KALEIDOSCOPE
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Kaleidoscope Science Curriculum

Learning Organiser for Year 1 - Plants

National Curriculum Summary
Key Subject Concepts

- Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
- Identify and describe the basic structure of a variety of common flowering plants, including trees.

Prior Knowledge/Experience

- Know that plants are different from animals

Key Vocabulary	Definition
Deciduous	A plant that drops its leaves every year.
Evergreen	A plant that keeps its leaves all year.
Root	Anchors the plant in the ground and carries water and minerals to the plant.
Seed	Part that can grow into another plant.
Blossom	A group of flowers on a tree
Bulb	A root shaped like an onion that grows into a flower or plant.
Fruit	A fleshy/juicy part of a plant containing the seeds which comes from the flower
Vegetable	The edible portion of a plant – grouped into leaves (lettuce),stem (celery) roots (carrots) tubers (potatoes), bulbs (onions) and flowers (broccoli)
Branches	Part of a tree that grows out from the trunk.
Petal	The parts that make up a flower
Stem	The main body or stalk of a plant, usually above the ground.
Trunk	The main woody stem of a tree
Leaf	A flat usually green part of a plant that is attached via a stalk.
flower	The part of a plant that holds the seeds and is surrounded by bright petals.

Examples include:
Wild Flowers: daisy, dandelion, buttercup, clover, primrose
Garden flowers: rose, tulip, daffodil, crocus, pansy,
Trees: yew, horse chestnut, sycamore, beech, oak

Working Scientifically Skills

TAPS
Plant structure – observation
Leaf looking - Observation

TAPS Plan for Focused Assessment of Science

Topic: Plants *(and Seasonal change)*	Year 1 Age 5-6	Title: Plant structure
Working Scientifically **Do:** Observe closely using simple equipment *(Observation over time if seasonal)*		**Concept Context** Identify and describe the basic structure of a plant and a tree. *(Could repeat seasonally)*

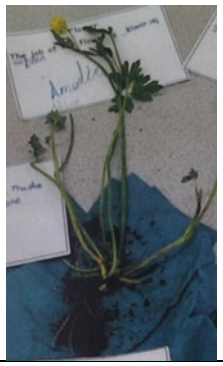
Assessment Focus

- Can children make careful observations of similarities and differences between plants?
- Can children label the basic parts of a plant?

Activity *Today we are botanists.*
Children could go on a 'Weedy Welly Walk' to dig up weeds (including roots).
Provide different types of real plants and pictures e.g. flower/vegetable/weed or picture of a wild flower/sapling/tree. Children to explore the plants using magnifying glasses, rulers.
Using post-it notes ask the children to write labels to identify the basic structure of a plant.
Question the children (this could be a small group activity) to explain what they know about each part of the plant (see questions below).
Record comments that the children make and/or photograph the labelled plant.
NB. Only dig up wild plants which are not protected species (e.g. bluebells cannot be dug up).
H & S – Ensure children wash their hands after touching plants.

T4

Adapting the activity
Support: Provide pre-made labels to prompt, e.g. stem, roots, etc.
Extension: Make comparisons between plants. How is this similar or different to trees?
Other ideas: Repeat weedy welly walk in a different season



Questions to support discussion

- What do you notice about these plants?
- Can you tell me the name of this part?
- What does each part of the plant do?
- Where does it grow?
- What differences can you see between these plants?
- Why might the plants look different?
- What happens to it during different seasons?

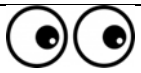
Assessment Indicators
Not yet met: Describe what they can see using everyday language. With support, label the basic structure of a plant.

Meeting: Can describe and point to the basic structure of a plant and a tree using scientific language, *e.g. leaves, flowers, petals, fruit, roots, bulb, seed, trunk, branch, stem.* May begin to explain what the parts of the plant are for.

