EYFS SCIENCE
Knowledge maps

Summary of Science in EYFS

Topic	Nursery	Reception
Animals, excluding humans	• Learn about the life cycles of animals • Compare adult animals to their babies • Observe how baby animals change over time	• Name and describe animals that live in different habitats. • Describe different habitats
Humans	• Learn about the life cycles of humans • Learn about how to take care of themselves • Learn about their senses	• Describe people who are familiar to them • Learn about how to take care of themselves
Living things and their habitats	• Explore the surrounding natural environment • Explore natural objects from the surrounding environment	• Explore the plants in the surrounding natural environment • Explore the animals in the surrounding natural environment • Explore plants and animals in a contrasting natural environment
Plants	• Grow plants	
Seasonal changes		• Play and explore outside in all seasons and in different weather • Observe living things throughout the year
Materials, including changing materials	• Explore a range of materials • Shape and join materials • Combine and mix ingredients • Change materials by heating and cooling, including cooking	• Explore a range of materials, including natural materials • Make objects from different materials, including natural materials • Observe, measure and record how materials change when heated and cooled • Compare how materials change over time and in different conditions
Electricity	• Identify electrical devices • Use battery-powered devices	
Light	• Explore light sources • Shine light on or through different materials	• Explore shadows • Explore rainbows
Forces	• Feel forces • Explore how things work • Explore how objects/materials are affected by forces	• Explore how to change how things work • Explore how the wind can move objects • Explore how objects move in water
Sound	• Listen to sounds • Make sounds	• Listen to sounds outside and identify the source • Make sounds
Earth and space		• Learn about the Earth, Sun, Moon, planets and stars • Learn about space travel

PLAN
Planning for assessment

Opportunities for science in the common EYFS themes

Click on the links in the table below to be taken to the relevant matrix.

Theme	Nursery	Reception
Dinosaurs	Animals, excluding humans	Animals, excluding humans
Farms	Animals, excluding humans Plants	
Food	Materials, including changing materials Plants	
People who help us	Humans Plants	Humans
Pirates	Materials, including changing materials Forces	Materials, including changing materials Forces
Robots	Materials, including changing materials Electricity Light Sound	Materials, including changing materials Earth and space
Space and the planets	Materials, including changing materials	Materials, including changing materials Earth and space Forces
Superheroes	Materials, including changing materials Humans	Materials, including changing materials Earth and space
Vehicles	Materials, including changing materials Electricity Light	Materials, including changing materials Forces Earth and space

	Forces Sound	
Building and construction	Materials, including changing material Electricity Forces Light	Forces Sound
All about me	Humans	Humans
The high street	Humans Materials, including changing materials Electricity Light	Humans
Holidays	Materials, including changing materials	Animals, excluding humans
Castles	Materials, including changing materials	
In the garden	Animals, excluding humans Living things and their habitats Plants	Living things and their habitats Animals, excluding humans
At the seaside	Animals, excluding humans	Animals, excluding humans Living things and their habitats
Under the sea	Animals, excluding humans	Animals, excluding humans
In the woods	Animals, excluding humans	Animals, excluding humans Living things and their habitats
Weather and seasons	Living things and their habitats	Seasonal changes Materials, including changing materials Living things and their habitats Sound Light
Animals	Animals, excluding humans	Animals, excluding humans Living things and their habitats Seasonal changes
Magic, witches and wizards	Materials, including changing materials Light	

Year	Reception	Topic	Animals, excluding humans

Understanding the World

- Recognise some environments that are different to the one in which they live.

Links with other areas of learning

Physical Development

- Revise and refine the fundamental movement skills they have already acquired: rolling; crawling; walking; jumping; running; hopping; skipping; climbing.

Prior learning	Future learning
• Understand the key features of the life cycle of a plant and an animal. (Nursery) • Begin to understand the need to respect and care for the natural environment and all living things. (Nursery)	• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 – Animals, including humans) • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 – Animals, including humans) • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 – Animals, including humans)

CREATING APPROPRIATE EXPERIENCES TO INITIATE LEARNING

What adults might provide	What adults might do
Opportunities to learn about animals from a different habitat • Sharing books about animals in the local area and animals in other countries e.g. jungle, polar regions, desert, ocean • Looking at pictures of animals in different habitats • Watching videos of animals in different habitats • Playing games involving matching animals to their habitats • Playing with small world animals in different habitats • Visiting the zoo, focusing on animals that live in different habitats • Caring for pets from a different habitat e.g. tropical fish • Creating pictures of animals in their habitats • Pretending to be animals • Naming and describing animals they see in books, pictures, videos or while on a trip • Describing different habitats	• Encourage children to name and describe animals that live in different habitats while reading books, watching videos, looking at pictures or playing matching games. • Encourage children to ask questions about different animals and the habitats they live in. • Encourage children to describe habitats. • Encourage children to talk about how animals are cared for when they live outside their natural habitat. • Encourage children to move like different animals. **Encouraging scientific enquiry** *Classification* • Sort animals according to where they live.

