Northern Territory Preschool
Science Games

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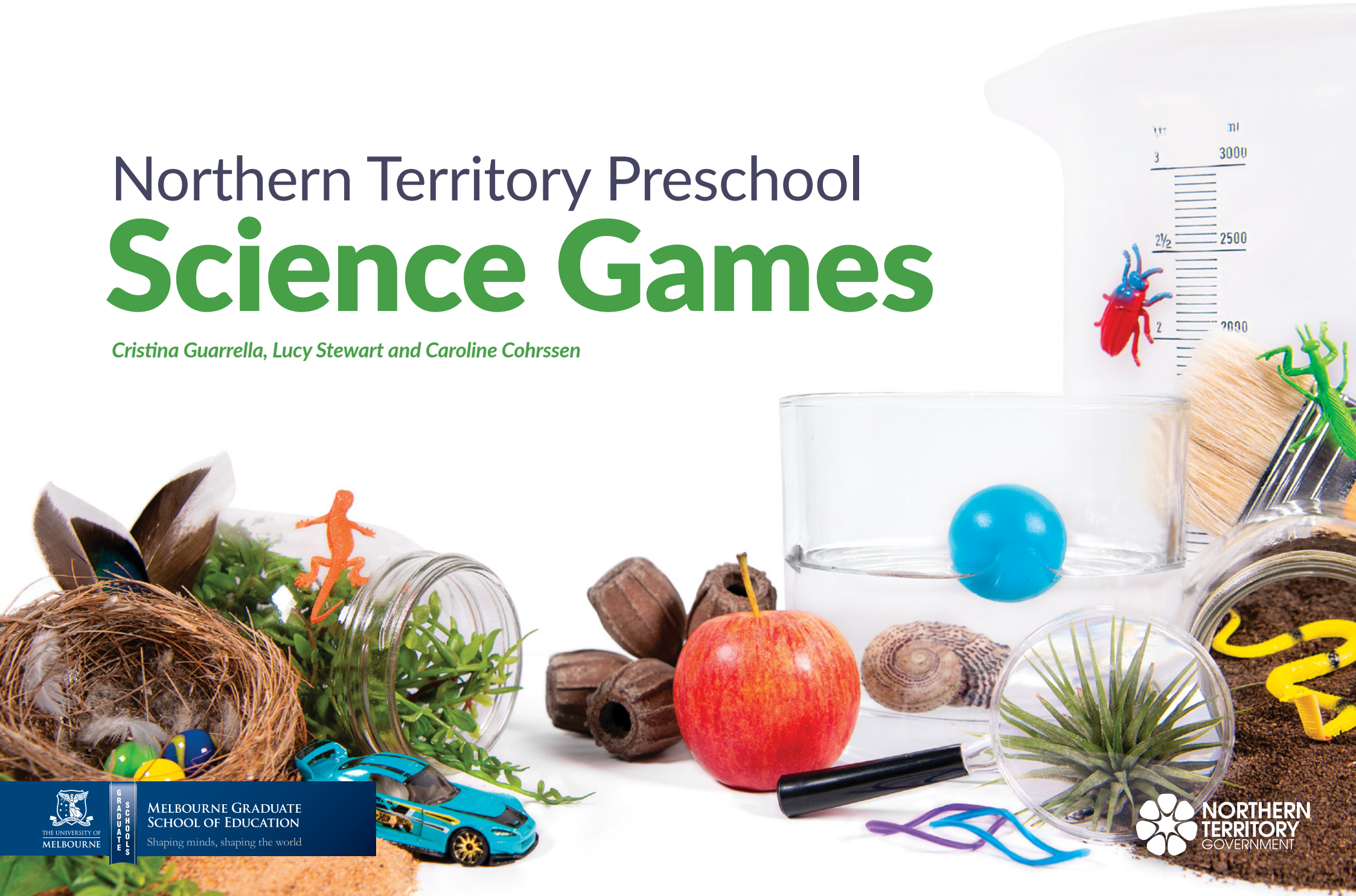

THE UNIVERSITY OF MELBOURNE
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Shaping minds, shaping the world

NORTHERN TERRITORY GOVERNMENT

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An electronic copy may be downloaded from the website
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Northern Territory Preschool Science Games,
Northern Territory Department of Education, Darwin, Australia

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These games have been developed by The University of Melbourne to support the implementation of the Northern Territory Preschool Curriculum. The games build on and extend the Northern Territory Learning Games® and in so doing, acknowledge that families are children's first teachers. The games are designed to prioritise children developing transferable, scientific thinking skills. Open-ended activities are also suggested, as this provides opportunities for children to explore the concepts in line with their particular interests. This provides a platform for teachers to facilitate inquiry-based learning.

The games are designed to assist preschool teachers enacting differentiated teaching and learning while maintaining important learning objectives for individual children that are informed by observation-based evidence.

The games are designed to be fun for children and easy to use for teachers. They focus on encouraging active participation, scientific thinking and reasoning, and back-and-forth conversations. Games are designed for use with small and large groups, acknowledging that high-level thinking skills are encouraged during interactions with peers and adults. Some of the games will be familiar to preschool teachers. It is hoped that the explicit learning objectives and suggested words to model in facilitating children's learning during these learning experiences will support formative assessment and reveal ways in which learning can be consolidated or extended. Some of the games are best played during the dry season or the wet season – use them in the way that follows children's interests and is relevant to your context.

Step-by-step instructions guide the educator through each game. Responding to educators' concerns about 'how to do science talk', important words to model are provided. You may wish to print each word (and meaning) on a card and laminate it. Then, the new words can be placed near the games.

The games are structured according to different science contexts. In addition, different science process skills are indicated for each game in a coloured box at the start of the game. These include Observing (four games), Classifying (three games), Comparing (two games), Communicating and Recording (three games) and Predicting and Checking (three games). However, note that each game could also be used to rehearse other science process skills as well, and a be platform for further investigation and inquiry.

The games strengthen opportunities for preschool teachers to respond to the diverse scientific knowledge, reasoning and language that children demonstrate as they transition into preschool, planning for current and future learning, and enacting the planning cycle. The games also provide opportunities to use mathematical thinking and to support communication and language skills. Some examples of connections with the *The Northern Territory Preschool Maths Games* have been pointed out.

Department of Education. (2013). Northern Territory LearningGames®. Darwin, NT, Department of Education.

Contents

Biological Science

In this collection of games, the focus is on animals and their habitats, plant growth and the human body.

Environmental Science

In this collection of games, the focus is on sustainability.

Chemical Science

In this collection of games, the focus is on natural and constructed environments; solid, liquid and gas states, and change of state.

Earth and Space Science

In this collection of games, the focus is on weather, soil and rocks, and the solar system.

Physical Science

In this collection of games, the focus is on forces, simple machines, magnetism, light and sound, and electricity.

Science Games

Grouped by science process skills

Observing

Use the five senses to explore objects and materials, indoors and outdoors

Classifying

Explore the properties of ordinary objects in order to group them

Comparing

Describe (verbally or nonverbally) what they see, hear, touch, feel and taste to describe, compare, order and sort

Communicating and Recording

Create and use simple representation to organise, record and communicate (verbally or nonverbally) scientific ideas and concepts

Predicting and Checking

Use skills of prediction, hypothesising, testing, experimenting and evaluating in play and construction experiences

Biological Science	Growing alfalfa sprouts 6 Using our senses 8 Paper bag lungs 12	Insects and spiders 10			
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Earth and Space Science		Nature hunt 24	Rain gauge 26		Cloud diary 28
Physical Science			Magnifying glasses 30	Magnetic and non-magnetic 32	Sink and float 34 Cars and ramps 36

Observation Biological Science
Growing alfalfa sprouts

Invite a small group of children to plant alfalfa seeds in a jar with you. Look carefully at the seeds with the children before the children plant them. Ask the children to tell you what they **observe** about the seeds when they look closely at them. While you plant the seeds together, have a conversation with the children. Ask, 'What do you think will happen to the seeds?' Ask the children to explain their thinking. Place the jar in a sunny spot. Water the seeds each day with the children. Together you will notice the changes as the seeds begin to sprout.

Why this is important

*The children will **observe** changes in the growing seeds. Over time, the children will see roots and stems sprout from the alfalfa seeds. They will learn that seeds germinate and grow into plants.*

Observing
Using the five senses to explore objects and materials, indoors and outdoors.

