

Scheme of Work

Cambridge Primary

Science 0097

Stage 1

This Cambridge Scheme of Work is for use with the Cambridge Primary Science Curriculum Framework published in September 2020 for first teaching in September 2021.

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# Contents

[Contents 3](#_Toc536706940)

[Introduction 4](#_Toc536706941)

[Unit 1.1 My body, your body, everybody! 9](#_Toc536706942)

[Unit 1.2 What is it made of? 16](#_Toc536706944)

[Unit 1.3 Growing strong 24](#_Toc536706946)

[Unit 1.4 The science of my toys 30](#_Toc536706948)

[Unit 1.5 Staying alive 36](#_Toc536706950)

[Unit 1.6 Journey to the International Space Station 41](#_Toc536706952)

[Sample Lesson 1 48](#_Toc536706954)

[Sample Lesson 2 50](#_Toc536706955)

# Introduction

This document is a scheme of work created by Cambridge Assessment International Education for Cambridge Primary Science Stage 1.

It contains:

* suggested units showing how the learning objectives in the curriculum framework can be grouped and ordered
* at least one suggested teaching activity for each learning objective
* a list of subject-specific vocabulary and language that will be useful for your learners
* some possible misconceptions learners may have, or develop
* sample lesson plans.

You do not need to use the ideas in this scheme of work to teach Cambridge Primary Science Stage 1. This scheme of work is designed to indicate the types of activities you might use, and the intended depth and breadth of each learning objective. These activities are not designed to fill all of the teaching time for this stage. You should use other activities with a similar level of difficulty, including those from endorsed resources.

The accompanying teacher guide for Cambridge Primary Science will support you to plan and deliver lessons using effective teaching and learning approaches. You can use this scheme of work as a starting point for your planning, adapting it to suit the requirements of your school and needs of your learners.

## Long-term plan

This long-term plan shows the units in this scheme of work and a suggestion of how long to spend teaching each one. The suggested teaching time is based on 45 total hours of teaching for Science Stage 1 at 1.5 hours a week. The actual number of teaching hours may vary according to your context.

| Unit | Suggested teaching time |
| --- | --- |
| **Unit 1.1** My body, your body, everybody! | 19% (8.5 hours) |
| **Unit 1.2** What is it made of? | 17% (7.5 hours) |
| **Unit 1.3** Plants | 17% (7.5 hours) |
| **Unit 1.4** The science of my toys | 17% (7.5 hours) |
| **Unit 1.5** Staying alive | 13% (6.5 hours) |
| **Unit 1.6** Journey to the International Space Station | 17% (7.5 hours) |
| **Total** | **45 hours** |

## Sample lesson plans

You will find two sample lesson plans at the end of this scheme of work. They are designed to illustrate how the suggested activities in this document can be turned into lessons. They are written in more detail than you would use for your own lesson plans. The Cambridge Primary Science Teacher Guide has information on creating lesson plans.

## Other support for teaching Cambridge Primary Science Stage 1

Cambridge Primary centres receive access to a range of resources when they register. The Cambridge Primary support site at [**https://primary.cambridgeinternational.org**](https://primary.cambridgeinternational.org) is a password-protected website that is the source of the majority of Cambridge-produced resources for the programme. Ask the Cambridge Coordinator or Exams Officer in your school if you do not already have a log-in for this support site.

Included on this support site are:

* the Cambridge Primary Science Curriculum Framework, which contains the learning objectives that provide a structure for your teaching and learning
* grids showing the progression of learning objectives across stages
* the Cambridge Primary Science Teacher Guide, which will help you to implement Cambridge Primary Science in your school
* templates for planning
* worksheets for short teacher training activities that link to the teacher guide
* assessments provided by Cambridge
* a list of endorsed resources, which have been through a detailed quality assurance process to make sure they are suitable for schools teaching Cambridge Primary Science worldwide
* links to online communities of Cambridge Primary teachers.

## Resources for the activities in this scheme of work

We have assumed that you will have access to these resources:

* paper, graph paper, pens, pencils, rulers and calculators for learners to use
* clean water
* the internet.

Other suggested resources for individual units and/or activities are described in the rest of this document. You can swap these for other resources that are available in your school.

Activities that require a resource that may be more difficult to find are marked ‘Requires additional resources*’*, with a suggested alternative activity immediately below.

The Cambridge Primary Science Equipment List provides a list of recommended scientific equipment that your school should have access to in order to teach all stages of Cambridge Primary Science. It is available on the support site.

## Websites

There are many excellent online resources suitable for teaching Cambridge Primary Science. Since these are updated frequently, and many are only available in some countries, we recommend that you and your colleagues identify and share resources that you have found to be effective for your learners.

## Approaches to teaching Cambridge Primary Science Stage 1

There are three components to the Cambridge Primary and Lower Secondary Science curriculum:

* four content strands (Biology, Chemistry, Physics, and Earth and Space)
* one skills strand (Thinking and Working Scientifically)
* one context strand (Science in Context).

When planning lessons, the three components should work together to enable you to provide deep, and rich, learning experiences for your learners.

We recommend you start your planning with a learning objective from one of the four content strands. This determine the focus of the lesson. Once there is a content learning objective lesson focus you can consider what Thinking and Working Scientifically learning objectives can be integrated into your teaching so learners are developing their scientific skills alongside their knowledge and understanding of science.

This approach is exemplified in this scheme of work by providing activities that cover the content learning objectives while also developing selected Thinking and Working Scientifically learning objectives. Some Thinking and Working Scientifically learning objectives are covered multiple times over the scheme of work which reflects the need for learners to have several opportunities to develop skills.

The selection, and frequency, of Thinking and Working Scientifically learning objectives in this scheme of work may match the needs of your learners. However, the selection of Thinking and Working Scientifically learning objectives needs suit the requirements of your school and needs of your learners. Any changes to what Thinking and Working Scientifically learning objectives are selected to be developed when teaching the content learning objectives will require activities to be reviewed and edited.

Once you are confident with the combination of content and Thinking and Working Scientifically learning objectives, you then have the option to integrate context into your lessons to show how the learning objectives and/or skills relate to the world the learners know and experience. The Science in Context learning objectives provide guidance on doing this. As including context is dependent on your learners and your context, the scheme of work does not give contextual links to an activity. Possible ways to contextualise units are provided in the unit introductions, aligned to the relevant Science in Context objectives.

Further support about integrating Thinking and Working Scientifically and Science in Context into lessons can be found in the Cambridge Primary Science Teacher Guide.

Misconceptions

Scientific misconceptions are commonly held beliefs, or preconceived ideas, which are not supported by available scientific evidence. Scientific misconceptions usually arise from a learner’s current understanding of the world. These ideas will informed by their own experiences rather than evidence. To support you in addressing misconceptions, for each learning objective in each unit we have suggested, where relevant, possible misconceptions to be aware of.

Due to the range of misconceptions that learners can hold not all misconceptions have been provided and you may encounter learners with misconceptions not presented in this scheme of work.

Misconceptions may be brought to the lesson by the learners, reinforced in the lesson, or created during a lesson. It is important that you are aware of misconceptions that learners may exhibit so that you can address them appropriately.

It is important to note that not all misconceptions are inappropriate based on the conceptual understanding learners are expected to have at different stages of their education. Therefore, some misconceptions may be validly held by learners at certain stages of their learning. A misconception of this type is known as an age-appropriate concept. Trying to move learners away from age-appropriate concepts too soon may give rise to other, more significant, misconceptions or barriers to their understanding of science. Over time age-appropriate concepts can become misconceptions when they start to interfere with the expected level of understanding learners need to have.

The misconceptions flagged in this scheme of work are considered to be either inappropriate concepts for a learner at this stage of understanding science or important age-appropriate concepts to be aware of so they are not challenged too early.

Health and safety

An essential part of this curriculum is that learners develop skills in scientific enquiry. This includes collecting primary data by experiment. Scientific experiments are engaging and provide opportunities for first-hand exploration of phenomena. However, they must, at all times, be conducted with the utmost respect for safety, specifically:

* It is the responsibility of the teacher in charge to adhere and conform to any national, regional and school regulation in place with respect to safety of scientific experimentation.
* It is the responsibility of the teacher in charge to make a risk assessment of the hazards involved with any particular class or individual when undertaking a scientific experiment that conforms to these regulations.

Cambridge International takes no responsibility for the management of safety for individual published experiments or for the management of safety for the undertaking of practical experiments in any given location. Cambridge International only endorses support material in relation to curriculum content and is not responsible for the safety of activities contained within it. The responsibility for the safety of all activities and experiments remains with the school.

The welfare of living things

Throughout biology, learners study a variety of living things, including animals. As part of the University of Cambridge, Cambridge International shares the approach that good animal welfare and good science work together.

Learners should have opportunities to observe animals in their natural environment. This should be done responsibly and not in a way that could cause distress or harm to the animals or damage to the environment.

If living animals are brought into schools then the teacher must ensure that any national, regional and school regulations are followed regarding animal welfare. In all circumstances, the teacher responsible must ensure all animals have:

* a suitable environment, including being housed with, or apart from, other animals (as required for the species)
* a suitable diet
* the opportunity to exhibit normal behaviour patterns
* protection from pain, injury, suffering and disease.

There is no requirement for learners to participate in, or observe, animal dissections for Cambridge Primary. Although dissection can provide a valuable learning opportunity, some learners decide not to continue studying biology because they dislike animal dissection. Several alternatives are available to dissection (such as models and diagrams) which you should consider during your planning.

If you decide to include animal dissection then animal material should be obtained from premises licensed to sell them for human or pet consumption, or from a reputable biological supplier. This approach helps to ensure animal welfare standards and also decreases the risk from pathogens being present in the material. Neither you nor your learners should kill animals for dissection.

When used, fresh material should be kept at 5 °C or below until just before use. Frozen material should be defrosted slowly (at 5 °C) without direct heat. All fresh or defrosted material should be used within 2 days. Preserved animal materials should only be handled when wearing gloves and in a well-ventilated room.

The responsibility for ensuring the welfare of all animals studied in science remains with the school.