	Researching using secondary sources • Learn how animals from a different habitat are cared for. • Learn about animals in a different habitat.
Vocabulary	**Common misconceptions**
Model and encourage children to use vocabulary such as: • names of animals, live, on land, in water, jungle, desert, North Pole, South Pole, sea, hot, cold, wet, dry, snow, ice Expose children to supplementary vocabulary such as: • environment, polar regions, ocean, camouflage	Some children may think: • animals are furry and have four legs • a bee is not an animal because it is an insect • animals adapt to their surroundings, e.g. a brown bear turns white and becomes a polar bear • animals living in the soil breathe by coming to the surface • dragons and other mythical creatures are real animals.
Linked texts	**Linked careers**
Other texts • Lost and Found by Oliver Jeffers • Shark in the Park by Nick Sharratt • One Day on our Blue Planet: In the Antarctic by Ella Bailey • Poles Apart by Jeanne Willis • Monkey with a Bright Blue Bottom by Steve Smallman • Walking through the Jungle by Julie Lacome • How many legs? by Kes Gray • What do you do with a tail like this? by Steve Jenkins • The Rainbow Bear by Michael Morpurgo • We're Going on a Bear Hunt by Michael Rosen and Helen Oxenbury • Bears by Sally Morgan • Usborne Beginners Bears by Helen Helbrough	**Opportunities in the role-play corner to care for animals that live in different environments** • Zookeeper • Safari centre • Aquarium • Explorer/Naturalist

How children might show their learning	
Characteristics of effective teaching and learning	
• Playing and exploring – children investigate and experience things, and 'have a go' • Active learning – children concentrate and keep on trying if they encounter difficulties, and enjoy achievements • Creating and thinking critically – children have and develop their own ideas, make links between ideas, and develop strategies for doing things	
Demonstrating skills and showing understanding	
What a child might be doing	**Possible evidence of learning**
Children ask questions, make observations and talk about what they have found out about: • animals from a different habitat. **Children sort:** • animals.	• Can name and describe animals that live in different habitats. • Can describe different habitats.

Year	Reception	Topic	Humans

Understanding the World

- Talk about members of their immediate family and community.
- Name and describe people who are familiar to them.

Links with other areas of learning

Personal, Social and Emotional Development
- See themselves as a valuable individual.
- Manage their own needs.

Physical Development
- Know and talk about the different factors that support their overall health and wellbeing: regular physical activity; healthy eating; toothbrushing; sensible amounts of 'screen time'; having a good sleep routine; being a safe pedestrian.
- Further develop the skills they need to manage the school day successfully: lining up and queuing; mealtimes; personal hygiene.

Mathematics
- Compare length, weight and capacity.

Prior learning	Future learning
• Use all their senses in hands-on exploration of natural materials. (Nursery) • Begin to make sense of their own life-story and family's history. (Nursery) • Understand the key features of the life cycle of a plant and an animal. (Nursery) • Begin to understand the need to respect and care for the natural environment and all living things. (Nursery)	• Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 – Animals, including humans)

CREATING APPROPRIATE EXPERIENCES TO INITIATE LEARNING

What adults might provide	What adults might do
Opportunities to describe people who are familiar to them • Talking about themselves, friends, family and community using photographs • Using mirrors to look at their faces • Creating pictures or collages of themselves, friends, family and community • Making hand and footprints using paint • Making fingerprints using ink pads	• Encourage children to look at photographs of different people and to describe them. • Encourage children to describe their friends and family using photographs to help them. • Encourage children to talk about how their friends and family are the same and different. • Encourage children to compare themselves to characters in books.

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- Using a 'magic' mirror which shows everything about them and getting children to describe themselves and how they are special
- Sharing books about different types of families

Opportunities to learn about how to take care of themselves

- Demonstrating and talking about how they look after themselves
- Talking about other people that look after them
- Talking to a dentist, nurse, meal supervisor/school cook, road crossing supervisor etc.
- Sharing videos of people who care for us and how we look after ourselves

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- Encourage children to compare their hand, foot and fingerprints with their friends.
- Encourage children to talk about the people who look after them, both within their family and the wider community e.g. teachers, doctors, dentists etc.
- Encourage children to ask a dentist, nurse, meal supervisor/school cook, road crossing supervisor etc. questions.

Encouraging scientific enquiry

Classification

- Sort images of people according to their characteristics.

Researching using secondary sources

- *Find out information from visitors (dentist, nurse etc.).*

Pattern seeking

- *Are taller children faster?*
- *Are taller children stronger?*

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<td>Vocabulary</td>
<td>Common misconceptions</td>
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Model and encourage children to use vocabulary such as:

- hair (black, brown, dark, light, blonde, ginger, grey, white, long, short, straight, curly), eyes (blue, brown, green, grey), skin (black, brown, white), big/tall, small/short, bigger/smaller, baby, toddler, child, adult, old person, old, young, brother, sister, mother, father, aunt, uncle, grandmother, grandfather, cousin, friend, family, boy, girl, man, woman

Expose children to supplementary vocabulary such as:

- bald, elderly, wrinkles, male, female, freckles

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Some children may think:

- sons look like their fathers and daughters look like their mothers.