Why this scientific skill is important
*Children use their senses to learn about the world around them. **Observing** all the parts of the natural environment encourages children to care for their country.*

You will need

- Alfalfa seeds (or a different, fast growing seed)
- Cottonwool
- Water in a spray bottle
- Small glass jar
- Camera/iPad to take photos
- Pen and paper

Learning Objectives

For the children to:

- Use the sense of vision in observing change
- Observe how seeds grow into plants
- Record changes in the seeds over time
- Describe the changes they notice as the seeds grow

Important words to use

- Observe
- Seed
- Germinate
- Sprout
- Root
- Stem
- Grow
- Plant

Observation

Growing alfalfa sprouts

New words

- ***Observe*** *– To notice, watch or discover something, using the five senses.*
- ***Germinate*** *– When a seed begins to sprout.*
- ***Sprout*** *– A small growth on a seed or plant.*
- ***Root*** *– The part of a plant that is usually underground and supplies stems and leaves with water.*
- ***Stem*** *– The main stalk of a plant.*

What the educator does

1. Lay some of the alfalfa seeds out on the table. Ask the children, 'What do you notice about these seeds?' As they describe the seeds, write down what the children **observe**.
2. Take a photograph of the alfalfa seeds on the table. (You will use this photograph later when you help the children remember what the seeds looked like before they were planted.)
3. The children line the bottom of the jar with cottonwool. Next, the children use the spray bottle to wet the cottonwool. Pour out any water that has not been absorbed by the cottonwool.
4. The children sprinkle alfalfa seeds over the cottonwool. Take care that the seeds are spread out over the surface of the cottonwool.
5. Encourage the children to water the seeds each day using the spray bottle. Ask questions about the changes children **observe**. Ask, 'What has happened since you last looked at the seeds?', 'Tell me about the changes you see?', and 'What do you think the seeds might look like next week?' Write down the predictions. (You will use these later to remind the children about what they thought would happen to the seeds.)
6. Once the seeds have sprouted, show the children the first photograph of the alfalfa seeds and remind them of the words they used to describe the seeds. Compare the alfalfa sprouts with the photograph and ask, 'How did watering the seeds change the seeds?' and 'What makes you think that?'
7. If you can see the roots through the side of the jar, ask the children what differences they observe between the roots beneath the cottonwool and the part of the plant that is above the cottonwool. Ask, 'Why are these plant parts different? What jobs do the plant parts do?'
8. Invite the children to share their ideas with the group or draw them on a piece of paper.
9. You could plant the alfalfa sprouts out into the garden with the children and continue to **observe** them growing.

Drop back ideas

1. *Go online with the children and watch a time-lapse video of a seed sprouting. Describe what is happening to the seed as you watch the video with the children.*
2. *Play some music and ask the children to be a tiny seed sprouting into a plant. Afterwards, ask the children to tell you about what happened to them when they were seeds. Ask them to explain how they changed.*
3. *Have the children take photographs or draw pictures of the seeds each day when they water them. Line up their pictures in order and ask the children if they notice anything changing.*

Extension ideas

1. *Plant seeds in three different jars. Place one jar in full sun, one jar in the shade and one jar in total darkness (like in a cupboard or a closed box). Water the seeds each day and ask the children what they notice is different about how the seeds in the sun, shade and darkness are growing.*
2. *Plant different types of seeds using the steps described above. Ask the children to describe the differences they observe between the different types of sprouts. Some will sprout one leaf while others may sprout two. Some seeds will take longer to sprout than others. Ask the children what this tells us about different types of plants.*

Open-ended activity

*Fill a tray with seeds. Encourage the children to look at, touch and smell the seeds. Ask the children questions to describe what they **observe**. Follow the children's lead as they explore what they can do with the seeds. They may try to open the seeds to look inside them. They may enjoy the feeling of running their hands through the seeds. They may begin to notice similarities and differences between the seeds.*

Observation Biological Science
Using our senses

During a fruit snack or lunchtime, focus children's attention on their senses of sight, smell, touch and taste. Asking children to use these senses during an everyday activity allows for the development of **observational** skills and vocabulary to describe objects.

Why this is important

*Children use their senses to **observe** the world around them. An everyday activity, such as eating fruit, provides opportunities for children to **observe** using their sense of sight, touch, smell and taste. With your support, their vocabulary is extended by adding new words to describe their observations.*

Observing

Using the five senses to explore objects and materials, indoors and outdoors.

Why this scientific skill is important

Children use their senses to learn about the world around them.

You will need

- Fruit snack/lunch

Learning Objectives

For the children to:

- Use the senses of sight, smell, touch and taste to explore their food
- Describe what they observed when using these senses
- Use appropriate vocabulary to describe what they see, smell, touch and taste
- Make connections to other sensory experiences

Important words to use

- Smooth/bumpy
- Sweet/sour
- Juicy/dry
- Crunchy
- Soft/hard
- Tastes like, smells like, feels like, looks like

Observation

Using our senses

What the educator does

1. Sit with the children during snack break or lunch and eat your own food.
2. Talk to the children about the food people are eating. Ask the children to describe their food. For example, 'Does it taste sweet or sour?'
3. Encourage the children to smell their food and to describe what it smells like. For example, 'Does it smell fruity or spicy?'
4. Bring children's attention to what it feels like in their mouths. Ask the children, 'Is your food crunchy? Is it juicy? Is it smooth or bumpy? What else do we eat that is crunchy (sour, juicy, sweet, sour, smooth or bumpy)?'

Drop back ideas

1. *Focus on modelling language to the children. For example, 'Your apple looks juicy. Your banana looks soft and squishy.'*
2. *Provide children with objects that have different textures or smells to explore. Draw their attention to these, modelling new words like 'smooth', 'rough', 'hard', 'soft', 'rubbery' and 'hard'.*
3. *Make a 'feely bag'. Put a range of objects of different sizes and shapes into a drawstring bag (or a container that children can't see into). Children take turns placing their hand into the bag, choosing an object without looking at it. Then they use describing words to give clues to their friends before pulling it out to check if their friends guessed correctly.*

Extension ideas

1. *Expand children's thinking to other types of food. Ask the children, 'What other foods are crunchy (smooth, juicy or sour)?'*
2. *Encourage children to contribute objects to sensory boxes. You could have a box of rough objects like tan bark and sandpaper, a box of soft objects like cottonwool and small soft toys, and a box of fragrant objects like cinnamon sticks, lavender, mint leaves and blue gum leaves. Model describing words as you explore the objects with the children. Encourage children to create more sensory boxes.*
3. *Make a 'feely bag'. Put a range of objects of different sizes and shapes into a drawstring bag (or a container that children can't see into). Children take turns placing their hand into the bag, choosing an object without looking at it. Then they use describing words to give clues to their friends before pulling it out to check if their friends guessed correctly.*

Open-ended activity

When children are using any materials (particularly sensory) indoors or outdoors, ask questions that prompt children to think about how they are using their senses. Using playdough, slime, finger painting, sand play and water play presents opportunities for this.

Classifying Biological Science
Insects and spiders

By looking closely at insects and spiders and discussing their body parts such as how many legs they have and whether they have wings, children explore ways to group them. For example, insects have six legs and spiders have eight legs.

Learning about the characteristics of different animals may lead to discussions about how they move, their habitats and their life cycles. Their body parts are specially adapted to suit their needs. For example, spiders create webs for protection; insects that have no wings need to climb up trees or burrow underground for protection.

You will need

- Tan bark
- Tray
- Plastic insects and spiders
- Leaves
- Magnifying glasses

Learning Objectives

For the children to:

- Explore the different features of spiders and insects
- Count the number of legs on different spiders and insects
- Use words to describe what they see
- **Classify** (group) objects that share features

Important words to use

- Features
- Legs
- Body
- Group
- Wings
- Habitat

Why this is important

*Children can explore different ways of **classifying** objects by looking at their body parts. When children know how to **classify** objects by their characteristics, they can transfer this skill. Being able to identify the features of objects and group them in different ways supports children's understanding of **classification**.*

When prompting ways to classify objects, you could encourage children to consider size, colour, uses, materials, parts and shapes.

Classifying

Exploring the properties of ordinary objects in order to group them.

Why this scientific skill is important

***Classifying** requires children to groups objects based on rules. This skill is used in everyday life and builds on observation skills. Children use the identification of features and characteristics to **classify** objects and create order in the world around them.*

Classifying

Insects and spiders

New word

- ***Habitat*** *- Natural home or environment of an animal, plant or other organism.*

What the educator does

1. Place the tan bark on the tray. Put the insects and spiders on the tan bark and provide magnifying glasses for the children to use.
2. Invite the children to hold and look at the insects and spiders. When the children use the magnifying glasses, show them how to hold the magnifying glasses close to the insects and spiders, rather than close to their eyes.
3. Ask children, 'What do you notice about the spiders' bodies? How many legs do they have?' Look at the other insects and spiders. Again, ask the children to count how many legs (and wings) they have.
4. Support children to **classify** by the features they have noticed. Say to the children, 'The creatures with six legs are insects and the creatures with eight legs are spiders. Let's sort the insects and spiders into groups.'

