. We do! The Moon revolves on its axis as it orbits the Earth so that the same side of the Moon always faces the Earth.
- night-time is caused because the Sun goes to the back of the Earth. In fact, it is the Earth that moves.

**Children already know...**
- Earth and space are not covered in Key Stage 1 or lower Key Stage 2 at all. However, the children will be aware of our Sun and be familiar with the names of some of the planets.
- The study of light and shadows in Year 3 introduces children to Sun’s apparent movement across the sky.

### SCIENTIFIC VOCABULARY

**daytime:** the time when part of the Earth is in daylight

**heliocentric (Sun-centred):** is the belief that the Sun is at the centre of the Solar System

**night-time:** the time when part of the Earth is in darkness

**orbit:** the path of a planet or moon around another celestial object

**planet:** a celestial body that orbits a star, is round and has cleared smaller objects away from its orbit

**Solar System:** a series of planets that orbit a star

**star:** an astronomical body that produces its own energy

**Sun:** the star at the centre of our Solar System

**time zone:** a geographical region where the same time is set
GET STARTED
Ask children to write their own address (keep some records with you, some children might need help) then tell them that they have only managed to write part of it, and that they need to write their address in the Universe. Let children share ideas about what their address might be and then give them the Universe Address cards (Activity Resource 1.4) to see if they can work out the correct order. Do let them search for parts of the address that they do not know to help them.
You could give children a postcard with a stamp on it and get them to write it to themselves and address it using the Universe postal address, post it and see how long it takes to arrive home.

LET’S THINK LIKE SCIENTISTS
Use these questions to develop research skills and speaking and listening:
- How big are the planets?
- How far away from us are they?
- What do they look like?
- How many planets are there?

ACTIVITIES

1 THE SOLAR SYSTEM

L.O. Describe the movement of the Earth and other planets relative to the Sun in the Solar System.

- Ask children to discuss in their groups the planets in our Solar System and see how many of them they know and also what they know about them. They could record their ideas on a large sheet of paper, each person adding what they know in a different colour pen and then writing their name in the same colour. This helps the teacher to be able to assess who has contributed what.
- Then you might choose to show them a video clip of ‘The Solar System Song’ (see Useful Websites list) and they could use it to check their initial ideas.
- Use the fact cards about the Solar System. There are 20 in all, so it is useful to double these up for a whole class. Everyone is given at least one or two cards (Activity Resource 1.1) and they have to read and memorise what is on the card. As soon as they have done that they swap their card with someone else and learn a new fact. After around 5–8 minutes each child will have learned a number of facts, so collect the cards in and then tell children to go back to their groups and working together add as many new facts as they can remember to their original sheet of paper. Explain to children that they should help each other remember facts and try to write as many new ones down as possible.
- Consolidate this by having a quick-fire question session asking a range of questions which demand that children think about the information they have learned, e.g.
  - Has anyone ever visited the Moon?
  - Which planet has a huge wind storm?
  - What is at the centre of the Solar System?
  - Which planet has terrible weather?

YOU WILL NEED
- Video clip – ‘The Solar System Song’
- Activity Resource 1.1
- Interactive activity: The Solar System (see My Rising Stars)
- PowerPoint slides for this topic (see My Rising Stars)
Either as a whole class or individually, children could access the interactive activity The Solar System (My Rising Stars) to consolidate knowledge about the Solar System. Finally, tell the children that they need to learn the names of the planets in order from the Sun. Use PowerPoint slide 4. An easy way of doing this is to create a mnemonic, using PowerPoint slide 6. Introduce children to a mnemonic which will help them remember the names of the planets, such as My Violent Evil Monster Just Scared Us Nuts. Ask them to produce one of their own. Share these as a class. Children can come up with some wacky sentences!

They could record their mnemonic using the approach on PowerPoint Slide 7, alongside key facts about each planet. They could also carry out extra research or watch a video clip (see Useful Websites on My Rising Stars).

**Assessment**

- Em. Children can name some of the planets in the Solar System.
- Exp. Children are able to name and describe planets in the Solar System.
- Exc. Children have extended their research beyond the classroom and are able to talk about similarities and differences between planets in the Solar System.

### 2 Modelling the Solar System

**L.O. Describe the movement of the Earth and other planets relative to the Sun in the Solar System.**

- Use PowerPoint slide 5 and ask the children which planet is the odd one out, using visual clues (or personal knowledge) from the photographs.

- In this activity children will model the Solar System. Explain to children that scientists often use models to help people understand an idea, especially one that cannot be seen easily. This model uses fruit to represent the planets. PowerPoint Slide 8 and Activity Resource 1.2 give examples of fruit used to represent each planet and the distance of each planet from the Sun. Tell the children that the distance has been scaled down so that the Solar System can fit into the school grounds and help children understand how far each planet is away from the Sun and each other.

- Children will need to be in groups of at least ten; eight planets, the Sun and someone to organise them. Tell children they are going to make a simple model of the Solar System in the playground. The idea here is to organise the planets the correct distance from the Sun so that they are roughly in proportion to those in real life. The person who is organising could take a video clip or photograph of the final fruit Solar System so that, back in class, the group could create a voice over or print out the photograph to put in their book. Ask children to:
  - explain what a scientific model of the Universe is.
  - describe how using this model helped them learn the Solar System.
  - describe what they now know about the positions of the different planets in comparison to each other and the Sun.