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Other texts

- I Love My Hair by Natasha Anastasia Tarpley
- What I Like About Me by Alia Zobel-Nolan

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Opportunities in the role-play corner to show how people take care of them

- Doctor
- Nurse
- Dentist
- Optician

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How children might show their learning	
Characteristics of effective teaching and learning	
• Playing and exploring – children investigate and experience things, and 'have a go' • Active learning – children concentrate and keep on trying if they encounter difficulties, and enjoy achievements • Creating and thinking critically – children have and develop their own ideas, make links between ideas, and develop strategies for doing things	
Demonstrating skills and showing understanding	
What a child might be doing	**Possible evidence of learning**
Children ask questions, make observations using simple equipment and talk about what they are doing and have found out while carrying out a range of activities, such as: • describing people who are familiar to them • learning about how to take care of themselves. **Children sort:** • humans by their characteristics. **Children record their observations when:** • drawing themselves, their family, friends and community.	• Can describe themselves, family, friends and community. • Can create pictures of themselves, family, friends and community and identify their distinguishing features. • Can talk about what they see when using a mirror. • Can compare hand, foot and fingerprints and talk about how they are different. • Can talk about how they look after themselves and how other people look after them.

Year	Reception	Topic	Living things and their habitats

Understanding the World

- Draw information from a simple map.
- Explore the natural world around them.
- Describe what they see, hear and feel whilst outside.
- Recognise some environments that are different to the one in which they live.

Prior learning	Future learning
• Use all their senses in hands-on exploration of natural materials. • Explore collections of materials with similar and/or different properties. • Begin to understand the need to respect and care for the natural environment and all living things.	• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 – Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 – Plants) • Explore and compare the differences between things that are living, dead, and things that have never been alive. (Y2 – Living things in their habitat) • Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 – Living things in their habitat)

CREATING APPROPRIATE EXPERIENCES TO INITIATE LEARNING

What adults might provide	What adults might do
Opportunities to explore the plants in the surrounding natural environment • Taking photographs of the plants they find in the school grounds • Observing closely and drawing the plants in the school grounds • Finding plants in the school grounds to match with photographs of them • Looking at aerial views to count the number of trees in the school grounds • Using a map of the school grounds, with pictures of where specific plants can be found, to find those plants • Creating a map to show how to find their favourite plants in the school grounds **Opportunities to explore the animals in the surrounding natural environment** • Finding minibeasts in the school grounds • Taking photographs of the minibeasts they find in the school grounds	• Support children to identify different plants e.g. trees, bushes, flowers, vegetables, herbs. • Ensure children are careful when exploring the plants and do not damage them in any way. • Encourage children to touch and smell the plants, when appropriate. • Encourage children to talk about the plants they find. • Support children to name the plants they find. • Encourage children to find the same plant in a different place. • Ensure children are careful when observing minibeasts and return them to where they found them. • Encourage children to talk about the minibeasts they find. • Support children to name the minibeasts they find.

• Matching the minibeasts they find to pictures that identify them • Observing the minibeasts closely, using a magnifying glass or app on a tablet • Drawing pictures of the minibeasts • Creating a map to show where they found each type of minibeast • Sharing books about minibeasts • Playing with small world minibeasts • Building minibeast homes **Opportunities to explore plants and animals in a contrasting natural environment** • Visiting a contrasting natural environment e.g. forest, beach, etc. • Finding and taking photographs of plants and animals in the contrasting natural environment • Sharing non-fiction and fiction books about the contrasting natural environment visited	• Encourage children to identify similarities and differences between the plants and animals they find in the surrounding natural environment and the contrasting one they visit. • Encourage children to ask questions about the plants and animals they find. **Encouraging scientific enquiry** *Classification* • Name and describe plants and animals they find in the school grounds. *Pattern seeking* • Look for minibeasts in different areas of the school grounds. • Look for plants in different areas of the school grounds.
Vocabulary	**Common misconceptions**
Model and encourage children to use vocabulary such as: • plant, tree, bush, flower, vegetable, herb, weed, animal, names of plants and animals they see, name of a contrasting environment e.g. beach, forest Expose children to supplementary vocabulary such as: • environment	Some children may think: • trees are not plants • trees are not living as they do not seem to change or grow • weeds are bad plants.
Linked texts	**Linked careers**
Traditional stories and nursery rhymes • Incey, Wincey Spider • Ladybird, Ladybird Fly Away Home *Other texts* • Bad-Tempered Ladybird by Eric Carle • Mad About Minibeasts by David Wojtowycz & Giles Andreae • Ben Plants a Butterfly Garden by Kate Petty • Norman the Slug with the Silly Shell by Sue Hendra • Aargh a Spider by Lydia Monks • Insects: A Close-up Look by Peter Seymour	**Opportunities in the role-play corner to explore and compare plants and animals in the surrounding natural environment and a contrasting one** • Botanist • Naturalist • Entomologist • Ecologist • Environmentalist • Environmental scientist • Beekeeper

• Down at the Cool of the Pool by Tony Mitton • Over and Under the Pond by Kate Messner • Red Knit Cap Girl by Naoko Stoop	

HOW CHILDREN MIGHT SHOW THEIR LEARNING	
Characteristics of effective teaching and learning	
• Playing and exploring – children investigate and experience things, and 'have a go' • Active learning – children concentrate and keep on trying if they encounter difficulties, and enjoy achievements • Creating and thinking critically – children have and develop their own ideas, make links between ideas, and develop strategies for doing things	
Demonstrating skills and showing understanding	
What a child might be doing	**Possible evidence of learning**
Children ask questions, make observations using simple equipment and talk about what they are doing and have found out while carrying out a range of activities, such as: • exploring the plants in the surrounding natural environment • exploring the animals in the surrounding natural environment • exploring plants and animals in a contrasting natural environment. **Children record their observations when:** • drawing plants and animals they find.	• Can name and describe plants and animals in the school grounds and their environment. • Can talk about how another environment is different to their surrounding natural environment. • Children do not damage the living things they encounter in the natural environment.