Drop back ideas

1. *Read books about spiders and insects. Look at the pictures. Count the legs, wings and other body parts. Talk about which have the same number and which are different.*
2. *Using the resources for this activity, focus on just one feature such as size. Ask children to group objects: which are big and which are small?*
3. *Focus on one characteristic only, such as legs. For example, you could ask, 'How many legs does your spider have? Let's count them together.' Support the children to sort objects by number of legs.*
4. *Consider the Physical Science learning experience: Magnifying glasses.*

Extension ideas

1. *Ask the children to think of a different way to **classify** the insects and spiders. For example, sort by colour, size, or whether they have wings.*
2. *Discuss the different habitats that these creatures might need. Ask children questions that lead to extended thinking and discussion such as, 'This spider has eight legs. Where might it live? Why do you think that?' or, 'If this insect has wings, how do you think it moves around?'*
3. *Provide the children with magnifying glasses, clipboards, paper and pencils. Ask them to conduct an investigation. Ask them to find insects and spiders in the outdoor environment. The task is to draw the animals without touching them. After they have drawn the animal, the children count the number of legs and decide whether if it is a spider or an insect.*
4. *Consider the Physical Science learning experience: Magnifying glasses.*

Open-ended activity

While children are playing outdoors, draw their attention to living things in the environment. Then, ask the children to identify features that they notice. Model language such as, 'I can see a bird with two legs and two wings'. Remember to draw children's attention to features of non-living things in the environment.

Observation Biological Science
Paper bag lungs

The children will make a paper bag lung and use their own breath to inflate it. As the children play with the paper bag lung, they will focus on the experience of their own lungs inflating and deflating and observe this happen to the paper bag. Introducing the game with a drop back suggestion (on the following page) may be needed to support children's understanding.

1 Using the tip of a pen, poke a hole at the bottom of the cup. Make sure the opening allows for a straw to fit tightly.

2 Secure the bag to the cup with an elastic band. Use sticky tape to seal the the paper bag tightly.

3 Insert a straw in the hole at the base of the cup. Use sticky tape to make a tight seal where the straw enters the cup.

4 With construction of the paper bag lungs complete, have a child blow into the straw and watch the bag inflate.

Why this is important

The human body is made up of different organs. In this game, the children are learning about respiration: when we breathe, our lungs take in oxygen and breathe out carbon dioxide.

Observing

Using the five senses to explore objects and materials, indoors and outdoors.

Why this scientific skill is important

Children use their senses to learn about the world around them. In this game, children develop the foundational scientific skill of observation. As children observe the paper bag lung inflate, they use their sense of sight to observe a model of a lung. As they take a breath to inflate the paper bag lung, they feel their own lungs expand inside their bodies. As they blow into the straw, they see the paper bag expand the way their own lungs expand when they are full of air. At the same time, they feel their own lung deflate as the air leaves their lungs.

You will need

- Paper cups
- Pen
- Paper bags
- Elastic bands
- Straws
- Sticky tape

Learning Objectives

For the children to:

- **Observe** what happens to their body as they breathe
- **Observe** what happens when the paper bag lung inflates
- Use language to **describe** the similarity between the paper bag lung and their own breathing

Important words to use

- Breathe/respire
- Lungs
- Air
- Oxygen
- Carbon dioxide
- Inflate
- Organs
- Human body

Observation

Paper bag lungs

New words

- ***Inflate*** *- To fill extendable material (like a balloon) with air.*
- ***Lungs*** *- The main organ of the respiratory system in humans and most animals.*
- ***Organs*** *- Parts of the body like the heart, lungs and kidneys. The skin is also an organ.*
- ***Oxygen*** *- A colourless, odourless gas breathed in during respiration.*
- ***Carbon Dioxide*** *- A colourless, odourless gas breathed out during respiration.*
- ***Respiration*** *- The act of breathing.*

What the educator does

1. Help the children to make the paper bag lungs. Make a small hole in the side of a cup near the bottom. Next, place the opening of the paper bag over the mouth of the cup. Use an elastic band and sticky tape to secure the paper bag to the cup. Thread the straw through the hole in the side of the cup. Use sticky tape to make a tight seal where the straw enters the cup. Look at the pictures on the previous page to guide you.
2. Encourage the children to inflate the paper bag lungs by blowing through the straw. As the children play with the paper bag lungs, ask them to describe what happens when they blow through the straw. What does this feel like in their body? What does the air do to the paper bag? What happens when the paper bag goes flat? Encourage children to use their words and body movements to **explain** what happens to their lungs.

Drop back ideas

1. *At different times of the day, take time with the children to notice their breathing. When the children are relaxed, **describe** their slow calm breaths. After they have been active, **describe** how they are breathing fast.*
2. *After Step 1 (above), have the children run on the spot for 30 seconds. Once they stop, have the children **describe** what happens to their bodies as they breathe. Ask the children, 'Does your body feel the same as it did before you ran on the spot?' and, 'Why do you think breathing might feel different now?' You could do this when talking about the heart. Ask the children to place their hands on their chests before and after running to feel how fast their heart is beating. Ask the children to **describe** the difference in how their hearts feel before and after exercise.*

Extension ideas

1. *Encourage the children to **observe** the similarities and differences in their bodies. Children learn that the human body is made up of the same body parts.*
2. *Create full-size paper outlines of the children's bodies. Provide the children with paints or pencils to draw in their organs. Have books of the human body available. Look at the pictures of the human body in the books and the children's own drawings and talk about the parts of the body.*

Open-ended activity

Set up a play space with a range of resources relating to the human body. You could provide old X-Ray films on a light box, plastic models of organs (e.g. a heart) and a full or part skeleton of the human body. Observe the children's play and identify their interests. Reflect on your observations of the children and use this information to add or take away resources for the children to explore. If the children were interested in the movement of the skeleton bones, you may remove the plastic models of organs and add a model of a joint. Talk to the children as they play. Describe what you see and ask the children questions about what they are observing.

Classifying Environmental Science
What goes in the compost?

The children will work together to sort through ordinary items that end up in the rubbish bin. They will **classify** the rubbish into two groups: materials for landfill and items that can be put into the compost bin.

What to add to the compost 'Compostable'	What not to add to the compost 'Non-compostable'
✓ Vegetable and food scraps	✗ Meat and dairy products
✓ Tea leaves and tea bags	✗ Metals, plastic, glass
✓ Cold wood ash	✗ Cooking fat
✓ Coffee grounds	✗ Magazines
✓ Dead flowers	✗ Large branches
✓ Old potting mix	✗ Weeds with seeds or roots
✓ Egg shells	✗ Bones
✓ Old newspapers (wet)	✗ Sawdust from treated timber
✓ Sawdust (not from treated timber)	✗ Animal manure (especially cat and dog droppings)
✓ Fallen leaves, weeds and grass cuttings (in layers)	✗ Bread or cake (may attract mice)

Why this is important

In this game the children learn how to reduce waste going to landfill.

*By recognising the properties of items that can be put in a compost bin, the children are practicing the scientific skill of **classifying**.*

Classifying
Exploring the properties of ordinary objects in order to group them.

Why this scientific skill is important
*Classifying requires children to groups objects based on rules. This skill is used in everyday life and builds on observation skills. **Classifying** objects as compostable and non-compostable allows children to order objects using fixed rules, based on what they have observed and compared.*

You will need

- A selection of compostable and non-compostable items. For this game you can use either real life materials or representations of these such as toy fruits, vegetables, eggs and plants
- A compost bin
- A landfill bin

Learning Objectives

For the children to:

- Use fixed rules for **classifying** items as compostable or non-compostable
- Explain why they decided that an item can or cannot be composted

Important words to use

- Compostable/ non-compostable
- Sort
- Classify
- Waste
- Landfill

Classifying

What goes in the compost?

New words

- ***Compostable*** *- Items that rot easily and can be used in compost (this does not include meat and dairy because they attract dogs and rats); non-compostable items must not be placed in the compost bin.*
- ***Landfill*** *- Rubbish that will be disposed of by burying it underground.*
- ***Non-compostable*** *- Items that do not rot easily and that cannot be used in compost.*

What the educator does

1. Sit on the floor in a circle with the children. Place the landfill and compost bins in front of you and the compostable and non-compostable items to be sorted in the middle of the circle.
2. Explain the **classification** rule to the children. The rule is fixed – the children must not change it. Items that can go in the compost include vegetables, food scraps, leaves, tea bags and egg shells. All other items of rubbish have to go in the landfill.
3. Give each child a turn to choose an item from the middle of the circle. Ask each child to choose an item and decide which bin it belongs in. Ask each child, 'Is that something that can go in the compost?', 'Have you chosen something that is compostable?' or, 'Can you explain why you have chosen to put it in that bin?' Encourage the children to place the items in the correct bins and repeat the correct reasons when given by the children, to reinforce them.
4. As the children become more confident with classifying the items, allow them to put them into the bins independently.