# Unit 1.1 My body, your body, everybody!

| Unit 1.1 My body, your body, everybody! |
| --- |
| Outline of unit: |
| The unit begins with a focus on the whole body and the names for different parts of the body before leading learners to consider the similarities and differences between their own body and those of their peers. Following this, the focus is on the five senses and how these can be used to make sense of the world around us.  This unit also focuses on sound as it links well with learning about the sense of hearing. At this early stage, the terminology ‘sound source’ can be introduced, but it should be clearly linked to the sources of sounds made by familiar objects such as musical instruments.  For each of the investigations about senses we suggest you model, by speaking aloud, the process of identifying the mystery object. This will help young learners to understand exactly what they should be doing and support them in verbalising their own thought processes. |
| Recommended prior knowledge or previous learning required for the unit: |
| Learners will benefit from experience of looking at and describing their own bodies. |
| Suggested examples for teaching Science in Context: |
| ***1SIC.03*** *Know that everyone uses science and identify people who use science professionally.*  Learning about the body provides an opportunity to talk about scientists who use this knowledge in their professions, e.g. doctors and nurses. If your setting has the capacity to set up a hospital (or doctor’s surgery) role-play area then this would give learners the opportunity to apply their new knowledge of the body and their senses to a real-life context and help them to understand how this science applies to their lives. |

| Learning objective | Key vocabulary | Possible misconceptions |
| --- | --- | --- |
| **1Bs.03** Recognise and name the major external parts of the human body. | Head, neck, chest, arms, legs, hips, shoulders, hands, feet, eyes, ears, nose, mouth, body | Learners may have alternative words for parts of the body. It is important they use standard vocabulary within school. |
| **1Bp.04** Describe how humans are similar to and different from each other. | Similar, similarity, same, different, difference, human | Learners may believe that the differences between people mean that they are not all human. It is worth discussing the broad features that make us human whilst recognising some differences also exist. |
| **1Bs.02** Identify the senses (limited to sight, hearing, taste, smell and touch) and what they detect, linking each to the correct body part. | Sense, sight, hearing, taste, touch, feel, smell, eye, nose, mouth, ears, body, skin, detect | Learners may assume that only our hands are able to use the sense of touch rather than correctly understanding it is the skin. This can be explored through touching skin on the head and arms.  There is a common misconception that, in order to see, our eyes send out ‘rays’ rather than light entering them. Learners could look inside a dark box in a dark room and then look again with a torch to understand that their eyes are not a light source. |
| **1Ps.01** Identify different sources of sound. | Listen, hearing, ears, sound, source, noise, loud, quiet | Learners may only relate sound sources to concrete examples such as musical instruments and objects hitting each other. This is acceptable for learners of this age. |
| **1Ps.02** Explore that as sound travels from a source it becomes quieter. | Listen, hearing, ears, sound, source, noise, loud, louder, faint, fainter, near, far, quieter | Learners may not think that sound travels as they are often so close to the source the speed of sound cannot be noticed This can be resolved through watching videos of thunderstorms and discussing the delay between seeing lightning and hearing thunder. |

# Unit 1.1 Suggested activities

| Learning objective | Thinking and Working Scientifically opportunities | Suggested teaching activities and resources |
| --- | --- | --- |
| **1Bs.03** Recognise and name the major external parts of the human body. | **1TWSc.05** Collect and record observations and/or measurements by annotating images and completing simple tables. | **Naming and labelling body parts**  Lead learners in singing a song about body parts (such as ‘Heads, shoulders, knees and toes’). As learners become more confident in singing the song, miss words out and see if they can include the missing body part as they sing.  Look at an image of a person and identify the parts of the body from the song. Talk about other parts of the body so learners know the following; head, chest, arms, legs, hips, shoulders, eyes, nose, mouth, ears, hand, feet, knees, elbows. Identify and name them together as a class.  Model drawing around a learner either on large paper or with chalk on the ground outside. Label some of the external body parts by matching image and word cards onto the drawing. Learners then work in small groups to do the same; they label as many body parts as they can. You can give blank word cards to learners who are able to write to complete by themselves.  During the activity ask questions such as:  *Where is their chest?*  *Can you find their arm?*  **Resources:** Image of a person**,** chalk or coloured pencils or pens, large paper, body part image and word cards. |
| **1Bp.04** Describe how humans are similar to and different from each other. | **1TWSc.05** Collect and record observations and/or measurements by annotating images and completing simple tables. | **Describing similarities and differences of humans**  Review each part of the body by asking learners to point to a body part when you say it. For example, you say ‘leg’ and learners point to a leg (it does not have to be their own).  Discuss with learners what body parts we all have in common.  *Do we all have shoulders?*  *Do we all have arms?*  Identify these as similarities.  Ask the learners:  A*re we all the same?*  Learners can discuss if they agree or disagree and decide why, before sharing their thoughts with the whole class. When learners say we are not all the same, identify the differences.  *Are there other differences between us?*  Explain that some of the largest differences are in our faces.  Give learners mirrors and ask them to look closely at their face. Lead learners in a discussion of what they can see and encourage them to compare their own faces with those of their peers.  *What have you observed?*  *How are you similar or different to the person next to you?*  *What facial parts do we all have in common?*  Ask learners to look at the finer details of their face such as the shape of their eyebrows or ears and the texture of their hair. Learners then draw portrait outlines to record key information about their own face and head. You could ask them to record information on hair colour, length or texture; eye colour or whether they have any freckles or moles.  Be aware of the differences in learners’ appearances and possible disabilities in your class and be prepared to address these in a sensitive manner. Some learners may be colour blind and have difficulty distinguishing similar colours.  **Resources**: Small mirrors made of a material safe for handling by learners of this age. |
| **1Bs.02** Identify the senses (limited to sight, hearing, taste, smell and touch) and what they detect, linking each to the correct body part. | **1TWSp.01** Ask questions about the world around us and talk about how to find answers. | **Identifying images using the sense of sight**  This activity focuses on the sense of sight. Show learners a highly-magnified image (or a small part of a larger image) and challenge them to work out what is in the image using only what they can see. Ask learners which body part is linked to the sense of sight (eyes) and explain that we cannot use this sense when our eyes are closed.  Play a game where one learner says the first letter sound of an object that they can see and the others have to guess what the object is by asking simple questions:  *What can you see?*  *If we could not see, what else could we do to identify the object?*  The learner that guesses correctly chooses the next object.  **Resources:** Close-up or magnified images of familiar objects. |
| **1TWSa.01** Describe what happened during an enquiry and if it matched predictions. | **Identifying using sense of smell**  Explain that it is not only our sense of sight that helps us to identify things and to make sense of the world around us. Encourage learners to suggest other senses we have, and focus in on the sense of smell when it is mentioned. Ask learners which body part is linked to the sense of smell (nose).  Ask learners questions as they smell a range of pre-prepared ‘smell pots’:  *What does it smell like?*  *Do you like the smell?*  *Have you smelled that scent anywhere before?*  Learners make predictions of what might be inside the pots based on the evidence they can gather by smelling. Discuss what caused them to make their prediction.  *How did you make your prediction?*  Open the pots and identify the substances discussing if they matched their predictions.  *Were there any surprises?*  Discuss any smells where the prediction was not true and how the prediction was still valid. Highlight how science is about thinking and then finding out, not always trying to get a right answer.  **Resources:** ‘Smell pots’ – opaque cups (or pots) containing familiar, strong-smelling substances such as mint, garlic or orange. To prevent learners from using their sense of sight, cover the pots with paper or opaque fabric and make small holes in the top to allow learners to smell what is inside. |
| **1TWSc.05** Collect and record observations and/or measurements by annotating images and completing simple tables. | **Identifying food by taste**  Ask learners which body part is linked to the sense of taste (mouth and especially tongue). Make it clear that it is just our tongue that tastes, not our whole mouth.  Prepare a ‘taste test challenge’ for learners. Select a range of foods for learners to identify using their sense of taste alone; ask them to close their eyes.  *Is that taste familiar?*  *Does it taste sweet or savoury?*  *Do you like the taste?*  Learners then create a label for each food showing what they think it is.  For health and safety reasons, make sure you are fully aware of any allergies or dietary restrictions of the learners. Some learners may not want to eat something if they do not already know what it is.  **Resources:** Range of foods. To prevent learners from using their other senses, you could use food colouring to change the appearance of foods. |
| **1TWSc.01** Sort and group objects, materials and living things based on observations of the similarities and differences between them. | **Identifying using touch**  Prepare a selection of familiar objects in opaque drawstring bags (or in cardboard boxes with small hand‑sized holes). Ask learners which body part is linked to the sense of touch (skin). Learners then reach into the bags or boxes and try to identify the object using their sense of touch alone.  Remind learners that it is not just our hands that use the sense of touch. Reinforce this by having a selection of objects that feel very different to each other, e.g. a feather, a rough stone, a smooth plastic toy and a hairbrush. Allow learners to look at these objects first, then choose a willing volunteer learner. Ask them to close their eyes, then gently brush their arm with one of the objects and see if they can identify what it was. Discuss the similarities or differences between the objects in order to distinguish them.  *How does it feel?*  *What does it feel like?*  *What clues told you what the object was?*  Learners then repeat this same activity in pairs, grouping objects based on how they feel.  Be aware that some learners will not feel comfortable putting their hand into a bag or box if they do not know what is inside.  **Resources:** Bags or boxes with objects inside that are familiar to learners, familiar objects that have very different textures. |
| **1Ps.01** Identify different sources of sound.  **1Bs.02** Identify the senses (limited to sight, hearing, taste, smell and touch) and what they detect, linking each to the correct body part.  (Note, for the suggested activity the focus is on hearing only) | **1TWSc.05** Collect and record observations and/or measurements by annotating images and completing simple tables. | **Identifying sources of sound**  Ask learners which body part is linked to the sense of sound (ears). Lead learners through a ‘listening minute’, in which they sit in silence with eyes closed for a minute and try to identify the sources of all the sounds they hear.  *What can you hear?*  *Was it a loud or quiet sound?*  *What do you think made that humming or banging sound?*  *What was the source of the sound?*  Discuss how different sounds can have different sources. Discuss with learners that their voices are sounds and identify that the source of this sound comes from their necks and throats.  Ask learners to create a simple table in which to record what they heard and what the source of the sound was. |
| **1Ps.02** Explore that as sound travels from a source it becomes quieter. | **1TWSc.04** Follow instructions safely when doing practical work. | **Identifying that sound becomes fainter the further away from the source you are**  In an open space, such as a hall or outdoor yard, tell learners they will play a game. Some of the learners wear a blindfold and some have a familiar musical instrument. Using their sense of sound alone, the learners wearing a blindfold must find their way by moving closer to the sound of an instrument.  *How did you find your friend?*  *How did the sound change as you moved closer?*  *What other sounds might be good to use for this game?*  Throughout the activity, repeatedly reinforce the correct terminology of ‘sound source’ and highlight how the sound becomes louder the closer you get to the source.  As learners cannot ‘see with their eyes’ that sound becomes fainter as you go further from the source, consider using a visual model to illustrate the phenomenon. Show a video of ripples in water, or drop an object into a tray of water, to demonstrate that ripples in water also get weaker the further they are from where the object is dropped. Sound behaves a bit like that, the further away from the source you are the fainter the sound.  **Resources:** Musical instruments, blindfolds, video of ripples/tray of water and object |