	Year	Reception	Topic	Seasonal changes
	Understanding the World			
	• Explore the natural world around them. • Describe what they see, hear and feel whilst outside. • Understand the effect of changing seasons on the natural world around them.			

Prior learning	Future learning
• Understand the key features of the life cycle of a plant and an animal. (Nursery – Plants & Animals, excluding humans)	• Observe changes across the four seasons. (Y1 – Seasonal changes) • Observe and describe weather associated with the seasons and how day length varies. (Y1 – Seasonal changes)

CREATING APPROPRIATE EXPERIENCES TO INITIATE LEARNING	
What adults might provide	**What adults might do**
Opportunities to play and explore outside in all seasons and in different weather • Playing in the rain and snow • Drawing around puddles • Catching rain and hail in buckets • Catching snowflakes on frozen black paper and looking at them with magnifying glasses or an app on a tablet • Making icicles • Using scarves or pinwheels to explore the strength and direction of the wind • Looking at photographs of different seasons and types of weather • Sharing books about different seasons and types of weather **Opportunities to observe living things throughout the year** • Sharing books about the seasons • Going on seasonal walks to observe key features of the seasons • Making artwork with seasonal found objects • Visiting a canal or pond to look for birds and their young in spring • Visiting a farm to see the young animals in the spring	• Encourage children to talk about how they feel in different types of weather/seasons. • Encourage children to talk about the clothes they wear in different seasons and why. • Encourage children to talk about the weather throughout the year. • Encourage children to find shelter or make shelters to keep themselves dry in the rain or shade themselves when it is sunny. • Encourage children to talk about how the ground changes when it rains. • Encourage children to measure the size of puddles using their feet after it rains. • Encourage children to talk about how puddles change over time after it rains. • Encourage children to talk about the animals and plants that they find in different seasons. • Encourage children to ask questions about the weather and seasonal changes.

• Finding minibeasts in the school grounds at different times in the year • Taking photographs of the minibeasts they find in the school grounds at different times in the year • Looking for birds and other animals throughout the year using binoculars • Sharing books and videos about animals that migrate or hibernate over winter, gather food in autumn, build nests and lay eggs in spring etc. • Taking photographs of the plants they find in the school grounds at different times in the year • Observing closely and drawing the plants in the school grounds at different times in the year • Matching animals and plants they find to pictures that identify them	**Encouraging scientific enquiry** *Classification* • Which clothes are suitable for each season? *Observing over time* • How does a puddle change over time? • How does a snowman change as it melts? • How does the natural world change with the seasons? *Researching using secondary sources* • Find out about how animals behave in different seasons. • Find out about the weather and seasons.
Vocabulary	**Common misconceptions**
Model and encourage children to use vocabulary such as: • spring, summer, autumn, winter, seasons, sunny, cloudy, hot, warm, cold, shower, raining, storm, thunder, lightning, hail, sleet, snow, icy, frost, puddles, windy, rainbow, animals, young, plants, flowers Expose children to supplementary vocabulary such as: • hibernate, migrate, snowflake	Some children may think: • it always snows in winter • it is always hot in the summer • all babies and young animals are born in spring • plants only have flowers in the spring and summer • animals sleep during winter • it rains to help the plants grow • when it is hotter, it is because the Sun is closer • God controls the weather.
Linked texts	**Linked careers**
Traditional stories and nursery rhymes • Rain, Rain Go Away • Rain on the Green Grass • It's Raining, It's Pouring • I Hear Thunder *Other texts* • Seasons by Anna Pang • Autumn is Here by Heidi Pross Gray • Spring is Here by Will Hillenbrand • One Springy Day by Nick Butterworth • WOW! It's Night-time by Tim Hopgood • Tree - Seasons Come, Seasons Go by Britta Teckentup	**Opportunities in the role-play corner to talk about the weather throughout the year** • Meteorologist • Weather presenter

• The Snowy Day by Ezra Jack Keats • The Snowman by Raymond Briggs	

HOW CHILDREN MIGHT SHOW THEIR LEARNING	
Characteristics of effective teaching and learning	
• Playing and exploring – children investigate and experience things, and 'have a go' • Active learning – children concentrate and keep on trying if they encounter difficulties, and enjoy achievements • Creating and thinking critically – children have and develop their own ideas, make links between ideas, and develop strategies for doing things	
Demonstrating skills and showing understanding	
What a child might be doing	**Possible evidence of learning**
Children ask questions, make observations using simple equipment and talk about what they are doing and have found out while carrying out a range of activities, such as: • playing and exploring outside in all seasons and in different weather • observing living things throughout the year. **Children use equipment to measure when:** • exploring the size of puddles. **Children sort:** • clothes for different seasons. **Children record their observations when:** • observing plants, animals and puddles.	• Can talk about different types of weather. • Can talk about the four seasons. • Can talk about the living things they see in the playground and on visits during each season.