Drop back ideas

1. *Encourage the children to collect their food scraps in a bucket during the daily preschool routine, separating out meat and dairy products as these are not compostable. Add the scraps to the compost bin.*
2. *Create compost and landfill posters with the children. Include pictures of items that can go in the compost and items that go into landfill. Hang the posters near the compost and landfill bins where children can see them as reminders.*
3. *Create a second set of compost and landfill posters. Print out pictures of compostable and non-compostable items. Support the children to match the compostable items with the compost poster and the non-compostable items with the landfill poster.*

Extension ideas

1. *Add an additional bin for recycling and another for reusable materials. Discuss the classification rules for these bins and sort rubbish into four bins. Ask the children to explain their choices.*
2. *Create compost, landfill, recycling and reusing posters with the children. Draw or find pictures of examples for each. Hang the posters near the bins where children can see them as reminders.*
3. *Create a worm farm with the children. Go online and use books to investigate how to set up the worm farm and what worms eat. Are there differences between what goes in the compost and the worm farm?*
4. *Collect the class rubbish for one day. Sort this into compost, recycle, reuse and landfill. Take a photograph and count how many items you have in each category. Repeat this one day each week for a term. Compare your results from week to week. Does the amount of waste stay the same or change? What can you do to reduce the amount of landfill?*

Open-ended activity

Place an empty fish tank on a bench at the children's eye level. Help the children to place compostable and non-compostable items into the fish tank. Cover everything in the fish tank with soil. Plant two or three small plants into the soil. Water it as needed. Leave the fish tank visible in the preschool environment to allow the children to observe changes. Pay attention to what the children observe in the fish tank and follow their interest, discussing what they see.

Communicating and recording Environmental Science

How can we reuse this?

Children and families help to collect objects that could be recycled like empty boxes, bottle caps, milk cartons and jars. During small group discussions, ask children to **communicate** what they know already about the materials from which objects are made (such as glass, plastic and cardboard). Encourage children to **share creative ideas** about how each object could be reused.

Why this is important

Thinking of ways in which objects that human beings have made can be used more than once is a way to help children understand how people affect the environment. Finding new ways to use an object makes it more useful. It prevents the object from adding to rubbish in landfill.

This also helps children to recognise the materials from which objects are made. They learn that different materials are used for different purposes.

Communicating and recording

*Creating and using simple representation to organise, **record** and communicate (verbally or nonverbally) scientific ideas and concepts.*

Why this scientific skill is important

*Children use communication skills to learn more about different materials and how they can be reused. They also practise **explaining** and discussing their ideas.*

You will need

- Large piece of paper
- Textas
- Some reusable materials like bottle tops, cardboard boxes and jars (enough for each child to have materials to use)

Learning Objectives

For the children to:

- **Talk about** what can and cannot be reused and the reasons for this
- Use words to **share their ideas** about how objects can be reused
- **Record their ideas** with the educator's support

Important words to use

- Reuse
- Plastic
- Cardboard
- Paper
- Glass

Communicating and recording

How can we reuse this?

What the educator does

1. Place materials in the middle of a small group of children sitting in a circle.
2. Invite the children to select an item from the middle. Ask children questions like, 'What object do you have? What is it made of? What is it used for?'. Make sure that each child has a turn to **share** an idea.
3. Choose one object and explain to the children that it could be reused to make something new. Demonstrate some examples. For example, a glass jam jar could be used to hold pencils or it could be filled with water to hold flowers. A cardboard cereal box could be used to make a robot.
4. Ask children, 'What else could you use your object for?' Encourage each child to **suggest** a new use for the object they selected. Encourage the group to **discuss** their ideas together.
5. Encourage the children to **record** their ideas by writing or drawing them on the large piece of paper.

Drop back ideas

1. *Set up reusable materials for children to explore. Talk to children about the original purpose for the material (e.g. a box for cereal, a bottle top from a water bottle).*
2. *Invite them to make new things with the materials and to **explain** what they are making.*

Extension ideas

1. *Talk about what happens to some materials when they are put in the rubbish. Experiment by burying different materials (paper, glass, plastic) in a designated area in the yard and checking on them over time. Talk about the differences between the materials as time passes. You could make a chart to **record** the changes once each week.*
2. *Ask children, 'What materials do we reuse every day?' The list may include reusing lunch boxes by washing them and using them for lunch the next day. Ask the children to **make a list** of reusable materials and add to it each time someone has a new idea. They could write or draw the items on the list.*

Open-ended activity

*Set up a 'making area' in the classroom. Encourage children to make something new by reusing materials. Talk to children about what the materials were used for before. Invite them to make new things with the materials and to **explain** what they are making. Rather than throwing their creations away, encourage children to take them apart carefully. If they return the material to the making area, they can reuse them again.*

Observation Environmental Science
Watering plants

Children will **observe** what happens to the soil and the leaves of plants after they have been watered.

By using different equipment to water plants, children have opportunities to **observe** the different ways in which water can be dispersed. They **observe** how different types of water dispersal affects how quickly the plants receive water. They also **observe** what happens when a plant does not get enough water.

Why this is important

Water is essential for life. Animals, humans and plants need water to grow. Water can move and flow. We need to be careful about how much water we use.

Observing
Using the five senses to explore objects and materials, indoors and outdoors.

Why this scientific skill is important
Children use their senses to learn about the world around them. ***Observing*** *naturally occurring phenomena encourages children to care for their country.*

You will need

- Plants/seedlings/garden – indoor or outdoor
- Water
- Spray bottles
- Watering cans with nozzles and without nozzles
- Jugs

Learning Objectives

For the children to:

- Use their eyes (sense of vision) to **observe** the water as it leaves the container
- Use their hands (sense of touch) to feel the water leaving the container
- Talk about what happens after the water has been poured/ sprayed on the plants

Important words to use

- Pouring
- Spraying
- Droplets
- Absorb
- Soil
- Leaves

Observation

Watering plants

New words:

- ***Absorb*** *- To take in or hold water.*
- ***Dispersed*** *- Spread or scattered around.*

What the educator does

1. Provide different containers for the children to water plants with, such as spray bottles, watering cans and jugs.
2. Look for plants that are drooping – see if the soil around them is dry. Show the children the dry soil and ask them what has happened to the plants.
3. Invite two children to water a drooping plant using the spray bottle. Talk about how much water the children **observe** coming out of the spray bottle. Ask the children what happens when the water reaches the plant. Ask, 'Do the leaves get wet? Do the leaves move when the water hits them? Why? Does the soil get wet?'
4. Do this again using a watering can. Ask children what they **observe** now. (The children may **observe** that more water is going onto the plant than previously and the leaves move more when more water hits them.) Ask the children what they **observe** about the soil. What happens to the water? Where does it go? Does the soil absorb the water?
5. Do this again with a jug of water. Ask the children 'What happens when you pour a lot of water onto the plant?'

Drop back ideas

1. *Focus on one kind of watering equipment (for example, a spray bottle). Ask children to explain where the water goes after it has been sprayed on the plant. Use the words you want the children to learn: 'Do you see the droplets? What are they doing? They are rolling off the leaves and into the soil!'*
2. *Set up two play areas with soil – one that is wet and muddy, and another that is dry. Provide buckets and digging equipment. Encourage children to make **observations** about the two different environments and the effects that water has on the soil.*

Extension ideas

1. *Ask the children what they think may happen if plants do not get enough water. Write down their ideas and encourage the children to draw pictures to predict (say) what will happen.*
   *Agree that you will not give the plant any water so that the class can explore what happens when plants do not get enough water to grow. Encourage children to **observe** plants drooping. Look at the plant each day for a few days.*
   *After a few days, give the plant enough water to soak the soil. **Observe** what happens to the plant. Invite the children to draw pictures of the plant a few hours after it has received water.*
   Compare their first pictures with their second pictures. Discuss what may have led to this change in the plant.
2. *At group time, discuss what happens to plants when there is no water (or rain) for a long time.*
   Outside, identify areas of the garden that are dry and have few plants. Then, encourage the children to find areas of the garden that have good water supply. What do the plants look like in this area?