Make sure that children check their grammar and spelling and that their sentences not only make sense but use scientific knowledge.

**You Will Need**

- Fruit to represent the Sun and eight planets
- Activity Resource 1.2
- PowerPoint slides for this topic (see My Rising Stars)

**Assessment**

- Em. Children participate in the activity; they find it difficult to understand the idea of a model and scale.
- Exp. Children can say why they are using fruit and can write about the distances of planes in the Solar System.
- Exc. Children use the word model with confidence, make comparisons about size of planets and distances relative to each other and the Sun.
3 WHAT IS AT THE CENTRE OF THE SOLAR SYSTEM?

L.O. Describe the movement of the Earth, and other planets, relative to the Sun in the Solar System.

Describe the Sun, Earth and Moon as approximately spherical bodies.

- Ask children to write down the mnemonic for remembering the planets and ask them to add the Sun as part of the mnemonic and decide where it should be.

- Use either an orrery if you have one, or show children the video clip (see Useful Websites list) that illustrates how the planets move around the Sun. In this activity children should learn a number of scientific words such as orbit and heliocentric (which means the Sun at the centre). Children watch the video again, this time focusing on the speed that different planets orbit the Sun. Ask:
  - What shape is the Earth and other planets? (Use PowerPoint slide 9 if children are unsure of the answer)
  - Do all planets orbit at the same speed?
  - Which planet orbits the fastest / slowest?
  - Which planets look as if they are hardly moving at all?

- Give children the data on Activity Resource 1.6 that has information on the orbit and day length of the planets. They should complete this activity, which demands that they use data to answer questions and also look for patterns in the data.

- Organise children into the same groups as the previous activity (Modelling the Solar System) and, using an area of the playground, each child models being the planet they were, but this time, rotates and moves around the Sun (a child) whilst the other planets also move. This is quite complex, so children will need time to organise themselves. They could create concentric circles (orbit paths), about 1m apart and travel on their orbit at the appropriate speeds.

- The child organising their group could take a video or photograph for the children to use back in the classroom, for example, to create a voice over or print out photographs so that each child can identify which planet they were and explain their movement around the Sun, using words such as ‘heliocentric’ and ‘orbit’.

**YOU WILL NEED**

- Activity Resource 1.6
- Solar System model from Activity 2
- Video or camera equipment

**ASSESSMENT**

- Em. Children need support to carry out their part of the model.
- Exp. Children know that the model shows how planets orbit the Sun at different speeds and spin on their axis differently. They can also say that planets are spheres.
- Exc. Children are able to explain similarities and differences between the movement of different planets.
BECOME AN EXPERT – RESEARCH A PLANET

L.O. Describe the movement of the Earth and other planets relative to the Sun in the Solar System.

Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations

- This is an activity that children can carry out across this topic, gradually building up their understanding of the Solar System.
- Give children time to write down the names of the planets in our Solar System using the mnemonic for remembering their names and ask them to think about which two planets they would like to research and why. If this is a group activity, the group could vote on the planets to study.
- The reason why children research two planets is to develop their ability to compare and contrast the similarities and differences between planets and understand the nature of planets in the Solar System. Make sure that across the class all the planets in the Solar System are being researched, including the Earth, Sun and Moon.
- There are a number of ways that this can be organised, e.g.
  - an individual research project;
  - pairs working together;
  - a small group researching the same planet and organising jobs and sharing information.
- Linking with and using Literacy skills is important to the quality of children’s research and how this supports the development of their understanding of the Solar System. Children need to retrieve, record and present information from non-fiction sources, e.g. books, internet, video clips, posters. They should be able to explain and discuss their understanding of what they have read, not copy verbatim. They should decide the best way to communicate to an audience, for example, booklet, newspaper article, science blog, PowerPoint, video interview, using notes from their research.
- To scaffold children in managing to research without copying verbatim, use the Question Stem approach, where children use the stems to ask a range of questions which then become the focus of their reading. So, if a group of children are researching Venus, use of the questions stems should result in a wider range of information, e.g.
  - Which way does Venus rotate?
  - Who discovered Venus?
  - What is the atmosphere of Venus like?
  - How does Venus go around the Sun?
  - Where is Venus in the Solar System?
  - Can Venus be seen at night?
- Children should then use their notes to communicate what they have learned, this could be as part of a whole class working wall, a ‘Big Book’ on the Solar System, a set of ‘Fact File Top Trumps’ cards, PowerPoint presentation, a Planet Blog on the school website or perhaps through a ‘Hot Seating’ activity.

YOU WILL NEED
- Books, websites etc. to research planets
- Materials to record and communicate findings, e.g. fact cards, big book

ASSESSMENT
- Em. Children are able to use a model or watch a video and talk about how the planets move around the Sun.
- Exp. Children research information and communicate it using an appropriate way of presenting information.
- Exc. Children are able to present information that explores the similarities and differences between their two planets, applying their knowledge of key features, e.g. day/night, atmosphere, moons, orbit and year.
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