	Year	Reception	Topic	Materials, including changing materials
	Understanding the World			
	• Explore the natural world around them. • Describe what they see, hear and feel whilst outside.			

Prior learning	Future learning
• Use all their senses in hands-on exploration of natural materials. (Nursery) • Explore collections of materials with similar and/or different properties. (Nursery) • Talk about the differences between materials and changes they notice. (Nursery)	• Distinguish between an object and the material from which it is made. (Y1 – Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 – Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 – Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 – Everyday materials)

CREATING APPROPRIATE EXPERIENCES TO INITIATE LEARNING	
What adults might provide	**What adults might do**
Opportunities to explore a range of materials in a sensory way, including natural materials • Looking for dew, ice, icicles and frost in the playground • Using their senses to explore natural materials in the environment, such as stones, twigs, leaves, feathers, seeds, flowers etc. • Gathering natural materials to make collections **Opportunities to make objects from different materials, including natural materials** • Making pictures using natural materials they have gathered from the environment • Making dens, nests, bug hotels etc. using natural materials • Making ice pictures by putting water in a shallow tray and adding natural objects gathered from the environment and then leaving them outside to freeze or putting them in the freezer	• Encourage children to talk about the natural materials they explore, using their senses. • Encourage children to talk about the materials they are using when making pictures. • Encourage children to choose from a range of materials, including natural materials, when making models and identify a key property that was required. • Encourage children to reuse materials and talk about what can be recycled to care for the natural world. • Support children to list the properties the material has. • Encourage children to test that their model is fit for purpose and that the materials are suitable. • Encourage children to compare and describe how materials change over time and in different conditions.

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- Making junk models with a range of materials, including natural materials they have gathered from the environment

Opportunities to compare how materials change

- Making popcorn in a microwave and on a fire
- Making pizza dough with different flours
- Baking bread in different tins or for different times to compare the outcome
- Baking cupcakes and removing one after every five minutes
- Choosing where to put ice cubes in the playground and observing how quickly they melt
- Observing how a large block of ice changes over time, using string to measure around it
- Putting wax crayons in different areas of the playground and observing how they change
- Making a snowman and observing how it changes over time
- Making snowballs and putting them in different parts of the playground and observing how they change over time

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- Encourage children to take photographs or draw pictures to record how materials change.
- Encourage children to measure how objects change when they melt.
- Encourage children to ask questions about materials and how they change.

Encouraging scientific enquiry

Comparative testing

- How does popcorn made in a microwave compare to popcorn made on a fire?
- How quickly do ice cubes melt in different areas of the playground?
- How are pizza bases different when made with different flours?
- How does a loaf cook differently in different tins?
- How do cupcakes cook if they have different amounts of mixture?

Observing over time

- How does the block of ice change over time?
- How does a snowman change over time?
- How does cake mixture/bread dough change as it is cooked?

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<td>Vocabulary</td>
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Model and encourage children to use vocabulary such as:

- ice, water, frozen, icicle, snow, melt, wet, cold, slippery, smooth, big, bigger, biggest, smaller, smaller, smallest, hard, soft, bendy, rigid, wood, plastic, paper, card, metal, strong, weak, hot, apply heat, waterproof, soggy, not waterproof, best, change, change back

Expose children to supplementary vocabulary such as:

- solid, liquid, gas, most suited

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Some children may think:

- material only means fabric
- all plastic/wood etc. is the same.

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Opportunities in the role-play corner to compare materials and explore how they change

- Recycling centre worker
- Product designer
- Builder
- Chef

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HOW CHILDREN MIGHT SHOW THEIR LEARNING	
Characteristics of effective teaching and learning	
• Playing and exploring – children investigate and experience things, and 'have a go' • Active learning – children concentrate and keep on trying if they encounter difficulties, and enjoy achievements • Creating and thinking critically – children have and develop their own ideas, make links between ideas, and develop strategies for doing things	
Demonstrating skills and showing understanding	
What a child might be doing	**Possible evidence of learning**
Children ask questions, make observations using simple equipment and talk about what they are doing and have found out while carrying out a range of activities, such as: • exploring a range of materials in a sensory way, including natural materials • making objects from different materials, including natural materials • comparing how materials change. **Children use equipment to measure when:** • observing how objects melt. **Children sort:** • materials, including natural materials. **Children record their observations when:** • materials are changing over time or in different conditions.	• Can name the material they are using and why. • Can talk about multiple properties of the material and why it is suited for its purpose. • Can observe changes in their natural world and say why it is different now or will change in the future. • Can compare and describe how materials change over time and in different conditions.

	Year	Reception	Topic	Light
	Understanding the World			
	• Describe what they see, hear and feel whilst outside.			
	Links with other areas of learning			
	Personal, Social and Emotional Development • Manage their own needs.			