Open-ended activity

*Provide children with a tub of water and a range of equipment so that children can explore and **observe** the movement and absorption of water. For absorption, equipment could include materials such as face washers, scraps of different fabric and sea sponges. For movement, water wheels, jugs, plastic syringes and squeezable toys that fill with water are suitable.*

Observation Chemical Science
Paint with water

Provide a small group of children with buckets of water and paintbrushes. Encourage them to 'paint' hard surfaces. You will use language to support the children to learn about evaporation by **observing** what happens to the water.

You will need

- Buckets of water
- Paintbrushes

Learning Objectives

For the children to:

- Use the sense of vision to **observe** and comment on the evaporation of water
- Use scientific language accurately

Important words to use

- Evaporate/evaporation
- Liquid
- Gas
- Observe

Why this is important

*While the children **observe** the changes in their water paintings, they are learning about evaporation. As the water heats up on the hard surface it evaporates. Evaporation is when water turns from a liquid into a gas.*

Observing

Using the five senses to explore objects and materials, indoors and outdoors.

Why this scientific skill is important

*Children use **observation** to understand and monitor change in the environment around them. **Observing** and monitoring change in the natural environment encourages children to care for their country.*

Observation

Paint with water

New words

- ***Evaporation*** *- When liquid changes into a gas. Liquid water evaporates to become a gas called 'water vapour'.*
- ***Gas*** *- An air-like substance that fills a space.*
- ***Liquid*** *- A substance that flows freely like water or oil and takes the shape of its container.*

What the educator does

1. Provide the children with paintbrushes and a bucket of water. Encourage them to paint on hard surfaces in the sun.
2. As the children paint, draw their attention to sections of their work where the water has 'disappeared'. The water has evaporated. Ask the children, 'What do you think has happened to the water here?' Listen to their responses. Explain to the children that the water has evaporated - this means it has turned from a liquid into a gas.
3. Paint a line of water and watch it evaporate. Describe what you **observe** and ask the children what they can see happening as the water evaporates.

Drop back ideas

1. *Use water to make hand- and footprints on different surfaces. Draw the children's attention to the marks they are making. Ask them, 'What do you notice happening to your footprints?'*
2. *Provide the children with spray bottles to spray water on outdoor surfaces. Use words to describe the water turning from a liquid to a gas.*

Extension ideas

1. *Place a jar or a cup of water in the room where it will not be bumped over. Draw a line on the jar to show the water level. Each day look at the water level with the children. Discuss how much water has evaporated. Continue to **observe** the water until the jar is empty. Ask the children, 'What has happened to the water?' and 'Why would more water evaporate on some days than on others?'*
2. *Paint lines of water in different areas of the yard e.g. full sun, full shade and partial sun. Note the time at which you paint the lines. How long it takes for the water to evaporate? Which line evaporates the fastest and which line takes the longest to evaporate? Ask the children to suggest reasons for the differences.*
3. *Place an ice block outside. **Observe** and record the changes with the children. Use language to describe the changes as the ice melts to water and evaporates to gas.*

Open-ended activity

*Set up a table with a large container of water, a bowl of ice cubes and some smaller cups, funnels and mixing spoons. Encourage the children to engage with the resources. Support their **observations** by asking what they notice happening to the water and ice. Follow the children's lead as they play.*

Communicating and recording Chemical Science
Making slime

Using their eyes and their hands, children **observe** and experience the changes that take place when they mix a solid and a liquid. Once the slime has been made, it can be **explored** using the senses over a period of time. Once the chemical change has happened, it will not change back – make sure the children are watching out for the change from the beginning so that they share in the excitement!

Children can make this slime themselves, either on their own or in small groups.

You may prefer to make slime outdoors – it can be messy fun!

You will need

- Large tub/water trough
- Soap flakes (one cup)
- Warm water (three cups)
- Whisks or egg beaters
- Food dye

Learning Objectives

For the children to:

- Explore the change that happens when liquid and solid are mixed
- Use vocabulary to **describe** what they see and feel

Important words to use

- Solid
- Liquid
- Describe
- Change
- Texture

Why this is important

*A chemical reaction happens when we mix the liquid (water) and the solid (soap flakes) together. A new substance is made. This chemical reaction cannot be reversed: we can't separate the soap flakes from the water afterwards. This provides opportunities for children to **experience** and **talk** about a chemical change. By talking about what they notice and feel, children **communicate** their observations of change and **describe** states of matter.*

Communicating and recording
Creating and using simple representation to organise, record and communicate (verbally or nonverbally) scientific ideas and concepts.

Why this scientific skill is important
*Children build on their observation skills when they **communicate** what they experience through using their senses. They also **communicate** their understanding of how the materials change when they combine.*

Communicating and recording

Making slime

New words

- ***Liquid*** *- A substance that flows freely like water or oil and takes the shape of its container.*
- ***Matter*** *- Everything that has a mass and takes up space is made of matter; that is, everything around us is made of matter.*
- ***Solid*** *- Things that hold their shape and can't be poured like a liquid; they can be hard or soft, smooth or rough, big or little.*
- ***Texture*** *- How something looks or feels: rough or smooth, flat or raised.*

What the educator does

1. Invite the children to make slime.
2. Guide the children to add soap flakes to the warm water.
3. Show the children how to whisk the mixture or to use an egg beater to mix the soap flakes and water together. (Add more soap flakes if you need to make it thicker.) Remind the children to watch out for the change!
4. Ask, 'What does the mixture look like now? Is it fluffy or gooey?'
5. As the mixture thickens into slime, ask the children to **explain** the change they see happening. Encourage them to use their hands to feel the texture of the mixture. Ask the children, 'What does the mixture feel like?'

Drop back ideas

1. *Make the slime and then encourage children to explore the slime with their hands. Ask the children, 'What does it feel like? Does it feel like water?' Model words like 'slippery', 'slimy' and 'stretchy' to describe the slime.*
2. *Add drops of colour to the slime. Ask the children questions that encourage them to **describe** the changes they see as you mix the colour into the slime.*

Extension ideas

1. *Add one colour to the slime. Ask children, 'What changes to do you notice?' Ask the children to **explain** why the mixture is changing.*
2. *Add a second food dye colour (such as blue to yellow). Ask children, 'What change can you see happening when the different colour is added?'*
   Adding more than one colour will show children what happens when colours are mixed.

Open-ended activity

Provide a tub of warm water. Invite children to place their hands in the water and to describe what the water feels like. Add soap flakes and allow children to feel the changes occurring. And ask them questions about what they can feel changing. Once the slime has been created, encourage children to add materials/equipment to the slime and to discuss any changes that occur. For example, adding colour will change the colour of the slime, but adding plastic animals will not change the slime or the animals.

Classifying Earth and Space Science
Nature hunt

In this game, the children collect materials from the natural environment and sort them into groups. Play this with small or large groups of children. The children search for leaves, shells, seeds, rocks or feathers. As the children collect their objects, they notice the similarities and differences between objects in nature. In this game, the children decide on the rules for sorting their objects into groups.

When prompting ways to classify objects, you could focus on size, colour, uses, materials, parts or shapes.

Why this is important

*As the children collect objects from the natural environment, they look at the properties of natural materials. Then, they compare the properties of natural materials. When the children group the objects according to rules, they are **classifying** the objects they have collected. The children may also group the objects according to how they are used. The children are using scientific thinking as they make sense of the natural environment.*

Classifying

Exploring the properties of ordinary objects in order to group them.

Why this scientific skill is important

***Classifying** requires children to groups objects based on rules. This skill is used in everyday life and builds on observation skills. In this game, children decide on rules to **group** objects they find in the natural environment.*

You will need

- A basket
- Natural objects collected from the environment

Learning Objectives

For the children to:

- Identify similar properties shared by different objects
- Create rules to **classify** objects
- Apply their **classification** rules to a group of objects (sort objects into groups)

Important words to use

- Classify
- Sort
- Group
- Same
- Different

Classifying

Nature hunt

What the educator does

1. Invite the children to join you on a nature hunt. First, decide with the children what type of objects they are going to collect. For example, you may decide to collect rocks, leaves or seeds.
2. As you collect objects with the children, talk about the objects. You could say, 'That rock is round', or 'That rock is smooth,' or 'That rock is round and smooth.'
3. After the nature hunt, sit in a circle with the children. Lay out the collection of natural items in the centre of the circle. Ask the children, 'What do you notice looks the same about these items?' and 'How are these objects different? Why do you think that?'
4. When the children describe similarities and differences between the objects, put the objects in groups. For example, make groups of small rocks, large rocks, smooth rocks and rough rocks. The children are **classifying** the objects.
5. Ask the children to think of a new way to **classify** (group) these objects. Ask the children open-ended questions like, 'Why you have included this object in the group?' or, 'How did you know this object belonged in this group?'