# Unit 1.2 What is it made of?

| Unit 1.2 What is it made of? |
| --- |
| Outline of unit: |
| This unit focuses mainly on chemistry learning objectives, namely those concerning materials and their properties. These learning objectives require learners to build up a strong knowledge of different materials and acquire the ability to apply a broad vocabulary of terms to describe their properties.  This unit also looks at floating and sinking, providing learners with an opportunity to apply their learning about materials and their newly-acquired vocabulary to more than one context.  Learning about materials lends itself well to carrying out scientific enquiry activities so there are many practical activities in this unit. We suggest learners undertake as many of these practical activities as they can to test out their own ideas and experience the scientific enquiry process. |
| Recommended prior knowledge or previous learning required for the unit: |
| Learners will benefit from:   * experience of handling a wide range of everyday materials * knowledge of the names of these materials used in context. |
| Suggested examples for teaching Science in Context: |
| ***1SIC.02*** *Talk about how science explains how objects they use, or know about, work.* A number of the activities in this unit encourage learners to think about why specific materials have been chosen to make certain items. This makes it easy to draw out the science behind everyday objects that they are familiar with but are unlikely to have thought about thought about in such terms before. ***1SIC.03*** *Know that everyone uses science and identify people who use science professionally.*  The principle’s umbrella and caretaker’s sponge activities make it explicit how people use science in their everyday lives, both personally and professionally. There are a great many ways in which these activities could be adapted for different professions and different needs. For example, learners could be asked to investigate the best material for a warm scarf for a clothing designer, or to find the most suitable material for a farmer to package their produce in. |

| Learning objective | Key vocabulary | Possible misconceptions |
| --- | --- | --- |
| **1Cm.01** Identify, name, describe, sort and group common materials, including wood, plastic, metal, glass, rock, paper and fabric. | Material, object, wood, plastic, metal, glass, rock, paper, fabric, hard, soft, rough, smooth, rigid, flexible, shiny, dull, group, sort, same, similar, different, difference | The term ‘material’ is often assumed to refer to fabric only. Ensure the scientific definition of ‘material’ is used when teaching about materials. |
| **1Cm.02** Understand the difference between an object and a material. | Material, object | Learners may not be able to distinguish between an object and what it is made of, particularly if it is a very familiar object. This can be explored by looking at objects composed of more than one material and identifying the different materials they are made of. |
| **1Cp.01** Understand that all materials have a variety of properties. | Material, property, hard, soft, rough, smooth, rigid, flexible, shiny, dull, waterproof, group, sort, same, similar, different, difference | Learners sometimes struggle with the distinction between ‘smooth’ and ‘soft’ as well as ‘rough’ and ‘hard’. This can be explored through hands on activities while reinforcing the appropriate scientific vocabulary. |
| **1Cp.02** Describe common materials in terms of their properties. |
| **1Cc.01** Describe how materials can be changed by physical action, e.g. stretching, compressing, bending and twisting. | Material, push, pull, compress, squash, squeeze, twist, bend, stretch | Learners may be unable to identify which forces are being applied during everyday activities and can confuse whether they are pulling or pushing something to make it move, change shape or direction. Adults in the classroom can develop this understanding through providing practical experiences and appropriate use of language. |
| **1Pf.03** Explore that some objects float and some sink. | Float, sink, push, pull, heavy, light | Learners tend to assume all large objects will sink and all small objects will float. This can be explored through practical experiences. |

# Unit 1.2 Suggested activities

| Learning objective | Thinking and Working Scientifically opportunities | Suggested teaching activities and resources |
| --- | --- | --- |
| **1Cm.01** Identify, name, describe, sort and group common materials, including wood, plastic, metal, glass, rock, paper and fabric. | **1TWSc.01** Sort and group objects, materials and living things based on observations of the similarities and differences between them. | **Sorting materials**  Introduce learners to the term ‘material’; explain that it means ‘what something is made of’. Give a few examples using familiar objects to make this clear, e.g. ‘the table is made of wood, the door handle is made of metal; wood and metal are the materials.’  Show learners a range of different materials to handle and discuss. (If possible, use balls or blocks to help learners focus on the material itself rather than the object.)  *How does it feel?*  *Have you seen this material before?*  Ask learners to find items made of each material and match it to the balls or blocks. These could either be found in the classroom or chosen from a set of pre-selected objects. During this activity, begin using the vocabulary associated with properties of the materials the learners are handling.  *How did you know that was also made of wood?*  *What does it have in common with the other wooden objects?*  *Are all the plastic objects hard?*  Learners can sort and group objects in the classroom based on the materials they are made of.  For health and safety reasons, remind learners that broken glass can be dangerous and to handle any glass objects carefully.  **Resources:** A range of different familiar materials including wood, plastic, metal, glass, rock, paper and fabric. |
| **1Cm.02** Understand the difference between an object and a material. | **1TWSc.05** Collect and record observations and/or measurements by annotating images and completing simple tables. | **Material hunt**  Introduce learners to differentiating between object and material, play a materials version of ‘I Spy’. Begin by saying ‘I spy with my little eye, something made of [material].’ Learners then look around the room and see if they can guess the same item you are thinking of. The learner who guesses correctly then has a turn at choosing an item for others to guess.  Tell learners they will be going on a hunt for special objects. They will need to find objects made of two or more materials and identify each material. For example, a table may be made of both wood and metal. Learners then search their classroom or school for objects made of more than one material; they record their findings by drawing a picture of the objects and labelling the different materials used.  The findings of the learners can then be shared and the difference between an object and a material can be discussed and agreed.  *What is the difference between an object and a material?*  **Resources:** A selection of objects made of more than one material to start a discussion (such as scissors, doors, chairs, clothes pegs, cutlery). |
| **1Cp.01** Understand that all materials have a variety of properties. | **1TWSc.01** Sort and group objects, materials and living things based on observations of the similarities and differences between them. | **Materials dominoes**  Gather a variety of small, familiar, household objects made of different materials, e.g. kitchen utensils, stationery items, small toys. First, give each learner (or pair of learners) an object. As learners share a description of their object with the class, write on the board the scientific vocabulary associated with the properties of materials, e.g. hard, soft, rough, smooth, flexible, transparent, opaque. Each time you write the scientific vocabulary, ask all learners if their object is made of a material that shares this property, and ensure all learners can see the same property demonstrated by different objects.  Then model how to play materials dominoes in which objects must be matched up according to their properties. Start the game by placing down an object and asking learners if they have an object with the same material or the same property. For example, put down a metal fork; learners could match a plastic building brick because it is also shiny, or a wooden spoon because it is also hard. Learners must then find a match for the new item, so a pair of scissors could be matched to the building block because they are also made of plastic. Play continues until all items are used up.  After the demonstration, learners then play the game together in small groups. As they play, discuss their decisions with them and make sure they are clearly justifying their choices rather than just putting objects down.  *Can you explain why you have chosen that object?*  *What does this material have in common with that one?*  *Do you have any other objects that could have been put down there?*  Make sure to praise the correct use of scientific vocabulary and highlight this to all learners when it is done well.  **Resources:** A range of familiar household objects made of materials learners have encountered in previous activities. |
| **1Cp.02** Describe common materials in terms of their properties. | **1TWSa.01** Describe what happened during an enquiry and if it matched predictions. | **The principle’s umbrella (requires additional resources)**  This activity focuses on whether materials are waterproof or not. Tell learners that the principle has just discovered their umbrella has a hole in it. It is their job to find a suitable material to fix it. Ask learners to think about how they could investigate this.  *What sort of material do you think would be useful for this task?*  *How could we test its effectiveness?*  *What could we do to test if the material is waterproof?*  If possible, you could invite the principle into the classroom to introduce this task to learners, as it would add extra motivation to the task.  Explain that some materials do not let any water pass through them and the name for this property is ‘waterproof.’ Ask learners to suggest ways of testing which of the materials are waterproof. Decide together to pour water onto each material and choose a way of seeing if the water leaks through. One option is to place a paper towel that will clearly show when it has become wet underneath each material. Alternatively, place each material over a small cup or pot and see if any water drips through. Show learners the range of materials available for testing and ask them to make a prediction about which they think will be best and why, encouraging them to use their new scientific vocabulary to justify their choice.  After learners have carried out the activity for themselves, they feedback to the class which material they felt was best. Learners could use simple equipment such as spoons or pipettes to drop water onto the different materials. While they are investigating, discuss what is happening to help identify any misconceptions and consolidate understanding.  *Why do you think this material will not be good for mending the hole in the umbrella?*  *What did you find out about that material?*  **Resources:** Equipment for investigation, e.g. pipettes, cups and jugs. Range of materials to test including at least one waterproof fabric. |
| **1TWSc.02** Use given equipment appropriately.  **1TWSc.04** Follow instructions safely when doing practical work. | **The caretaker’s sponge (requires additional resources)**  This activity focuses on absorbency as a property of materials.  Explain to the learners that a caretaker, cleaner or other member of school staff has run out of sponges, and a teacher has accidentally spilled a drink. It will be the learners’ job to find out which material will be best to clean up the mess. Lead a discussion into which materials learners think will be useful for cleaning up spills.  *What material will soak up lots of water?*  *What have you used to clean up spills in the past?*  *Can you think of any materials that will definitely not be suitable for cleaning up?*  Explain that the word to describe a materials ability to soak up liquids is called ‘absorbency’ and that a material will need to be very absorbent to clean up all the mess.  Model testing for absorbency by; dropping water from a pipette onto a small amount of a chosen material (no bigger than a 5cm x 5cm square) in a dish or similar, one drop at a time, counting each one and stopping when the material will not absorb any more water. Model recording this by writing the name of the material and a tally to show the number of drops it absorbed. Learners may need practise using the pipettes first in order to master the skill of making small drops before using them for the investigation.  Learners then carry out the investigation independently or in pairs or small groups. When they have completed their work, they could share what they have learned by writing a letter to the caretaker telling them which material will be the best to use for cleaning up the mess.  **Resources:** Pipettes, dishes, jugs (for water); range of materials to be tested, e.g. paper, card, cellophane, fabric, waterproof fabric, paper towels or tinfoil. |
| **1TWSp.02** Make predictions about what they think will happen. | **Materials mix up**  This activity allows learners to apply their knowledge of properties of materials to possible uses of these materials. Begin with a discussion of familiar materials and their properties.  *What properties does glass have?*  *Which materials can be flexible?*  Choose a familiar object (e.g. a window) and ask learners to list the properties of the material (e.g. glass is transparent, waterproof) that make it a suitable material for this object. Then suggest another object that the same material would not be suitable for and ask learners to think about why not.  *Could we make a coat out of glass? Why not?*  *What properties does glass have that would make it unsuitable for a coat?*  With two sets of cards, one with names of familiar objects on and another with materials on, model selecting one card form each at random. Then use the properties of the selected material to explain whether or not it would be suitable for that object; predict what would happen if such an object was made. For example, ‘window’ and ‘fabric’ could be selected and we would expect learners to say fabric would be an unsuitable material for a window as it is not firm, waterproof, or transparent. If a window were to be made of fabric, then we would not be able to close it up securely, we might get wet on days when it is raining and we would not be able to see out of it. Learners then carry out this task independently, deciding whether or not materials would be suitable and predicting what would happen if this object was made.  **Resources:** Sets of cards listing familiar objects (e.g. a coat, an umbrella, a table, a spoon, a book) and common materials (e.g. fabric, glass, wood, metal, plastic, rock and paper). |
| **1Cc.01** Describe how materials can be changed by physical action, e.g. stretching, compressing, bending and twisting. | **1TWSc.01** Sort and group objects, materials and living things based on observations of the similarities and differences between them. | **Changing materials**  Give learners small lumps of modelling clay and ask them to try to find all the ways they can change its shape.  *What happens if you compress it?*  *Can you twist it? Stretch it?*  *What did you do to make it that shape?*  Explain that some materials, like this modelling clay, can be changed by physical action (pushing, pulling, twisting, rolling, folding etc.) and some materials cannot. Instruct them to stretch their clay and explain what happens (it will initially stretch, then break). Then give out elastic bands and ask learners to describe what happens when these are stretched (they go back to their original shape after being stretched).  Learners then work independently to manipulate a range of materials to explore which can be changed by physical actions and which cannot. Materials should include some that return to their original shape after being manipulated and some that do not, as well as some that learners will not be able to change with their own hands. Learners then sort the materials according to whether or not they were able to change them.  This activity can be extended by allowing learners to choose their own categories by which to sort the materials.  **Resources:** Range of materials to investigate, e.g. fabric, aluminium foil, rock, plastic, paper, modelling clay and elastic bands |
| **1Pf.03** Explore that some objects float and some sink. | **1TWSp.02** Make predictions about what they think will happen.  **1TWSa.01** Describe what happened during an enquiry and if it matched predictions. | **Floating and sinking**  Introduce the learners to the terms ‘float’ and ‘sink’ and discuss their meaning.  *Have you heard these words before?*  *What does ‘float’ mean?*  *Can you think of a time you saw something sinking?*  Hold up a familiar object for learners to see, drawing their attention to its material. Ask learners to predict whether or not the object will float, then place it into a clear tank (or tray) of water so learners can see the bottom. Repeat this with another object made of a different material, modelling, again, making a prediction before testing it out.  Learners then investigate, independently or in pairs, which objects float or sink. Before testing each object, learners record a prediction about whether it will float or sink in a simple table, and then note down if their prediction was correct.  For health and safety reasons, think carefully about where to carry out this activity, as water splashed on the floor indoors may create a slip hazard, it may be best to carry out the activity outside. Warn learners of potential hazards before they begin investigating. If a glass tank is used then an adult should be supervising its use at all times.  If resources do not allow learners to investigate themselves, you can lead this activity with the learners joining in and demonstrating for the whole class together.  This activity can be extended by asking learners to look for a pattern in whether objects float of sink, for example:  *Do all wooden objects float?*  *Do all round objects sink?*  **Resources:** Plastic tanks or trays filled with water (ideally at least one clear glass or plastic one for initial demonstration), range of familiar objects to test. |