Prior learning	Future learning
• Explore how things work. (Nursery) • Talk about the differences in materials and changes they notice. (Nursery)	• Recognise that they need light in order to see things and that dark is the absence of light. (Y3 – Light) • Notice that light is reflected from surfaces. (Y3 – Light) • Recognise that light from the Sun can be dangerous and that there are ways to protect their eyes. (Y3 – Light) • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Y3 – Light) • Find patterns in the way that the size of shadows change. (Y3 – Light)

CREATING APPROPRIATE EXPERIENCES TO INITIATE LEARNING	
What adults might provide	**What adults might do**
Opportunities to explore shadows • Looking for shadows created by the Sun on cloudy and non-cloudy days • Drawing around shadows and comparing their shape and size • Making shadows using their bodies, both outside using the Sun and inside using torches • Making shadows using transparent and opaque objects/materials • Putting hands in a beam of light and making shadow shapes • Making shadows using shadow puppets or other objects • Observing a toy outside and noticing how the shadow changes during the day • Observing what areas are sunny and shady at different times in the day • Sharing books about shadows	• Encourage children to talk about the shadows that they see inside and outdoors. • Support children to identify the light source and the object that is making the shadow. • Support children to identify that see-through objects make pale shadows and non-see-through objects make dark shadows. • Support children to measure shadows using their feet or other non-standard units. • Encourage children to draw around shadows throughout the day to record how they change over time. • Encourage children to talk about changes they feel when the clouds cover and uncover the Sun. • Encourage children to talk about the changes to the shadows when the clouds cover and uncover the Sun.

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• Making rainbows from sunlight e.g. bubbles, water sprinkler, holographic paper, CDs etc.
• Sharing books about rainbows</td><td>• Support children to choose appropriate clothing when they are hot or out in the Sun.
• Encourage children to ask questions about the shadows and rainbows that they see.

Encouraging scientific enquiry

Comparative testing
• Compare the shape of shadows made by different objects.
Classification
• Which objects/materials make dark shadows?
Observing over time
• How do the Sun and shade change during the day?
• How does a toy's shadow change during the day?
Researching using secondary sources
• Find out about shadows.
• Find out about rainbows.</td></tr>
<tr><td>Vocabulary</td><td>Common misconceptions</td></tr>
<tr><td>Model and encourage children to use vocabulary such as:
• Sun, sunny, light, shadow, shady, clouds, torch, see-through, non-see-through, source, light source
Expose children to supplementary vocabulary such as:
• casting a shadow, pale, dark, transparent, opaque</td><td>Some children may think:
• shadows are only caused by the Sun
• all shadows are black.</td></tr>
<tr><td>Linked texts</td><td>Linked careers</td></tr>
<tr><td>Other texts
• Suddenly by Colin McNaughton
• Where is the Dragon? By Leo Timmers</td><td>Opportunities in the role-play corner to use shadows
• Puppeteer</td></tr>
</table>

HOW CHILDREN MIGHT SHOW THEIR LEARNING	
Characteristics of effective teaching and learning	
• Playing and exploring – children investigate and experience things, and 'have a go' • Active learning – children concentrate and keep on trying if they encounter difficulties, and enjoy achievements • Creating and thinking critically – children have and develop their own ideas, make links between ideas, and develop strategies for doing things	
Demonstrating skills and showing understanding	
What a child might be doing	**Possible evidence of learning**
Children ask questions, make observations and talk about what they are doing and have found out while carrying out a range of activities, such as: • exploring shadows • exploring rainbows. **Children use equipment to measure when:** • comparing the size of shadows. **Children sort:** • objects/materials that make dark or pale shadows. **Children record their observations when:** • shadows change throughout the day.	• Can point out shadows in the playground. • Can explain when shadows can be seen in the playground. • Can talk about how shadows changes during the day. • Can identify the light source and the object making a shadow. • Can identify shadows that are dark and pale. • Can identify and describe a rainbow.

	Year	Reception	Topic	Forces
	Understanding the World			
	• Explore the natural world around them. • Describe what they see, hear and feel whilst outside.			

Prior learning	Future learning
• Explore how things work. (Nursery) • Explore and talk about different forces they can feel. (Nursery) • Talk about the differences between materials and changes they notice. (Nursery)	• Compare how things move on different surfaces. (Y3 – Forces and magnets) • Observe how magnets attract or repel each other and attract some materials and not others. (Y3 – Forces and magnets) • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 – Forces and magnets) • Describe magnets as having two poles. (Y3 – Forces and magnets) • Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 – Forces and magnets) • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. (Y5 – Forces) • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. (Y5 – Forces)

CREATING APPROPRIATE EXPERIENCES TO INITIATE LEARNING	
What adults might provide	**What adults might do**
Opportunities to explore how to change how things work • Adapting objects to see if they can be made to float or sink e.g. cutting and peeling fruit and vegetables, reshaping plasticene etc. • Testing how many small objects different foil containers can hold before sinking • Testing how toy cars move down ramps and gutters • Testing how wheels turn when sand or water is poured through them • Testing how objects fall with and without a parachute attached	• Encourage children to talk about how they changed objects to make them float or sink. • Encourage children to count and record how small objects different 'boats' can hold before they sink. • Encourage children to talk about how they changed how the cars rolled down ramps/gutters. • Encourage children to talk about what happened when they poured sand/water through wheels and down gutters and how they changed this.