Drop back ideas

1. *Describe the properties of natural objects during everyday interactions with children. For example, 'Look! This seed is in a seed pod' or, 'This seed is light so it can drift in the wind.'*
2. *While you are on the nature hunt, **sort** the natural items into groups with the children as you collect them. Collect oval leaves in one basket and long, skinny leaves in a second basket.*

Extension ideas

1. *Use two hula hoops on the ground to group the natural objects. You could **sort** long objects (like leaves) into one hoop and smooth objects (like rocks) into the other. Ask the children where to put a long and smooth leaf. Guide the children to work out that it would belong to both groups. Show the children that the groups could overlap. Where the hula hoops overlap, the children have created a third group with two rules (long AND smooth).*
   Encourage the children to find more objects that fit in both groups.
2. *Go online with the children and find out why leaves have different shapes.*

Open-ended activity

*Lay out a collection of stones, sticks and leaves on a layer of sand or dirt in a shallow tray. Give the children time to play with the natural materials in their own way. Observe the children's play and describe what they have done with the natural materials. For example, say, 'I can see you have **grouped** all the large stones together.' You could encourage the children to explain what they are doing with the natural materials.*

Comparing Earth and Space Science
Rain gauge

Children can make their own rain gauges or they can help the educator make one for the group. By using a fixed measurement system, children are able to **compare** the amount of rain that falls on different days.

Why this is important

Understanding the weather is important: this information helps people to survive in harsh climates. In many cultures, the year is divided into seasons according to the months of the year. Aboriginal Elders in your local community may be able to visit your preschool to talk about the signs that the seasons are changing in the area you live in.

*Children are able to build **comparison** skills by observing and comparing weather events. They are prompted to discuss concepts such as 'more', 'same as' and 'less', and 'most' and 'least' when **comparing** the amount of water in the rain gauge.*

*Measuring rainfall provides opportunities for children to collect, record, analyse and interpret information. **Comparing** and **describing** the amount of rainfall encourages children's ability to observe, **describe** and **compare** other weather events.*

Comparing

Describing verbally or nonverbally what children see, hear, touch, feel and taste to describe, compare, order and sort.

Why this scientific skill is important

*Children use **comparison** skills to observe changes, this supports children in developing concepts of 'more', 'less' and 'same as'.*

You will need

- Plastic container (about 600 ml); tall and deep is better than wide and shallow
- Permanent marker
- Funnel
- Small connecting blocks (all the same size)

Learning Objectives

For the children to:

- Measure the amount of rainfall each day
- Record the amount of rainfall received
- **Compare** the amount of water in rain gauge from day to day
- Use vocabulary to **describe** differences in rainfall from day to day

Important words to use

- Gauge
- Measure
- More/most
- Less/least
- Rain
- Weather

Comparing Rain gauge

What the educator does

Choose a week in which it is likely to rain!

1. Invite the children to help make the rain gauge(s).
2. Using a tower of interconnecting blocks, demonstrate marking each block on the side of the container. Remind the children of the important things to remember when measuring volume[1]. Place the funnel in the top of the container and put the rain gauge outside in a place where it will catch rain. Be sure that it will not fall over in windy weather.
3. At the same time each day for one week, ask the children to check the rain gauge. Ask children, 'What do you notice about the level of water in the container today?'
4. Ask children to observe how far up the water reaches on the side of the gauge. Support the children as they determine how much rain has fallen. **Write down** how much rain has fallen or encourage the children to **record** this by drawing a picture to show how much water is in the container.
5. Empty the rain gauge each day.
6. At the end of the week, ask children, 'Which day had the most rain?' and, 'How do you know this?' Ask, 'Which day had the least rain?' and, 'Were there days were there was no rain?'

[1] *Northern Territory Preschool Maths Games, pages 32-33.*

Drop back ideas

1. *Focus on children's **comparison** between a day with a little rain and a day with more rain. Having clear differences simplifies the comparison. Ask children, 'Which day had the most rain? How do we know this?'*

Extension ideas

1. *Support the children to make a **graph** of the rainfall over one week. This may be done using connecting blocks to represent each day's rainfall. **Compare** the daily rainfall by asking children, 'Which day had the most rain? Which day had the least rain? How do we know?'*[2]
2. *Introduce a thermometer to the children. Attach it to an outside wall, low enough for the children to see it easily.*
   *Show children that the red liquid (alcohol) rises and falls when it is warmer or cooler outside. At different points in the day (or on different days), ask children to **read** and **record** the numbers that the red liquid reaches. Ask children 'When was it the hottest? When was it the coolest? How do we know?'*

[2] *This learning experience aligns with Data Collection, Representation and Analysis in the Northern Territory Preschool Maths Games, pages 38-39.*

Open-ended activity

*Put containers of the same size and shape into a tub of water. Encourage children to explore filling the different containers and to **compare** which hold more water and which hold less. This can be extended to filling containers with other materials such as sand, pebbles, leaves, or food substances during a cooking experience.*

Predicting and Checking Earth and Space Science
Cloud diary

Understanding the weather is important: this information helps people to survive in harsh climates. In many cultures, the year is divided into seasons according to the months of the year. Aboriginal Elders in your local community may be able to visit your preschool to talk about the signs that the seasons are changing in the area you live in.[1]

Introduce the Cloud Diary by talking to the children about how the weather is changing as it builds towards the wet season. Have discussions about where the rain comes from.

Provide a small group of children with a camera or an iPad to take pictures of the sky. Encourage children to talk about the clouds and what this may mean for the weather. Check later in the day to see if their predictions were right.

This can be done over several days or once a week for several weeks.

1. *Examples of seasons and calendars: http://www.larrakia.csiro.au/#/page/larrakia http://livingknowledge.anu.edu.au/learningsites/seacountry/10_observing.htm*

You will need

- Camera/iPad

Learning Objectives

For the children to:

- Look at the pictures of the sky and talk about the clouds they see
- **Predict** what the clouds will look like later in the day
- **Check** later in the day to see if their predictions were right

Important words to use

- Predict
- Change
- Clouds
- Check
- Observe

Why this is important

*Observing the sky and noticing changes in the weather encourage children to pay attention to the world around them. Children use their existing knowledge about the weather and the seasons to make **predictions** and later, to **check** their predictions.*

Predicting and Checking

Using skills of prediction, hypothesising, testing, experimenting and evaluating in play and construction experiences.

Why this scientific skill is important

*Children use what they already know about their environment to make **predictions**. When children **check predictions** they extend this knowledge further.*

Predicting and Checking

Cloud diary

New word

- ***Predict*** *- To say that something will happen in the future.*

What the educator does

1. Provide the children with opportunities to take photographs of the sky soon after they arrive at preschool in the morning.
2. Print the pictures out (or look at the photographs on an iPad) and talk about what the children observe in the sky. Ask the children questions like, 'What words would we use to describe the sky?' and 'What do the clouds look like today?'
3. Ask the children to share ideas about what the sky will look like later in the day (**predict**), Ask the children questions like, 'What do you think the sky will look like at lunch time? And in the afternoon?' Ask the children to explain why they came up with their predictions.
4. At midday and in the afternoon, explain that it's time to **check** if they were right. Provide the children with the iPad/camera again to take photographs of the sky.
5. Remind the children about their morning **predictions**. Ask the children questions like, 'What do you notice about the sky in the afternoon?', 'Has it changed?', 'How has it changed?' and 'Were your **predictions** correct?'

Drop back ideas

1. *Find a comfortable space outside to lie on the ground with a small group of children and look up at the sky. Ask the children, 'Do you think it will rain today? What makes you think that?' At the end of the day, ask the children if they were correct about whether it rained or not today.*
2. *Provide children with clipboards, paper and pencils. Ask the children to draw a picture of what they think a cloud looks like. Take the children outside and ask them to look at some clouds in the sky. Ask children, 'Are all the clouds the same shape? Can you see some different clouds?' Encourage children to draw the clouds they see in the sky.*
3. *Discuss other signs that the seasons are changing that are known to the children. For example, have the turtles laid their eggs? Are the magpie geese eggs hatching? What does this tell us about the season?*

Extension ideas

1. *Take a photograph of the sky in the morning and print it out. Ask children in the group to describe the clouds. Ask children, 'What do you think the clouds will look like tomorrow?' The following day, take a picture again to check and talk about if they were correct. Repeat this once each month and add the photographs to a visual diary in the form of a wall chart. Discuss how the sky changes as the seasons change.*
2. *If there are clouds in the sky, find a space to lie outside to look up at the sky with a small group of children. Pay attention to the clouds and talk about whether the clouds are moving and changing or staying still. (You could video the sky to watch again later.) Ask the children, 'What makes the clouds move?" After the children have offered suggestions, guide their thinking to understanding that the wind moves the clouds. As a follow-up question, say, 'If the clouds are moving fast, what do you think the wind is doing?'*
3. *Discuss other signs that the seasons are changing that are known to the children. For example, have the turtles laid their eggs? Are the magpie geese eggs hatching? What season will follow? What kind of weather do we predict that season will bring?*

Open-ended activity

Encourage children to observe, draw or photograph the outdoor environment. Ask questions to prompt their thinking such as, 'Are leaves from the trees becoming dry or dropping to the ground? Does the ground feel dry or damp? What birds and animals can you see? Are there any birds collecting sticks or building nests?' In a group discussion, predict what these observations might mean and what will come next.