# Unit 1.3 Growing strong

| Unit 1.3 Plants |
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| Outline of unit: |
| This unit begins with introducing learners to the different parts of a plant, and how these can differ from plant to plant. Learners then discover that plants need water and light to survive and grow; they will see this in action by either growing a plant from a seedling or investigating where plants survive in their school grounds.  The timing of the practical activity in this unit needs to be carefully planned, as it requires time for the seedlings to grow, and for the learners to be able to take a number of observations at regular intervals. You may wish to plant the seedlings at the start of the unit and carry out the other lessons while the plant is growing. |
| Recommended prior knowledge or previous learning required for the unit: |
| Learners will benefit from experience of seeing a range of different plants in their local environment. Public parks and gardens provide good opportunities to observe a broad range of plant life. |
| Suggested examples for teaching Science in Context: |
| ***1SIC.03*** *Know that everyone uses science and identify people who use science professionally.*  During activities that involve exploring plants in the local area, learners could consider the roles of those who tend these areas, e.g. gardeners, tree surgeons and caretakers. They could also look at how much of their diet is made up of plants and learn about the role of farmers in growing this food.  ***1SIC.04*** *Talk about how science helps us understand our effect on the world around us.*  Learners could explore their local environments to identify areas in which there are no plants and consider the reasons why; is it due to man-made structures and changes to the environment? They could consider how these areas could be changed by us, to allow for future plant growth. |

| Learning objective | Key vocabulary | Possible misconceptions |
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| **1Bs.01** Recognise and name the major parts of familiar flowering plants (limited to roots, leaves, stems and flowers). | Plant, flowers, roots, leaves, stem | Learners sometimes do not consider trees or grass to be plants as they do not have the typical structure of the flowering plants. Make sure to include trees and grasses in examples of flowering plants. |
| **1Bp.03** Know that plants need light and water to survive. | Plant, seed, grow, light, water, survive | Learners tend to think plants are not alive because they do not appear to display the same characteristics of life as animals, e.g. the movement of a plant is much more subtle. Demonstrate to learners that plants can be killed and show them what a dead plant looks like. Discuss with learners that if a plant can die that means it is alive.  Learners may believe that plants eat soil, drink water (where there plant stem acts as a straw) and take in light. It is important not to reinforce these misconceptions and where appropriate challenge them. For example, discuss how a plant has no mouth so cannot eat or drink, and when you listen there is no eating or drinking noise. |

# Unit 1.3 Suggested activities

| Learning objective | Thinking and Working Scientifically opportunities | Suggested teaching activities and resources |
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| **1Bs.01** Recognise and name the major parts of familiar flowering plants (limited to roots, leaves, stems and flowers). | **1TWSc.02** Use given equipment appropriately.  **1TWSp.01** Ask questions about the world around us and talk about how to find answers.  **1TWSc.05** Collect and record observations and/or measurements by annotating images and completing simple tables. | **Exploring familiar plants**  This activity serves as a general introduction to learning about plants.  Lead a discussion about what learners think plants are.  *Where can plants be found?*  *Can you name any plants?*  *What different parts do plants have?*  Learners then explore a range of familiar flowering plants using equipment such as magnifying glasses or hand lenses if they are available. Learners could also be given tweezers (or scissors) to take apart the plants and get a closer look. Make sure that a number of the plants have visible roots to enable learners to see these parts of the plant that are usually hidden.  *Are the roots of each plant all the same?*  *Can you find any leaves on this plant?*  *Are all the stems the same colour?*  Reinforce the key vocabulary (i.e. roots, leaves, stem, flowers, plant) with learners throughout the activity.  Ask learners to record their findings with simple, labelled diagrams.  After taking a closer look at the plants, ask learners if they have any questions of their own. It is likely that you will need to model the thought process of how to ask questions, e.g. ‘I noticed that my flower has round petals. I wonder if all petals are round?’ These questions should be recorded and revisited in relevant lessons. If time permits, extra activities to explore some of the learners’ questions should be carried out.  For health and safety reasons, do not use plants that contain irritants that may be released when they are cut up, or poisonous substances that may be ingested.  **Resources:** Equipment for making observations such as magnifying glasses or hand lenses, range of familiar plants (including some with visible roots). |
| **1Bs.01** Recognise and name the major parts of familiar flowering plants (limited to roots, leaves, stems and flowers). | **1TWSc.05** Collect and record observations and/or measurements by annotating images and completing simple tables. | **Flower hunt**  Begin the activity by looking at photographs of a range of flowers, both familiar and unfamiliar, and lead a discussion about the images.  *What can you see in the pictures?*  *What do all the flowers have in common?*  *Do all the plants have the same number of flowers?*  Then take learners outside to carry out a ‘flower hunt’, looking for flowers on plants within the school grounds (or, alternatively, show them flowering plants in pots in the classroom). Learners record their findings with simple, observational drawings. If (digital) cameras are available, learners could photograph their findings.  **Resources:** Clipboards, a range of flowering plants (in the school grounds or in pots in the classroom), (digital) cameras (optional). |
| **1Bs.01** Recognise and name the major parts of familiar flowering plants (limited to roots, leaves, stems and flowers). | **1TWSc.01** Sort and group objects, materials and living things based on observations of the similarities and differences between them. | **Exploring leaves**  Provide a broad range of leaves (different shapes, sizes and colours) collected from the local area. Give each learner one leaf and ask them to make some close observations.  *What can you see on your leaf?*  *What colour or shape is your leaf?*  *What plant do you think it may have come from?*  When learners have had a chance to explore their own leaf, ask them to compare it with another learner.  *Are your leaves the same shape?*  *Which is larger?*  *What is the same about both leaves?*  After this, ask learners to sit in a circle. With large hoops or sheets of paper in the centre of the circle, give learners some criteria, for example leaves that are green go in one hoop and leaves that are not green go in another, and ask them to place their own leaf in the correct hoop. Repeat this with a range of different criteria. You could group leaves by size, shape, colour, texture etc.  *Which group does your leaf fit in?*  *Are all of the leaves in the correct group?*  *Is there more than one group your leaf could be placed in?*  Learners then work in small groups or pairs to decide on their own criteria to sort a number of leaves. This activity could be recorded with drawings or by taking photographs. When learners have sorted their leaves discuss their reasoning for sorting them as they did.  *Can you explain why you put this leaf there?*  **Resources:** A broad range of leaves in different sizes, shapes and colours, taken from familiar plants (prior to this activity, learners could help with the collection of these). |
| **1Bp.03** Know that plants need light and water to survive. | **1TWSc.03** Take measurements in non-standard units. | **Growing a plant (requires additional resources)**  This activity takes place over more time, as it requires learners to grow a plant from a seedling/plug plant. Although this activity does not specifically focus on the stem, it does provide an opportunity to look at stems in more detail than previous activities.  Begin with a discussion of what learners already know about the needs of plants; remind them that plants need both light and water to survive. If a plant is growing or remaining the same that means it is surviving. Learners then plant a seedling/plug plant and select a spot with plenty of light for them to grow. If possible, place the plant right up against the side of a plastic cup so learners can see the roots as they grow. They will grow best in soil but could also be planted in cotton wool or blotting paper.  Over the next few days, learners take responsibility for watering their plants; help them decide how much water to use, as young learners tend to over water plants. Every few days, learners make observations of their growing plant and measure the stem and roots using non-standard units; cube-shaped bricks work particularly well, as these can be used to create a very clear, visual bar graph of the plant’s growth over time. After taking each measurement, learners record what they have found in a plant journal or diary.  As the plant grows, discuss with learners what the stem is and what it does. Look at trees in the school grounds (or pictures of trees) and discuss where the stem of the tree is; learners should be able to identify the trunk as the stem.  **Resources:** Plants that will grow relatively quickly (e.g. cress, broad beans, lettuce, peas and tomato), clear plastic cups, soil (optional), small objects for taking non-standard measurements (e.g. cube-shaped bricks, paperclips, small construction toys). |
| **1Bp.03** Know that plants need light and water to survive. | **1TWSp.02** Make predictions about what they think will happen. | **Researching where plants grow well**  Before carrying out this task, identify some areas of the school grounds that would be unsuitable for wild plants to survive (because of a lack of access to sunlight and/or water) and some areas where plants survive and grow.  Begin by showing learners images of a barren desert, a lush rainforest and a dark, man-made structure (e.g. a warehouse, a multi-storey car park). Lead a discussion about the differences that learners can see between the pictures, and why they think there are only a few plants in some pictures.  *What do you think the weather is like in these pictures?*  *Why are there only a few plants in this picture?*  *What is missing that a plant would need?*  Clarify that plants need light and water in order to survive and grow well, so places that are too dark or dry will not be good places for plants to survive and grow.  Tell learners that the school is hoping to bring in some new potted plants and they will need a suitable place to grow. Learners then carry out a survey of the school grounds to see where plants already grow well because of a good supply of light and water, and identify a good place to put the new plants so the new plants survive.  *Would this be a good place to keep our plants?*  *Would the plant get plenty of water if we placed it here?*  **Resources:** Images of contrasting settings where plants would and would not grow successfully (e.g. desert, rainforest, warehouse). |