• Testing how different balls bounce • Making and testing paper aeroplanes • Designing different marble runs or routes for water/sand to travel down gutters or pipes **Opportunities to explore how objects move in air** • Identifying objects being blown around outdoors • Observing how different objects fall e.g. scarves, feathers • Observing how toys/objects move in the wind e.g. streamers, balloons, pinwheels, bubbles etc. • Comparing the movements of a ball and a balloon when bouncing or throwing and catching **Opportunities to explore how objects move in water** • Exploring how a marble moves through different liquids in sealed bottles • Observing how sailing boats move through water	• Encourage children to compare how objects fall, including with or without parachutes. • Encourage children to explore and talk about how they changed how different balls bounced. • Encourage children to make different aeroplanes and compare how far they fly by marking where they land. • Encourage children to describe how sand or water moves down pipes or gutters, or marbles travel down a marble run, and how they changed this. • Encourage children to notice and talk about the objects in the playground that are moved by the wind. • Encourage children to explore and talk about what they observe when turning bottles filled with different liquids and a marble upside down. • Encourage children to ask questions about forces, such as "What happens if I ..." **Encouraging scientific enquiry** *Comparative testing* • How many cubes/small plastic animals can fit in different 'boats'? • Compare how cars move down ramps/gutters. • Compare how wheels turn when sand or water is poured through. • Compare how objects fall. • Compare how objects fall with and without parachutes. • Compare how different balls bounce. • Compare how things move when blown. • Compare how a marble moves through different liquids. • Compare how different paper aeroplanes fly.
Vocabulary	**Common misconceptions**
Model and encourage children to use vocabulary such as: • float, sink, up, down, top, bottom, surface, move, roll, drop, fly, turn, spin, fall, fast, slow, faster, slower, fastest, slowest, further, furthest, wind, air, water, blow, bounce Expose children to supplementary vocabulary such as: • force, rotate, solid, liquid, gravity	Some children may think: • all light objects float and all heavy objects sink • objects made of the same material will always float or sink.

Linked texts	Linked careers
Traditional stories and nursery rhymes • Billy Goats Gruff • Gingerbread Man *(making boats to cross the river)* *Other texts* • Mr Gumpy's Outing by John Burningham • Mr Archimedes' Bath by Pamela Allen • Who sank the boat? by Pamela Allen • Stickman by Julia Donaldson • Flotsam by David Wiesner • Blown Away by Rob Biddulph	**Opportunities in the role-play corner to explore how to change how things work** • Boat builder • Aircraft engineer • Rocket designer • Engineer

HOW CHILDREN MIGHT SHOW THEIR LEARNING	
Characteristics of effective teaching and learning	
• Playing and exploring – children investigate and experience things, and 'have a go' • Active learning – children concentrate and keep on trying if they encounter difficulties, and enjoy achievements • Creating and thinking critically – children have and develop their own ideas, make links between ideas, and develop strategies for doing things	
Demonstrating skills and showing understanding	
What a child might be doing	**Possible evidence of learning**
Children ask questions, make observations and talk about what they are doing and have found out while carrying out a range of activities, such as: • exploring how to change how things work • exploring how the wind can move objects • exploring how objects move in water. **Children use equipment to measure when:** • pouring water and sand. **Children record their observations when:** • testing boats and aeroplanes.	• Can talk about how they changed objects to make them float or sink. • Can talk about how they changed how cars move down ramps or gutters. • Can talk about how they changed how wheels turn when sand or water is poured through them. • Can talk about how they changed how balls bounce. • Can compare how different boats and aeroplanes performed. • Can describe how objects fall with and without a parachute. • Can describe how a marble moves through different liquids.

	Year	Reception	Topic	Sound
	Understanding the World			
	• Describe what they see, hear and feel whilst outside.			

Prior learning	Future learning
• Explore how things work. (Nursery)	• Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 – Animals, including humans) • Identify how sounds are made, associating some of them with something vibrating. (Y4 – Sound) • Recognise that vibrations from sounds travel through a medium to the ear. (Y4 – Sound) • Find patterns between the pitch of a sound and features of the object that produced it. (Y4 – Sound) • Find patterns between the volume of a sound and the strength of the vibrations that produced it. (Y4 – Sound) • Recognise that sounds get fainter as the distance from the sound source increases. (Y4 – Sound)

CREATING APPROPRIATE EXPERIENCES TO INITIATE LEARNING	
What adults might provide	**What adults might do**
Opportunities to listen to sounds outside and identify the source • Going on a sound walk • Closing eyes and listening to the sounds around them when outside • Listening to rain, wind, thunder • Recording sounds when outside • Playing sound identification games • Catching rain in metal buckets or saucepans **Opportunities to make sounds**	• Encourage children to describe the sounds they hear. • Support children to identify what is making each sound. • Encourage children to ask questions about the sounds they hear and what is making them. **Encouraging scientific enquiry** *Comparative testing* • How does rain sound different when it lands in different containers?