Comparing Physical Science
Magnifying glasses

A small group of children use magnifying glasses to look closely at different objects. They will **compare** and **describe** how things look with and without a magnifying glass. The children will document their findings by drawing.

Remind the children to hold the magnifying glass close to the object they are looking at, rather than holding it up to their eye.

Why this is important

When children play with magnifying glasses they are learning how to use scientific tools. Children observe that objects look larger under the lens of the magnifying glass. Using a magnifying glass allows us to see the small details of an object.

In the extension activity, children observe that using a microscope will provide even more magnification.

Comparing
Describing verbally or nonverbally what children see, hear, touch, feel and taste to describe, compare, order and sort.

Why this scientific skill is important
*When children make **comparisons**, they extend their observing skills by noticing similarities and differences. This game supports children to discover similarities and differences between natural and made materials.*

You will need

- Magnifying glasses — hand-held and/or on a tripod
- A range of materials to view under the magnifying glasses (natural materials and made materials)

Learning Objectives

For the children to:

- **Observe** materials under a magnifying glass
- Use **language** to make comparisons and share this with their peers
- **Record** their comparisons through drawing

Important words to use

- Magnifying glass
- Lens
- Magnify
- Bigger/larger

Comparing

Magnifying glasses

What the educator does

1. With the children, collect a range of materials. Provide magnifying glasses for the children to use. A piece of fabric or a newspaper are examples of non-natural materials. Plants and seeds are examples of natural materials. Invite the children to choose an object and to look at it closely without a magnifying glass. Ask the children to **describe** what they see.
2. Then encourage the children to look at their object using a magnifying glass. Ask the children questions to support **comparisons**. You could ask, 'Has anything changed now that you are looking at the object using the magnifying glass? Does it look different under the magnifying glass?' and, 'Why do you think it looks like that?'
3. Ask the children to look at different objects with the magnifying glasses.
4. Encourage children to choose one object to draw. Fold a piece of paper in half. First, encourage the children to draw the object they have chosen on one side of the page. Then, have the children look at the object through the magnifying glass and draw what they see on the other side of the page.
5. Ask the children to share their pictures with each other, **describing** what is the same and what is different in their pictures.

Drop back ideas

1. *Play the Nature Hunt game (on page 24). Encourage children to find different objects, then to look at them through magnifying glasses.*
2. *Use words to **describe** the features of the objects the children are looking at.*

Extension ideas

1. *Use a digital microscope to **observe** the makeup of materials even more closely. Print out copies of the digital microscope pictures and place them next to the actual object. Ask the children, 'Why does the picture from the digital microscope look so different from the real object?' and, 'Tell me why you think that?'*
2. *Go online with the children and collect a range of microscope images of natural and non-natural materials. At group time, show these to the children and help them to group the images based on similarities and differences in the pictures.*

Open-ended activity

Depending on what you have available to use, place binoculars, vision glasses, lenses, magnifying glasses and a closed jar half-filled with water on a table. Encourage the children to look at the environment around them using the different tools. Follow the children's lead as they play. Ask the children if everything looks the same or different when they look through the lens.

Communicating and recording Physical Science
Magnetic and non-magnetic

Lay out a range of everyday items for a small group of children. Encourage them to use a magnet to discover which objects can be pulled by the magnet. Use language to describe the objects as 'magnetic' and 'non-magnetic'. As the children explore the properties of the objects, help them to **communicate** their findings by **recording** (drawing) magnetic and non-magnetic objects on a chart.

Why this is important

When playing with magnets, children learn that some objects can be moved without being touched. They learn about the magnetic force of attraction. Magnets are attracted to magnetic objects and not attracted to non-magnetic objects. Most magnetic objects are made of metal. Most non-magnetic objects are not made of metal.

Communicating and recording

*Creating and using simple representation to organise, record and **communicate** (verbally or nonverbally) scientific ideas and concepts.*

Why this scientific skill is important

The use of drawings allows children to communicate their developing understanding of magnetic and non-magnetic. This provides the children with the opportunity to consolidate their understanding and share their knowledge with others.

You will need

- Magnets - one for each child
- Everyday magnetic and non-magnetic objects (children could bring objects from home as well)
- Crayons/markers
- Large sheet of paper

Learning Objectives

For the children to:

- Observe magnets being attracted to magnetic objects and not attracted to non-magnetic objects
- Classify objects as magnetic or non-magnetic
- **Record** their findings using a chart
- **Communicate** their findings using the terms, 'magnetic' and 'non-magnetic'

Important words to use

- Magnetic
- Non-magnetic
- Attract
- Similar or different
- Pull
- Force

Communicating and recording

Magnetic and non-magnetic

New words:

- ***Force*** *- Something that causes a change in the movement of an object.*
- ***Magnetic*** *- Something that can be attracted by a magnet.*
- ***Magnetic field*** *- The space around the magnet where the magnetic force acts.*
- ***Non-magnetic*** *- Something that cannot be attracted by a magnet.*
- ***North and south poles of a magnet*** *- Magnetism concentrates at two points on a magnet, the north pole and south pole. The north pole of a magnet is the end of the magnet that points towards the north when suspended freely. This is also called the 'positive pole'. It is often coloured blue. The south pole of a magnet is the end of the magnet that points towards the south when suspended freely. This is also called the 'negative pole'. It is often coloured red.*
- ***Repel*** *- To push back or away from a force.*

What the educator does

1. Lay out a range of everyday objects that are magnetic and non-magnetic. Provide each child with their own magnet to use.
2. Choose one object. Ask the children to **say** what they think will happen when they put their magnet near the object. Have the children take turns to put their magnet near the object to test their prediction and **describe** what happens. Encourage the children to continue this play with the other objects provided.
3. While the children play with the objects and their magnets, **describe** the force between the magnets and the objects. Point out that the magnet is not attracted to the wooden block because the wooden block is 'non-magnetic', or the magnet can pull the spoon because the spoon is 'magnetic'. Encourage children to **use** these terms as they **talk** to you and to each other.
4. Draw a line down the centre of a large piece of paper to make two columns. Label the columns on the chart 'Magnetic' and 'Non-magnetic'. Ask the children to put all the magnetic objects into one column and the non-magnetic objects into the other. Ask the children to **explain** how they decided which group each object belonged with. They are **recording** what they have discovered.
5. Encourage the children to explore the environment to find more magnetic and non-magnetic objects to include on the chart. Ask the children to **explain** how they test whether an object is magnetic.

Drop back ideas

1. *When playing with the children during the open-ended play activity, ask children to **show** you the objects that are magnetic and the objects that are non-magnetic. Talk about how the objects react to the magnets.*

Extension ideas

1. *Encourage the children to use magnets to search for magnetic and non-magnetic objects in the preschool environment. Have the children take photographs of the objects they find. Print the photographs and add them to the **chart**.*
2. *Ask the children to **name** some of the similarities and differences they have noticed between the magnetic and non-magnetic materials. Introduce new ideas like 'metal' and 'non-metal'.*
3. *Count how many paperclips a magnet can lift. Ask the children if each magnet lifts the same number of paperclips? Test their prediction with different sized magnets. **Discuss** the reason for the differences.*
4. *Go online with the children to explore how magnets are used in engineering and technology. Encourage the children to **name** objects that they use at home or in the preschool environment that are magnetic.*

Open-ended activity

*Provide magnetic and non-magnetic objects and some magnets. As the children play, **describe** the magnet pulling the magnetic objects.*

Predicting and Checking Physical Science
Sink and float

Invite the children to **predict** what will happen to familiar objects when they are placed in water. Will they sink or float? The children will test their **predictions** by placing the familiar objects into water and watching what happens. The number of children who play at the same time will be limited by the size of the container of water.

Why this is important

Historically, people living near water have been very good at building rafts, canoes and other objects that float on water. These were a way of travelling on water and of transporting goods.