# Unit 1.4 The science of my toys

| Unit 1.4 The science of my toys |
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| Outline of unit: |
| This unit is based on the science behind items that learners will be familiar with: their toys. It begins with a look at the materials commonly used to make toys and considers why these materials are suitable. The unit then uses these familiar, everyday objects as examples to help learners understand some abstract physics concepts that can be difficult for learners to grasp, i.e. electricity, forces and magnets.  Learners, typically, can find it difficult to master the large number of words used to describe different materials. To ensure learners have plenty of time and opportunity to learn, and apply, the vocabulary associated with materials and their properties the ‘materials’ learning objectives from Unit 1.2 are revisited in this unit. |
| Recommended prior knowledge or previous learning required for the unit: |
| Learners would benefit from exposure to the broad range of vocabulary used for describing properties of materials by hearing them used in everyday contexts. |
| Suggested examples for teaching Science in Context |
| ***1SIC.01*** *Talk about how some of the scientific knowledge and thinking now was different in the past.*  Using toys as a theme for this unit provides an ideal opportunity to link learning about history to learners’ science lessons. Exploring toys from the past, and the materials they were made from, will allow learners to identify materials and technology that have been created more recently, e.g. plastics and electronic toys.  ***1SIC.02*** *Talk about how science explains how objects they use, or know about, work.*  This unit has many opportunities for learners to apply their new knowledge of materials and physical processes to objects they see and use every day.  ***1SIC.03*** *Know that everyone uses science and identify people who use science professionally.*  Links to toy creation and design are made explicit in one suggested activity for this unit (Designing a toy) but they can be discussed with learners in relation to any of the activities. It could also be valuable to invite (or correspond with) a professional who applies science in the design or manufacture of toys. |

| Learning objective | Key vocabulary | Possible misconceptions |
| --- | --- | --- |
| **1Cm.01** Identify, name, describe, sort and group common materials, including wood, plastic, metal, glass, rock, paper and fabric. | Material, object, wood, plastic, metal, glass, rock, paper, fabric, hard, soft, rough, smooth, rigid, flexible, shiny, dull, group, sort, same, similar, different, difference | The term ‘material’ is often assumed to refer to fabric. Ensure the scientific definition of ‘material’ is used when teaching about materials. |
| **1Cp.01** Understand that all materials have a variety of properties. | Material, property, hard, soft, rough, smooth, rigid, flexible, shiny, dull, group, sort, same, similar, different, difference | Learners sometimes struggle with the distinction between ‘smooth’ and ‘soft’ as well as ‘rough’ and ‘hard’. This can be explored through hands-on activities while reinforcing the language use. |
| **1Pe.01** Identify things that require electricity to work. | Electricity, plug, battery, wire | Learners’ awareness of the applications of electricity may be limited to domestic objects that use mains electricity to produce heat and light. They may be less aware of items that are powered by electricity via batteries or which do not produce heat or light.  Some learners can be cautious of working with electrical items, as they will have often been warned about the dangers electricity can pose. There is the opportunity to model to learners how to be safe with electricity. |
| **1Pf.01** Explore, talk about and describe the movement of familiar objects. | Move, forwards, backwards, turn, spin, push, pull | It can be difficult for learners to identify the forces being applied during everyday activities; they may confuse whether they are pulling or pushing something to make it move, change shape or direction. These concepts can be explored through practical experiences and discussion using appropriate language. |
| **1Pf.02** Describe pushes and pulls as forces. | Push, pull, force, move, change, speed | At this age, learners will possibly have no concept of a force having a connection with= movement or speed. They can have particular difficulty identifying a ‘pull’ as a force when it results in something moving towards themselves. Learners can develop their understanding through observation of pushing and pulling from different perspectives. |
| **1Pe.02** Explore, talk about and describe what happens when magnets approach and touch different materials. | Magnet, magnetic, attract, repel, force | Learners may say that magnets ‘stick’ together or to other objects, which is incorrect. Even at this early stage, it is important to use the terms ‘attract’ and ‘repel’ when talking about magnets. |

# Unit 1.4 Suggested activities

| Learning objective | Thinking and Working Scientifically opportunities | Suggested teaching activities and resources |
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| **1Cm.01** Identify, name, describe, sort and group common materials, including wood, plastic, metal, glass, rock, paper and fabric. | **1TWSc.01** Sort and group objects, materials and living things based on observations of the similarities and differences between them.  **1TWSc.05** Collect and record observations and/or measurements by annotating images and completing simple tables. | **Toy sorting**  Gather a range of different kinds of toys for this activity, including metal, plastic and wooden toys; stuffed animals and toys that require batteries. Either use a selection of toys at school or learners can bring in their own toys from home.  Give learners the opportunity to share their toys with each other and talk about their features. Then focus the discussion by asking them what materials they are made from and how they compare to those of their peers.  *Is your toy made of more than one material?*  *Can you name any of the materials your toy is made of?*  *Is there anyone else who has a toy made of the same material?*  Next ask learners to stand with someone whose toy has a material in common with theirs, then organise themselves into groups according to what materials they are made of. *Why have you chosen to stand with that person?*  *Are there any other groups you could join?*  *Which group has the most toys in?*  Learners then record this learning by photographing sorted toys or drawing pictures onto a simple chart.  This activity can be extended by asking learners to record their work on a Venn diagram.  **Resources:** Wide selection of toys made from a range of materials that are familiar to learners. |
| **1Cp.01** Understand that all materials have a variety of properties | **1TWSp.01** Ask questions about the world around us and talk about how to find answers. | **Designing a toy**  Gather a range of different kinds of toys for this activity, including metal, plastic and wooden toys; stuffed animals and toys that require batteries. Either use a selection of toys at school or learners can bring in their own toys from home.  Encourage learners to think of their own questions about the materials their toys are made of.  *Which materials were used for a lot of our toys?*  *Which materials are never used for toys?*  *Why do you think this is?*  Show learners a selection of toys made for babies (or photographs of toys) and ask them to discuss the materials used and why these have been chosen.  *Why do you think plastic has been used?*  *What properties do baby toys need to have?*  Support learners to come to the conclusion that toys for babies need to be sturdy and easy to clean, or soft and smooth so as not to hurt them. Learners then design their own toy for a baby, drawing it and labelling the materials used. Ask them to explain why they have chosen these materials based on their properties.  **Resources:** Selection of toys for babies or images of the same. |
| **1Pe.01** Identify things that require electricity to work. | **1TWSc.05** Collect and record observations and/or measurements by annotating images and completing simple tables. | **Searching for electrical objects**  With a selection of toys that can, again, be brought in from home or taken from those in school, ask learners to sort them into those that require electricity and those that do not. Talk about, and explain that electricity can produce different effects, such as make the toys move, light up or make sounds. Then broaden the discussion to objects in the classroom and learners’ homes that use electricity.  *What do you have in your bedroom that needs electricity?*  *What electrical objects have you used so far today?*  *Do all electrical things need to be plugged in?*  After this, learners go on an electrical object hunt. Ideally, this will be throughout school, enabling them to find more objects with different functions, but it can be done within the classroom if necessary. Ask learners to record what they find by completing a simple table.  Before setting off on the electrical object hunt, brief learners on the dangers of plug sockets and tell them not to touch any sockets or plugs they may find.  **Resources:** Selection of toys, including some that are powered by electricity. |
| **1Pf.01** Explore, talk about and describe the movement of familiar objects.  **1Pf.02** Describe pushes and pulls as forces. | **1TWSc.01** Sort and group objects, materials and living things based on observations of the similarities and differences between them. | **Pushes and pulls in the classroom**  With a selection of toys that move or have moving parts (e.g. cars, dolls and toys with buttons), discuss with learners how they can be made to move, using the language of *push* and *pull* throughout.  *What could you do to make your toy move?*  *What will happen if you push your toy?*  *Does anyone have a toy that turns, spins or jumps?*  From this, lead the discussion onto other familiar objects that move when pushed or pulled (e.g. doors, chairs, drawers).  Give learners cards that say ‘push’ and ‘pull’ and ask them to label objects in the classroom that can be pushed or pulled. After giving them a moment to find these objects, ask them to explain why they have placed their cards where they have done.  *How does that move when you push it?*  *Can your object be pushed as well as pulled?*  **Resources:** Selection of toys that move, set of ‘push’ and ‘pull’ word cards for each learner or pair of learners (learners could make these themselves). |
| **1Pe.02** Explore, talk about and describe what happens when magnets approach and touch different materials. | **1TWSp.02** Make predictions about what they think will happen. | **Exploring magnets**  Allow learners to freely explore a range of differently-shaped magnets and magnetic toys (e.g. magnetic letters, train carriages that join with magnets). Discuss with them what they can see happening while they play.  *What happens when one magnet goes near another magnet?*  *Can you make a magnet move without touching it?*  *Can you push these two magnets together?*  Bring learners back together as a class to share their observations with one another.  *Have they noticed any patterns in the materials that magnetic toys are made of?*  Introduce learners to the terms ‘attract’ and ‘repel’ and demonstrate each clearly with the magnets. Then show learners a small, magnetic object such as a coin (or paper clip and ask them to predict what will happen when a magnet approaches it. Model moving the magnet slowly towards the object until it is attracted to and moves towards the magnet. Repeat this with a non-magnetic object asking learners to first make a prediction and then move the magnet towards the object until they are touching.  Learners then repeat this themselves with small objects made of a range of different, familiar materials. Learners, using a pre-made table, record their simple predictions about what they think will happen. They then test each object. As they work, talk to them about what they have seen, and whether or not their predictions were correct.  *What happened when you tested the marble?*  *What materials are the magnetic objects made from?*  *Were all the metal objects attracted to the magnet?*  Reinforce with the learners that magnets do not stick to anything. Instead, an invisible force from the magnet can attract or repel materials. Learners will also discover that a magnet does not affect some materials.  **Resources:** Selection of differently-sized magnets and magnetic toys, selection of small magnetic and non‑magnetic objects (include some metal objects that are not magnetic). |