Possible ways of going further: Can use their observations to make comparisons between different plants or between different plant parts, *e.g. that plant has a thicker/taller stem than that one, the petals are smaller than the leaves.*

T4 Teacher box 4 - gather evidence in a range of ways. See TAPS pyramid for more egs

TAPS Plan for Focused Assessment of Science

Topic: Plants	Year 1 Age 5-6	Title: Leaf looking
Working Scientifically Observing closely 	**Concept context** identify and describe the basic structure of a variety of common flowering plants, including trees	

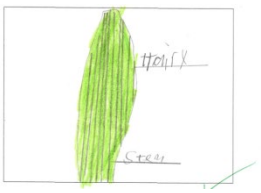
Assessment Focus

- Can children observe closely and make an accurate representation of a leaf that they have found?
- Can children describe features on their leaf?

Activity *Today we will be botanists.*
Go on a 'welly walk' in school grounds to collect leaves *(with clear instructions about where they are allowed to go and what they are allowed to collect/pick e.g. try to collect fallen leaves, do not over-pick from one plant, warn to look for prickles and stinging nettles etc – check with an adult if unsure)*.
Use magnifiers to look closely at the leaves and ask pairs to discuss what is the same/what is different. Draw a leaf, labelling with support.
At an appropriate point, you could include a mini-plenary in which you show a drawing by the class teddy/puppet. Ask the children to give advice on how to improve the drawing e.g. *what colour is the leaf stalk? Where do the veins really go?*
Children could then improve their own or do another drawing. P5
Wash hands.

Adapting the activity
Support: Adult prompts to look carefully at veins, hairs, colour etc.
Extension: Label parts of the leaf, e.g. veins, hairs. Compare two leaves.
Other ideas: Provide some unusual leaves (or pictures), e.g. composite leaf, cactus, grass. Collect a nature paint pallet: stick small bits onto a card strip (with double sided tape on.)

Key Questions



- What does a leaf look like?
- How are these leaves different/similar?
- What shape/colour is your leaf?
- Where did you find your leaf? How do you think it got there?
- Does you leaf have hairs/veins? Why do you think they are there?
- Does your leaf look the same on both sides?

Assessment Indicators
Not yet met: Children draw a leaf but shape may not be accurate or features are missing

Meeting: Children can draw a leaf outline accurately and show hairs/veins when present.

Possible ways of going further: Children compare the features of different leaves.

P5 Pupil box 5 - act on feedback. See TAPS pyramid for more examples.

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Kaleidoscope Science Curriculum

Learning Organiser for Year 1 - Animals including Humans

National Curriculum Summary
Key Subject Concepts

- Identify & names common animals including fish, amphibians, reptiles, birds and mammals
- Identify & name a variety of common animals that are carnivores, herbivores & omnivores.
- Name parts of animals and humans.
- Name the senses
- Explore differences between animals.

Prior Knowledge/Experience

- Being able to name some animals e.g. cat, ant, bear etc.

Key Vocabulary	Definition
Life cycle	The series of changes that an animal or plant passes through from the beginning of its life until its death.
Survive	Not die or disappear
Offspring	A person's children or an animal's young
Senses	Any of the ways in which a human obtains information about the physical world.
Body parts	Names of the different parts of the body including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth
Carnivores	Meat eaters
Herbivore	Plant eaters
Omnivore	Plant and meat eaters
Amphibians	Live on land and water
Birds	Has wings and feathers and a beak
Fish	Live in water, uses gills to breathe
Mammal	Give birth to live babies (not eggs)
Reptiles	Lay eggs, dry scaly skin
Cold blooded	Body temperature changes with the environment.

Working Scientifically Skills

TAPS Y1
Body parts
Animal classification

TAPS Plan for Focused Assessment of Science

Topic: Animals including humans	Year 1 Age 5-6	Title: Body parts

Working Scientifically
Review: Use observations and ideas to suggest answers to questions

Concept Context
Identify basic parts of the human body and say which part of the body is associated with each sense.

Assessment Focus
- Can the children observe and name parts of the human body?
- Can the children use their observations to say which part of the body is associated with each sense?