• Making noise by blowing on a blade of grass • Making wind chimes • Using voices, instruments and other objects to mimic sounds they hear outdoors	*Observing over time* • Listen to the siren of an emergency vehicle as it approaches and moves away.
Vocabulary	**Common misconceptions**
Model and encourage children to use vocabulary such as: • sound, noise, listen, hear, music, voices, bird song, traffic, sirens, thunder, high, low, loud, quiet, soft, volume, crackle, thunder, hum, buzz, roar Expose children to supplementary vocabulary such as: • source, crescendo, vibration, pitch	Some children may think: • sounds do not travel through solids and liquids.
Linked texts	**Linked careers**
Traditional stories and nursery rhymes • One Coconut, Two Coconuts • Pass the Secret Round *Other texts* • Splish, Splash, Splosh by Mick Manning • Alfie's Weather by Shirley Hughes • Polar Bear, Polar Bear, What Do You Hear? by Eric Carle • The Very Quiet Cricket by Eric Carle • The Very Clumsy Click Beetle by Eric Carle	**Opportunities in the role-play corner to listen to sounds** • Sound effect artist

How children might show their learning	
Characteristics of effective teaching and learning	
• Playing and exploring – children investigate and experience things, and 'have a go' • Active learning – children concentrate and keep on trying if they encounter difficulties, and enjoy achievements • Creating and thinking critically – children have and develop their own ideas, make links between ideas, and develop strategies for doing things	
Demonstrating skills and showing understanding	
What a child might be doing	**Possible evidence of learning**
Children ask questions, make observations and talk about what they are doing and have found out while carrying out a range of activities, such as: • listening to sounds outside and identifying the source making the sounds. **Children record their observations when:** • listening to sounds.	• Can describe sounds they hear. • Can identify the source of sounds. • Can describe how they make sounds.

	Year	Reception	Topic	Earth and space
	Understanding the World			
	• Explore the natural world around them. • Describe what they see, hear and feel whilst outside.			

Prior learning	Future learning
• Explore and respond to different natural phenomena in their setting and on trips. (Birth to three)	• Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. (Y5 – Earth and space) • Describe the movement of the Moon relative to the Earth. (Y5 – Earth and space) • Describe the Sun, Earth and Moon as approximately spherical bodies. (Y5 – Earth and space) • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky. (Y5 – Earth and space)

CREATING APPROPRIATE EXPERIENCES TO INITIATE LEARNING	
What adults might provide	**What adults might do**
Opportunities to learn about the Earth, Sun, Moon, planets and stars • Observing that the Sun appears to move across the sky • Observing that it is warmer and brighter when the Sun is shining than when it is behind the clouds • Observing that they can see the Moon at night and sometimes in the day • Observing that they can only see the stars at night • Making model planets e.g. with papier-mâché or Modroc and balloons • Modelling a cratered moon landscape with papier-mâché or Modroc • Observing distant objects, including the Moon, with binoculars or a small telescope • Sharing books and video clips about the Earth, Sun, Moon, planets and stars • Talking about what happens and what they can see and hear in the daytime and at night	• Encourage children to safely observe changes in the sky at different times of the day. • Support children to link changes in the sky to other observations e.g. changes in temperature and brightness. • Encourage children to observe the evening/night sky with their family. • Model asking questions about space and space travel. • Encourage children to ask questions about space and space travel. • Encourage children to move as if they were in space or on the Moon. • Encourage children to use observations from books and video clips when painting their model planets. • Encourage children to talk about how binoculars or a telescope make distant objects appear larger and closer. • Encourage children to sort animals by when they are active. • Support children to decide criteria for the 'best' rocket.

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- Sorting small world animals into those that are active in the daytime and those that are active at night

Opportunities to learn about space travel

- Joining materials to make model rockets, Moon buggies/Mars rovers and space stations
- Making and testing simple air-propelled card or plastic bottle rockets
- Sharing books and video clips about space exploration including video clips of astronauts walking on the Moon and floating in the space station

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- Support children to describe the movements of astronauts.

Encouraging scientific enquiry

Comparative testing

- Make and testing air-propelled rockets to find out which is the 'best'.

Pattern seeking

- Find simple patterns in how light levels and temperature change with the movement, or obscuring of, the Sun.

Research using secondary sources

- Find out about the Solar System, stars and space travel.
- Find out about nocturnal animals.

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<td>Vocabulary</td>
<td>Common misconceptions</td>
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Model and encourage children to use vocabulary such as:

- Sun, Moon, Earth, star, planet, sky, day, night, space, round, bounce, float

Expose children to supplementary vocabulary such as:

- sunrise, sunset, astronaut, astronomer, constellation, orbit, nocturnal, slow-motion, magnify

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Some children may think:

- the Earth is flat
- the Moon and Sun are discs
- stars are a pointed 'star' shape
- the Moon appears only at night
- at night, the Sun is turned off
- at night, the Sun goes behind the clouds.

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<td>Linked texts</td>
<td>Linked careers</td>
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Traditional stories, songs and nursery rhymes

- Twinkle, Twinkle Little Star

Other texts

- Whatever Next! by Jill Murphy
- Astro Girl by Ken Wilson-Max
- Look Up! by Nathan Bryon
- How to Catch a Star by Oliver Jeffers
- Owl Babies by Martin Waddell

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Opportunities in the role-play corner to learn about space

- Astronomer
- Astronaut on a space station or rocket
- Rocket designer

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Demonstrating skills and showing understanding	
What a child might be doing	**Possible evidence of learning**
Children ask questions, make observations and talk about what they are doing and have found out while carrying out a range of activities, such as: • learning about the Earth, Sun, Moon, planets and stars • learning about space travel. **Children record their observations when:** • making models of Earth, Sun, Moon, planets and stars • drawing things that happen in the daytime and at night.	• Can identify the Sun, Moon and stars and talk about how they are different from Earth. • Can identify differences between day and night. • Can talk about animals that are active at night. • Can talk about some differences between being on Earth and travelling in space.