# Unit 1.5 Staying alive

| Unit 1.5 Staying alive |
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| Outline of unit: |
| This unit starts with recognising things that are living and things that have never been alive, then considers the requirements for survival of animals and plants. It links to Unit 1.1 where learners looked at the human body and Unit 1.3 where learners looked at plants and what they need to survive, |
| Recommended prior knowledge or previous learning required for the unit: |
| Learners would benefit from:   * being able to name some parts of the body of both humans and animals * having some familiarity with the structure of plants (i.e., roots, leaves, stems and flowers). |
| Suggested examples for teaching Science in Context |
| ***1SIC.03*** *Know that everyone uses science and identify people who use science professionally.*  While learning about requirements for the survival of animals, learners could find out about people who look after animals professionally (e.g. veterinarians, farmers or zookeepers); they could look at secondary sources of information or speak to members of these professions. This unit could include a trip to a zoo, farm or veterinary clinic, where learners will witness first-hand how animals are cared for.  ***1SIC.04*** *Talk about how science helps us understand our effect on the world around us.*  While learning about what animals need to survive, learners could consider the impact that industry, growth and man-made structures have had on local plant and animal life. Learners could find an area where there is very little wildlife and consider the reasons why. |

| Learning objective | Key vocabulary | Possible misconceptions |
| --- | --- | --- |
| **1Bp.01** Identify living things and things that have never been alive. | Alive, living, once alive, never alive, dead | Objects (e.g. cars, fire) that were never alive but display the characteristics of living things, particularly movement, can be confusing for learners. They can also think their toys are alive having seen these characters in animations. Learners may think that plants are not alive because they cannot directly see the movement =of plants. These misconceptions can be explored through discussion and looking at whether a thing meets all of the indicators of being alive (e.g. movement, requiring nutrition). |
| **1Bp.02** Know that animals, including humans, need air, water and suitable food to survive. | Animals, humans, survive, survival, alive, food, water, air | Learners can think that food is just for ‘energy’ rather than being necessary for survival. This can be explored through looking at the nutritional information on food packaging and seeing it gives more than the energy provided by food.  Learners often incorrectly think that humans are not animals. This can be discussed through looking at a range of animals and understanding the similarities so learners understand ‘animal’ is a broad term. |
| **1Bp.03** Know that plants need light and water to survive. | Plant, seed, grow, light, water, survive | Learners tend to think plants are not alive because they do not appear to display the same characteristics of life as animals, e.g. the movement of a plant is much more subtle. Demonstrate to learners that plants can be killed and show them what a dead plant looks like. Discuss with learners that if a plant can die that means it is alive.  Learners may believe that plants eat soil, drink water (where there plant stem acts as a straw) and take in light. It is important not to reinforce these misconceptions and where appropriate challenge them. For example, discuss how a plant has no mouth so cannot eat or drink, and when you listen there is no eating or drinking noise. |

# Unit 1.5 Suggested activities

| Learning objective | Thinking and Working Scientifically opportunities | Suggested teaching activities and resources |
| --- | --- | --- |
| **1Bp.01** Identify living things and things that have never been alive. | **TWSc.05** Collect and record observations and/or measurements by annotating images and completing simple tables. | **Comparing humans and other animals**  If possible, bring an animal into the classroom for the learners to observe closely. Alternatively, you could use photographs of familiar animals (e.g. pets, those seen in the wild). Using the animal (or images) as a stimulus, discuss what these living things have in common with humans.  *What things do we do every day that these animals also do?*  *What do we have to do to stay alive?*  *How do these animals stay alive?*  Talk about what makes us (humans) living things, including movement, growth, eating and reproducing. (‘Having babies’ may be more appropriate terminology for learners this age, but they can still be introduced to the scientific term of ‘reproducing’ during the lesson).  Model comparing a human to another animal using a simple graphic organiser; identify the following: how it moves; what it eats and what its young look like. Learners then complete their own graphic organisers, comparing a human to an animal of their choice.  For health and safety reasons, ensure a thorough risk assessment has been carried out before bringing an animal into the classroom.  **Resources:** Images of a range of animals, real animal (optional). |
| **1TWSc.01** Sort and group objects, materials and living things based on observations of the similarities and differences between them. | **Sorting living things and things that have never been alive**  Begin by showing learners an image of a familiar vehicle (e.g. car) and leading a discussion.  *Is it alive?*  *It can move, so I think it is alive, do you agree?*  *How can you tell it is not alive and has never been alive?*  Support learners in coming to the conclusion that the vehicle does not grow or reproduce, so it is not alive.  Then show an image of a familiar plant and ask them again if it is alive. It is likely that learners will say it is not, as it does not demonstrate the characteristics of living things as clearly as animals. Explain that plants are living things, highlighting to learners that: they make seeds and so reproduce; take nutrients from the soil they grow in (reinforce plants do not eat soil) and they are also able to move and grow. If possible, you could show learners videos that have used time-lapse photography to make the slow growth, and movement, of plants more visible. They could also watch videos of plants that move more quickly, such as Venus flytraps (*Dionaea muscipula*) or sensitive ferns (*Onoclea sensibilis*).  Then give learners sets of images showing things that are alive and things that have never been alive. Ensure these images include plants and some other objects that learners typically find difficult to categorise (e.g. vehicles, computers, fire and some toys). Learners must then sort these according to whether they are alive or they have never been alive. Throughout the activity, ask learners to justify their choices.  *Why have you put this one with the things that have never lived?*  *What does this one do that all other living things do?*  **Resources:** Sets of images showing things that are alive and things that have never been alive including an image of a car and an image of a plant. |
| **1Bp.02** Know that animals, including humans, need air, water and suitable food to survive. | **1TWSc.01** Sort and group objects, materials and living things based on observations of the similarities and differences between them. | **Requirements for survival**  Briefly discuss with learners what ‘survive’ means. Then give individual learners (or pairs of learners) sets of cards showing things they may or may not need for survival; include everything necessary for survival (food, air, water, shelter etc.) and others that learners may think are vital (e.g. electricity, a bed). Ask them to discuss whether or not these things are requirements for survival, and sort them accordingly. Give learners time to discuss among themselves which goes where, questioning them as they sort.  *Why do you think this one is important?*  *What would happen if we did not have food?*  *What would happen if we did not have air?*  Bring learners back together as a group to address any misconceptions, focussing on food, air and water. Encourage learners to think about animals they know and ask if this is the same for all animals, guiding them to the understanding that all animals need water, air and suitable food to survive.  Learners then demonstrate what they have learned by role-playing with their peers; ask learners to imagine they have been stranded on a desert island with a pet. They are able to make one phone call to ask for supplies but they one have a few minutes. Learners practise then perform short role plays showing what they would ask for. This could be peer assessed, with each group getting feedback from other learners on whether or not they remembered everything important.  **Resources:** Sets of cards showing items necessary, and not necessary, for survival; real (or toy) phones to support role-play activity (optional). |
| **1Bp.03** Know that plants need light and water to survive. | **1TWSp.02** Make predictions about what they think will happen.  **1TWSc.03** Take measurements in non‑standard units. | **Depriving plants of light or water**  Begin talking about what plants need to survive and grow well, focussing on light and water. Tell learners we are going to find out what happens if plants do not have these things and ask them to predict what they expect to happen.  *Have you ever forgotten to water a plant?*  *What happened?*  *What do you think would happen to a plant that could not get any light?*  Ask learners to choose whether to remove water or light from a plant, and to think about how to investigate the effect that it has on the plant. Learners will likely need a lot of scaffolding in designing an investigation. Learners then plant two plants (e.g. seedlings or plug plants); one that will be given both light and water and one that will be deprived of one of these things. Explain to learners that we need to have one plant that is given everything (the control) so that we can compare it with the plant that is not getting something it needs. Clear plastic pots are best for planting in as learners can also make observations of the roots.  Over the next few days, learners take responsibility for watering their plants; help them decide how much water to use, as young learners tend to over water plants  Every few days, learners make observations of their growing plant and measure the stem or roots using non-standard units; cube-shaped bricks work particularly well, as these can be used to create a very clear, visual bar graph of the plant’s growth over time. After taking each measurement, learners record what they have found in a plant journal or diary. As well as taking measurements, encourage learners to make further observations of the differences between their plants.  *How are the colours of your two plants different?*  *Have they grown at the same speed?*  *Which plant looks more or less healthy? Why do you think this?*  This activity can be extended by asking learners to take and record standard measurements of their growing plant.  **Resources:** Plants that will grow relatively quickly (e.g. cress, broad beans, lettuce, peas and tomato), clear plastic cups, soil (optional), small objects for taking non-standard measurements (e.g. cube-shaped bricks, paperclips, small construction toys). |