As children play with objects in water they develop an understanding of buoyancy, the force that causes objects to float. When an object is buoyant, it floats on the top of the water.

Predicting and checking if an object sinks or floats in water supports children to identify materials that sink and materials that float.

Predicting and Checking

Using skills of predicting, hypothesising, testing, experimenting and evaluating in play and construction experiences.

Why this scientific skill is important

*When children **predict** and **check** if an object sinks or floats, they learn that the same objects sink or float every time. In this way, children explore the properties of familiar objects. As they observe objects floating or sinking, the children begin to think of reasons why this happens.*

You will need

- A plastic container of water
- A range of familiar objects that sink or float in water (a rock, a cork, a coin, a plastic ball)

Learning Objectives

For the children to:

- Explore the properties of familiar objects
- Make **predictions** about objects that will sink or float
- **Test** their predictions
- **Suggest reasons** why objects float or sink

Important words to use

- Sink
- Float
- Predict

Predicting and Checking

Sink and float

What the educator does

1. To start with, set out a range of objects for children to test. (During free play, they will find more objects to test.)
2. Invite the children to select an object. Before putting it in the water, the child should **predict** whether it will sink or float. After predicting whether the object will sink or float, encourage the children **check** their prediction by **experimenting** - placing the object in the container of water. What happens?
3. Ask the child whether they were right, or whether something unexpected happened.
4. Take the object out of the water. Ask the child if they put the object in the water a second time, will it sink or float? Then, support the child to **test** their **prediction**.
5. Continue to **predict** and **check** with a wide range of other objects. (Each time, ask the child to predict before testing whether the objects will sink or float.)
6. Ask the children to explain what the floating objects have in common. Ask the children what the sinking objects have in common. Can the children to develop a 'rule' for floating and sinking? Encourage the children to apply this rule to the next few objects that they test.

Drop back ideas

1. *As the children play with objects in water, model accurate use of the words 'sinking' or 'floating'.*

Extension ideas

1. *Roll up a ball of clay and **predict** if this will sink or float. **Test** the prediction. Now flatten the ball like a pancake and **predict** whether it will sink or float. **Test** the prediction.*
2. *Go online with the children and investigate how heavy boats float on water.*

Open-ended activity

Pour enough water into a standing trough for some objects to float and others to sink. Place plastic bowls, cups into the water. Add solid and hollow balls of the same size and choose other objects from the preschool environment that you know sink or float to place on a table nearby for the children to use. Encourage the children to explore and play with the objects by placing them in the water. Follow the children's interest in this water play and make predictions about what will happen when the objects are placed in the water.

Predicting and Checking Physical Science
Cars and ramps

Educators join in with children's play as they roll cars down ramps that have different surfaces. Educators ask children to **predict** what they think will happen to the speed of a car if the surface it rolls down is changed. After children make **predictions**, they **experiment** – the children roll the cars down the ramps to **check** to see if they predicted correctly.

Predicting allows children to apply their existing knowledge to a new situation and then to **check** to see if they were correct. This helps children to gain new knowledge. This game also allows children to explore the effects of friction and gradients through play.

You will need

- A few thin wooden blocks/ramps
- Bumpy cardboard
- Carpet or towel
- Rubber grip mats (like car mats or shower mats)
- Toy cars

Learning Objectives

For the children to:

- **Predict** whether cars will travel faster or slower on ramps of different surfaces
- **Test** to see if their predictions were correct
- **Communicate** what they noticed about the speed of the cars on different surfaces
- **Explain** the reasons for the differences they observed

Important words to use

- Surface
- Speed
- Faster
- Slower
- Predict/prediction
- Friction

Why this is important

*By experimenting with different changes to the materials and objects children play with in this game, they have the opportunity to **predict** the effect that the different materials will have on an object's movement.*

Predicting and Checking
Using skills of predicting, hypothesising, testing, experimenting and evaluating in play and construction experiences.

Why this scientific skill is important
*Children use their past experience and existing knowledge of forces to **predict** what effect different surfaces will have on the movement of objects. **Checking predictions** develops this knowledge.*

Predicting and Checking

Cars and ramps

New words

- ***Friction*** *- The name for the resistance of movement; happens when one object rubs against another object because each object works against the other object to slow the movement down.*
- ***Gradient*** *- Describes how much a line or a surface has moved away from being horizontal.*

What the educator does

1. Set up the ramps with the children. Allow time for the children to play with the cars and the ramps before adding materials.
2. Start by adding the bumpy cardboard to one of the ramps. Say to the children, 'Let's **predict** what will happen when we roll the cars on a different surface. What do you think will happen now that the car will be driving on a bumpy surface?' Encourage the children to discuss whether the car will go faster, slower, or stay the same.
3. Ask the children to **check** their **predictions** by rolling the car down the ramp with bumpy cardboard.
4. Ask the children, 'What happened to the car? Were your **predictions** correct?' Guide the children to observe that the car goes slower on the bumpy cardboard. This is because the bumps in the cardboard cause friction and the friction slows the car down.
5. **Experiment** with other materials. Add different materials to the ramp one at a time and ask children to **predict** and **check** again.

Drop back ideas

1. *Provide the ramps, cars and materials for children to explore independently. Join in the play. Ask questions or narrate the children's actions. For example, 'That car is going faster than this one!' or, 'That car is slowest!'*

Extension ideas

1. *Place a different material on each ramp. Suggest a car race and ask the children to **predict** the car that will roll the fastest and win the race. Ask children, why they think their chosen car might win. Count together, 'three, two, one, go!' so that the cars start at the same time. After each race, talk to the children about who **predicted** the fastest car. What helped that car to go the fastest?*
2. *Try changing the gradient of the ramps (to do this, raise the top of the ramp higher than the top of another ramp). Point to the car that will roll down the steepest ramp and ask the children, 'Do you think the car will go faster or slower now? Why do you think this?'*

Open-ended activity

Draw children's attention to forces within the playground, e.g. the slippery slide. Do some children slide down faster than others? Encourage the children to collect a basket of different objects to roll down the slide such as different sized balls, cars, bark and leaves.

New Words

Absorb *- To take in or hold water.*

Carbon Dioxide *- A colourless, odourless gas breathed out during respiration.*

Compostable *- Items that rot easily and can be used in compost (this does not include meat and dairy because they attract dogs and rats); non-compostable items cannot be used in compost.*

Dispersed *- Spread or scattered around.*

Evaporation *- When liquid changes into a gas. Liquid water evaporates to become a gas called 'water vapour'.*

Force *- Something that causes a change in the movement of an object.*

Friction *- The name for the resistance of movement; happens when one object rubs against another object because each object works against the other object to slow the movement down.*

Gas *- An air-like substance that fills a space.*

Germinate *- When a seed begins to sprout.*

Gradient *- Describes how much a line or a surface has moved away from being horizontal.*

Habitat *- Natural home or environment of an animal, plant or other organism.*

Inflate *- To fill extendable material (like a balloon) with air.*

Landfill *- Rubbish that is disposed of by burying it underground.*

Liquid *- A substance that flows freely like water or oil and takes the shape of its container.*

Lungs *- The main organ of the respiratory system in humans and most animals.*

Magnetic *- Something that can be attracted by a magnet.*

Magnetic field *- The space around the magnet where the magnetic force acts.*

Mass *- The amount of matter in an object.*

Matter *- Everything that has a mass and takes up space is made of matter; that is, everything around us is made of matter.*

Non-compostable *- Items that do not rot easily and that cannot be used in compost.*

Non-magnetic *- Something that cannot be attracted by a magnet.*

North and south pole of a magnet *- Magnetism concentrates at two points on a magnet, the north pole and south pole. The north pole of a magnet is the end of the magnet that points towards the north when suspended freely. This is also called the 'positive pole'. It is often coloured blue. The south pole of a magnet is the end of the magnet that points towards the south when suspended freely. This is also called the 'negative pole'. It is often coloured red.*

Observe *- To notice, watch or discover something, using the five senses.*

Organs *- Parts of the body like the heart, lungs and kidneys. The skin is also an organ.*

Oxygen *- A colourless, odourless gas breathed in during respiration.*

Predict *- To say that something will happen in the future.*

Repel *- To push back or away from a force.*

Respiration *- The act of breathing.*

Root *- The part of a plant that is usually underground and supplies stems and leaves with water.*

Solid *- Things that hold their shape and can't be poured like a liquid; they can be hard or soft, smooth or rough, big or little.*

Sprout *- A small growth on a seed or plant.*

Stem *- The main stalk of a plant.*

Texture *- How something looks or feels: rough or smooth, flat or raised.*

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