# Unit 1.6 Journey to the International Space Station

| Unit 1.6 Journey to the International Space Station |
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| Outline of unit: |
| This unit is based around an imaginary journey to the International Space Station (ISS) and is designed to provide learners with an opportunity to revise learning from other units and apply it to a different, real-life context (Earth and space). We recommend that this module is taught last.  The unit begins with a consideration of the preparations needed for space travel, including what things humans would need to stay alive on a long journey and the materials used to make equipment for space travel. After a look at the levels of fitness required by astronauts, and links to learning about forces, the unit concludes with activities related to the Sun and Earth.  Depending on the interests of the learners in your class, this unit could be edited to focus on a ‘Mission to Mars’ or ‘Trip to the Moon’. |
| Recommended prior knowledge or previous learning required for the unit: |
| Learners would benefit from:   * knowing the requirements of humans for survival (covered in Unit 1.5) * being able to describe common materials in terms of their properties (covered in Unit 1.2). * being familiar with the ISS. Consider giving a basic introduction to capture the interest of learners by sharing photos and video clips of both the ISS and the astronauts carrying out various activities on board. The ISS can also be introduced earlier in the year through shared reading of texts, such as *Max Goes to the Space Station* |
| Suggested examples for teaching Science in Context: |
| ***1SIC.03*** *Know that everyone uses science and identify people who use science professionally.*  The context of this unit means every lesson considers how scientific knowledge is applied by astronauts and other scientists involved in space travel. There are lots of opportunities for learners to apply their own learning to the engaging ‘real-life’ context of space. To enhance the learning in this unit, you could set up an ISS role-play area in which learners could pretend to be astronauts carrying out research in space. |

| Learning objective | Key vocabulary | Possible misconceptions |
| --- | --- | --- |
| **1Bp.02** Know that animals, including humans, need air, water and suitable food to survive. | Animals, humans, survive, survival, alive, food, water, air | Learners may think that food is just for ‘energy’ rather than being necessary for survival. This can be explored through looking at the nutritional information on food packaging and seeing it gives more than the energy provided by food. |
| **1Cp.01** Understand that all materials have a variety of different properties. | Material, property, hard, soft, rough, smooth, rigid, flexible, shiny, dull, group, sort, same, similar, different, difference | Learners sometimes struggle with the distinction between ‘smooth’ and ‘soft’ as well as ‘rough’ and ‘hard’. This can be explored through hands-on activities while reinforcing the correct language. |
| **1ESs.02** Describe the Sun as a source of heat and light, and as one of many stars. | Sun, heat, light, star, solar system | Learners usually see the Sun and stars as completely different things, and expect the stars to look like the five-pointed depictions of stars they often see in drawings and cartoons. This can be discussed by looking at photographs of stars, including the Sun and referencing space agency information, e.g. NASA, ESA, CNSA, IRSO, ROSCOSMOS. |
| **1Pf.02** Describe pushes and pulls as forces. | Push, pull, force, move, change | At this age, learners will probably not understand a force is connected to movement or speed. They can have particular difficulty identifying a pull as a force when it results in something moving towards themselves. Learners can develop their understanding through observation of pushing and pulling from different perspectives. |
| **1ESp.01** Know that Earth is mostly covered in water. | Planet, Earth, surface, water, sea, ocean | Learners can think that the islands on Earth are floating on the sea and have water underneath. This can be explored by building two models: an island which is part of a landmass surrounded by water and an island floating on water. The two models can then be compared and, through discussion, the one that is most likely to be real can be identified, e.g. the floating island moves with the water which does not happen in real life. Aerial and satellite footage can reinforce landmasses are fixed. |
| **1ESp.02** Describe land as being made of rock and soil. | Earth, land, rock, soil | Learners tend to class soil as ‘mud’ and see it as one material, rather than a substance made up of organic and inorganic materials. This misconception will be addressed in Stage 6. |
| **1ESs.01** Know the Earth is the planet on which we live. | Planet, Earth, solar system | Learners often think that the planet Earth is flat, or a flat, circular shape, rather than an approximately spherical shape. This misconception will be addressed in Stage 3. |

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# Unit 1.6 Suggested activities

| Learning objective | Thinking and Working Scientifically opportunities | Suggested teaching activities and resources |
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| **1Bp.02** Know that animals, including humans, need air, water and suitable food to survive. | **1TWSp.01** Ask questions about the world around us and talk about how to find answers. | **Preparing for the trip**  This activity considers requirements for the survival of humans, revisiting the learning from unit 1.5 and allowing learners to apply what they know in the new context of space.  Tell learners that they be taking an imaginary trip to the International Space Station. Look at some images of the ISS and explain that it is a science lab in space that orbits (goes around) the Earth. Give them the opportunity to ask any questions they may have about the ISS and, if time, revisit these in future activities.  Explain that it takes astronauts about 6 hours to get to the ISS and then they spend a long time there (recent missions have been about 6 months) so they will need to think carefully about what to take with them. Lead learners in a discussion about what they should take with them on this journey.  *What do you think would be important?*  *Is there anything you could not live without?*  *What would happen if we did not take any food, water, air or toys?*  Learners then create a list of what they plan to take with them. Encourage them to think about what is vital for survival and not just things that would make us feel more comfortable (e.g. toys). Discuss their choices with them throughout the activity and support learners in acknowledging that food, air and water are necessary.  *Why have you chosen to include this item?*  *What could you leave behind?*  **Resources:** Images of the ISS. |
| **1ESs.02** Describe the Sun as a source of heat and light, and as one of many stars. | **1TWSp.02** Make predictions about what they think will happen. | **Learning about the Sun**  Start the activity with a discussion of what learners already know about the Sun.  *What can you tell me about the Sun?*  *What do you think it is made of?*  Tell learners that the Sun is a star, the same as the stars they see in the sky at night, but much, much closer to us. To create a visual model that allows learners to see how objects appear smaller when they are further away, find two identical balls and hold them up for learners to see. Ask learners what they think will happen to the size of the balls if one is moved some distance away. Discuss their predictions before asking one of the learners to take one of the balls and hold it up at the other side of a playing field (or school hall). Highlight to the learners standing near to you that the second ball now appears smaller than the first, even though we know they are the same size. This is not an exact model for the difference in appearance between the Sun and other stars; not all stars are identical in size (as these balls are) but it does help to show how size appears to change depending on distance from an object.  After showing learners this model, explain that all stars are sources of heat and light; and, as the Sun is closer to us than the other stars, we can see the light and feel the heat. Discuss with learners what they know about sun safety; reinforce the importance of protecting their skin from sun burns and preventing damage to our eyes by never looking directly at the Sun (even if we are wearing sunglasses). Explain that astronauts on the ISS must also protect themselves from the sun just as we do.  Learners then demonstrate their learning by creating a poster targeted at ‘astronauts in training’ warning of the dangers of the sun and suggesting things they can do to keep safe.  **Resources:** Two balls that are identical in shape. |
| **1Cp.01** Understand that all materials have a variety of properties. | **1TWSp.01** Ask questions about the world around us and talk about how to find answers.  **1TWSc.03** Take measurements in non-standard units. | **Investigating materials for a spacesuit (requires additional resources)**  Look at an image of a spacesuit and encourage learners to come up with their own questions about it.  *What more do you want to know about this spacesuit?*  *What do you wonder about the materials used to make it?*  *What do you think it feels like to wear this spacesuit?*  After a discussion of learners’ own ideas, draw their attention to the visor. Ask learners to select the best material for a new visor.  *What properties do you think this material will need to have?*  *Can you think of any materials that would not be suitable?*  If learners have not already mentioned the terms themselves, explain that we use the words ‘translucent’ and ‘opaque’ to describe materials that let light through and those that do not. This will be clearer to learners if it is explained in terms of ‘what they can see through’ and ‘what they cannot see through’, but they should still hear the scientific vocabulary modelled correctly and be encouraged to use it themselves.  Support learners in deciding that the material will need to be transparent and rigid, then ask them to explore a range of materials and select one that will be the most suited to the job. Allow learners to come up with their own ranking system for the materials, supporting them as needed. For example, they could use numbers (e.g. 1 = completely opaque and 5 = completely transparent) or symbols (e.g. a smiley face means a suitable material and a sad face means an unsuitable material).  Learners then investigate a range of materials and use their results to decide on the most suitable one to make a visor. Make sure there is a wide selection, with varying flexibility, of transparent, translucent and opaque materials  **Resources:** Images of spacesuits with the visor clearly visible, broad range of different materials for investigating (e.g. plastic food wrap, paper, aluminium foil, cellophane, clear plastic, fabric and card). |
| **1Cp.01** Understand that all materials have a variety of properties. | **1TWSp.01** Ask questions about the world around us and talk about how to find answers. | **Spacesuit research**  Look at an image of a spacesuit.  *What more do you want to know about this spacesuit?*  *What do you wonder about the materials used to make it?*  *What do you think it feels like to wear this spacesuit?*  Then, using labelled images and short pieces of non-fiction text about spacesuits, learners see how many of their questions they can find the answers to.  At the end of the session, learners feedback by sharing one thing that they found out about the spacesuit that they did not know before (ideally the answer to one of their own questions).  **Resources:** Pre-prepared images and simple information texts about a spacesuit. |
| **1Pf.02** Describe pushes and pulls as forces. | **1TWSc.04** Follow instructions safely when doing practical work. | **Astronaut Training**  Explain to learners that we will soon be setting off to the ISS but we will need to carry out some astronaut training first. To provide some context the class could watch some online video clips of astronauts carrying out training exercises and talking about their fitness levels. Learners then carry out a prepared circuit of exercises, each involving a push or a pull. For each one, ask learners to identify the action they are doing as a push or a pull.  *What is moving?*  *How are you moving it?*  *Are you pushing or pulling the object or weight?*  Activities could include push-ups, climbing a rope, lifting small weights, walking up and down a small set of steps or rolling medicine balls. For health and safety reasons, ensure the activities are not too physically demanding and fully brief learners on how to do the activities in a safe manner. Also, be aware of any learners with physical disabilities who may need extra support with some of the activities.  To record their learning, learners could annotate photos of themselves carrying out the exercise with the words ‘push’ or ‘pull’.  We suggest that, following this activity, the learners take part in an imaginary journey to the ISS, using a story and movement. For example, learners could imagine they are strapped into their seats in a space shuttle then suddenly blast off; they could also act out carrying out some experiments or a spacewalk.  **Resources:** Prepared circuit of simple exercise activities involving pushes or pulls. |
| **1ESs.01** Know Earth is the planet on which we live.  **1ESp.01** Know that Earth is mostly covered in water.  **1ESp.02** Describe land as being made of rock and soil. | **1TWSp.01** Ask questions about the world around us and talk about how to find answers. | **A postcard from the ISS**  Ask learners to imagine we have now arrived on the ISS.  *What can you see out of the window?*  *What does Earth look like?*  Show learners either a globe or a photo of Earth taken from space and explain that this is our planet, Earth where they live. Then ask them to discuss what they can see.  *What do you think the blue bit is?*  *What else can you see as well as the oceans?*  Explain that the correct term for the parts that are not water is ‘land’ and it is made of rock and soil. Identify that most of the surface of the planet is covered by water.  If possible, use the internet to look at satellite photos of your location, and zoom out until learners can see both land and water. Alternatively, identifying their location on a globe (or map) will also aid understanding. Encourage learners to ask questions of their own.  Return to the photographs of Earth taken on the ISS. You could also show learners an online live video showing the view of Earth from the ISS. Ask learners to imagine they are writing a postcard to someone back home; encourage them to write about their view from the ISS, including being able to see both the land and water that make up the Earth. Learners then independently write their postcards.  **Resources:** A globe, images of the Earth taken from space, online live feed showing the current view from the ISS (optional). |
| **1ESp.02** Describe land as being made of rock and soil. | **1TWSc.04** Follow instructions safely when doing practical work.  **1TWSa.01** Describe what happened during an enquiry and if it matched predictions. | **Egg investigation (requires additional resources)**  Explain to learners that our time on the ISS is over and we must get back to Earth safely. Show them images of the Soyuz capsule and explain this is how astronauts return to Earth. Look at an image of Earth from space and talk about what they can see. Remind learners that the land is made of rock and soil; list a few areas within the school grounds that consist of rock or soil to aid understanding. Now, learners must choose an area for their Soyuz capsule to land; either on water, soil, rock or rocky soil. Allow them to discuss which they think is best and share their ideas before carrying out the investigation.  Learners then investigate by dropping eggs (or delicate alternatives) from varying heights onto different surfaces (soil, rocky soil, rock and a relatively deep tray of water). Eggs are ideal for this investigation, but possible alternatives are water balloons or small models made out of modelling clay.  After investigating, bring learners back together to discuss what they found out.  *What happened when you dropped the egg on the rocks?*  *How was it different when you dropped it in the water?*  *Which surface was best to cause least damage to the egg?*  *Was your prediction correct?*  Learners then select a point on a satellite photo or drawn image showing water, soil, rocky soil and rocks where they would aim to land their Soyuz capsule.  For health and safety reasons, make arrangements for cleaning up eggs (or water balloons) to avoid slips. If there are any egg allergies in class, choose an alternative.  **Resources:** Images of the Soyuz capsule, images of Earth from space, labelled satellite images showing different types of terrain, eggs (or fragile alternative to be dropped), different surfaces to investigate. |
| **1TWSp.01** Ask questions about the world around us and talk about how to find answers. | **A landing spot for the Soyuz capsule (alternative to practical investigation)**  Explain to learners that our time on the ISS is now over and we need to return to Earth. Ask them to discuss what questions we need to ask about our long journey back to Earth.  *How do you think we will get back?*  *What do you need to think about to keep yourself safe?*  Show them images of the Soyuz capsule and explain this is how astronauts return to Earth. Encourage learners to think of their own questions about the capsule. Learners of this age will probably focus on their basic needs, such as will they be comfortable, how long will it take and how will they go to the bathroom while on the capsule. Ask learners:  *How can we find out more without being able to see the capsule itself?*  Tell learners we will be engaging in some research from secondary sources to see if we can find the answers to the following questions, as well as their own questions:  *Where should the Soyuz capsule be landed, on land or water? Why?*  Learners then use pre-prepared images and simple information texts to find answers to the questions, and show their learning by completing a short piece of writing about what they have learned.  **Resources:** Prepared images and simple information texts about the Soyuz capsule. |

# Sample Lesson 1

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| CLASS: | |
| DATE: | |
| **Learning objectives** | **1Pf.03** Explore that some objects float and some sink  **1TWSp.02** Make predictions about what they think will happen.  **1TWSa.01** Describe what happened during an enquiry and if it matched predictions. |
| **Lesson focus/success criteria** | I can recognise when an object floats or sinks  I can give a prediction.  I can make an observation  I can compare my observation to my prediction and say if my prediction was correct or not. |
| **Prior knowledge/Previous learning** | By now learners will be familiar with a range of common materials and should be able to talk about some of their properties.  Some learners may have some experience of floating and sinking from taking baths or playing at home. The beginning of the lesson allows the learners time to discuss their ideas and gives an opportunity to check their prior understanding of these concepts. |

**Plan**

| **Lesson** | **Planned activities** | **Notes** |
| --- | --- | --- |
| **Introduction** | Explain to learners that they will be exploring floating and sinking. Give them some time to discuss the terms ‘float’ and ‘sink’ with a partner and listen to their explanations to identify learners with high levels of prior knowledge or any misconceptions the class may have.  Show them a small object that will sink (e.g. a marble, a coin) and ask learners to predict whether it will float or sink in a tray of water. Encourage them to give their prediction in a full sentence, using scientific vocabulary and explaining their reasoning. You could give them a sentence frame to help them articulate their ideas, such as ‘I think… because…’; for example, ‘I think it will float because it is small’.  Ask one of the learners to drop the object into the tray and observe what happens.  *Whose prediction was correct?*  *Do you think the same thing would happen with every object made of the same material?*  *Do you think the same thing would happen with every small object?*  Repeat with a larger object, asking learners to predict what they think will happen first and explain their reasoning. | If possible, use a clear plastic tank (or tray) so that learners can see what happens when an object is added to the water. |
| **Main activities** | Before learners begin their main task, model completing a simple table on which they will list: the object they are testing; their prediction about what will happen; and what actually happened when the object is dropped in the water.  Learners then work independently (or in pairs), making predictions and then testing objects of varying sizes and materials to see if they float or sink. Listen to their conversations to see who is able to use the ‘float’ and ‘sink’ vocabulary correctly.  This activity can be extended by asking learners to look for patterns in which objects float and sink. For example, they could investigate whether all plastic objects sink, or if all flat objects float. You could ask them to choose how to record their findings rather than providing a table. | Ensure there is a wide variety in the size, shape and material of the objects available for testing by the learners. |
| **End/Close/ Reflection/ Summary** | Bring the learners back together to discuss what they found out.  *Did any objects surprise you? Why?*  *Did you notice any patterns?*  *Did all the metal objects do the same thing?*  *Did all the large objects do the same thing?*  Discuss how their predictions were made on their understanding before the lesson, and now they have a better understanding of what objects float and sink they should be better at predictions.  Present one final object, not tested by the learners, and ask them to make a prediction about if it floats and sinks. Learners can talk in pairs before sharing their prediction, alongside a reason why they have made it.  Finish the lesson by testing the object and talking about how the more we know the better our predictions can become. |  |

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| **Reflection Use the space below to reflect on your lesson. Answer the most relevant questions about your lesson.** |
| *Were the learning objectives and lesson focus realistic? What did the learners learn today? What was the learning atmosphere like? What changes did I make from my plan and why?*  *If I taught this lesson again, what would I change?*  *What two things went really well (consider both teaching and learning)?*  *What two things would have improved the lesson (consider both teaching and learning)?*  *What have I learned from this lesson about the class or individuals that will inform my next lesson?*  *Were there any misconceptions?* |
| **Next steps**  **What will I teach next based on learners’ understanding of this lesson?** |

# Sample Lesson 2

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| CLASS: | |
| DATE: | |
| Learning objectives | 1Bp.02 Know that animals, including humans, need air, water and suitable food to survive.  1TWSc.01 Sort and group objects, materials and living things based on observations of the similarities and differences between them. |
| Lesson focus/success criteria | I can say what animals, including humans, need to survive  I can sort and group objects based on criteria |
| Prior knowledge/Previous learning | Learners should have already learned to identify things that are living and things that have never been alive. |

**Plan**

| **Lesson** | **Planned activities** | **Notes** |
| --- | --- | --- |
| **Introduction** | Introduce the term ‘survive’ and discuss it with learners. Explain that it means staying alive, and there are certain things that all animals (including humans) need in order to survive. Look at a range of animals and talk about what they all need to survive. |  |
| **Main activities** | Read out a list of items that may or may not be necessary for survival. Ask learners to ‘vote with their feet’; for each item read out, they move to one side of the classroom if they think it is necessary for survival and the other side of the classroom if they think it is not necessary. After all the learners have moved, select one or two from each side to explain why they have chosen that side. This is a valuable, formative, assessment tool to see quickly what learners are thinking.  Through discussion, agree a set of requirements for humans to survive. Ask learners to think about animals they are familiar with, e.g. their pets.  Do these animals have the same requirements as humans?  To demonstrate their understanding, learners imagine they are stranded on a desert island with a pet. Luckily, they have a mobile phone with enough battery for one phone call! Learners role-play a conversation asking for the supplies they will need in order to survive.  Allow learners time to practise, and then have them perform for other groups. | Items that are important to learners (e.g. teddy bears, games consoles) should be included in the list to enhance the discussion about what is vital.  To make the role‑play feel more ‘real’, a mobile phone could be used (model or real). |
| **End/Close/ Reflection/ Summary** | To finish the lesson, learners peer assess each other’s role-plays, giving feedback on which requirements for survival were included and which were not. | If resources are available, learners could be videoed as evidence of their learning. |

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| **Reflection Use the space below to reflect on your lesson. Answer the most relevant questions about your lesson.** |
| *Were the learning objectives and lesson focus realistic? What did the learners learn today? What was the learning atmosphere like? What changes did I make from my plan and why?*  *If I taught this lesson again, what would I change?*  *What two things went really well (consider both teaching and learning)?*  *What two things would have improved the lesson (consider both teaching and learning)?*  *What have I learned from this lesson about the class or individuals that will inform my next lesson?*  *Were there any misconceptions?* |
| **Next steps**  **What will I teach next based on learners’ understanding of this lesson?** |

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