Activity *Today you are an anatomist.*
Play body part games e.g. Heads, shoulders, knees & toes, Simon says etc.
What parts of the body do you know? Point to parts on themselves or others.
Could look closely at body parts using magnifying glasses / mirrors (mouth, eyes, ears, noses) – are they all the same? What are these parts for?
Ask children to create a model (e.g. play dough or clay) of the human body and label the parts (head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth).
Describe which part is associated with each sense and explain what we use each sense for.
Could label with different coloured paper or on a class/group model.

T4

Adapting the activity
Support: Adult to ask the names for parts of the model and scribe.
Extension: To name other parts of the body including internal organs.
Other ideas: Make large models out of scrap. Make models of animals.

Questions to support discussion
- What different parts of the body have you made?
- What does that part of the body do?
- What does this part help us to do?
- Which part of the body helps us to smell etc?
- What do you think happens inside?

Assessment Indicators
Not yet met: When prompted can name some body parts but does not suggest what these parts might do.

Meeting: Can name a range of body parts. Can link body parts to senses, *e.g. I can smell things with my nose.*

Possible ways of going further: Can talk about differences and similarities of body parts. Can name some internal organs, *e.g. heart, brain, lungs, stomach.*

T4 Teacher box 4 - gather evidence in a range of ways.
See TAPS pyramid for more example

TAPS Plan for Focused Assessment of Science

Topic: Animals including humans	Year 1 Age 5-6	Title: Animal classification
Working Scientifically Review: Identify and classify 	**Concept Context** Identify and name common animals including fish, amphibians, reptiles, birds and mammals. Identify and name common animals that are carnivores, herbivores and omnivores	

Assessment Focus

- Can the children name a variety of animals including fish/amphibians/reptiles/birds/mammals?
- Can the children classify animals according to different animal groups and/or what they eat?

Activity *Today we are going to be zoologists*
(small group – adult to scribe children's comments)
Give children a small selection of pictures or plastic toys of different animals from all of the main vertebrate groups (ensure that these represent a true image of the animal). Children to identify and classify into fish, amphibian, reptile, bird and mammal and explain why they belong to that group. Prompt children to name animals and discuss their choices. Using a prepared chart or labels, children sort under the headings fish, amphibian, reptile, bird and mammal.
Either take photo of classifying or stick pictures onto template.
Using mammals only, identify one example that is a carnivore, a herbivore and an omnivore.
This activity can be completed as an elicitation activity at the start of the topic, then repeated to assess the progression of children's learning.

Adapting the activity
Support: Sort according to 3 animal groups initially – mammal, fish and bird.
Extension: How else could you sort them? What other ways?
Other ideas: Children to research animals using books and internet.

Questions to support discussion

- What is the same about the animals in that group?
- How are they different to this group?
- Why is the …….. in that group?
- Where would you put….?
- How could you sort differently?
- Which other animal could be in that group?

Assessment Indicators
Not yet met: Names some common animals. Needs support to sort or limited to common mammals, birds and fish.
Meeting: Name a variety of common animals including fish /amphibians /reptiles / birds/mammals. Uses observations to classify into given scientific groupings including animal groups or omnivore/herbivore/carnivore and can explain how they are similar, *e.g. birds have feathers, frogs go in the water and out of water, they are all mammals because they are hairy.*
Possible ways of going further: Can classify according to a range of features and give reasons for their choices, *e.g. some mammals live underwater, include other insect groups.* Names and classifies other animals which are not pictured.

T1 Teacher box 1 - plan elicitation. See TAPS pyramid for more examples.

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Kaleidoscope Science Curriculum

Learning Organiser for Year 1 – Everyday Materials

National Curriculum Summary
Key Subject Concepts

Distinguish between an object and the material from which it is made

- identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
- describe the simple physical properties of a variety of everyday materials
- compare and group together a variety of everyday materials on the basis of their simple physical properties.

Prior Knowledge/Experience

- Name different objects understanding that they have different properties

Key Vocabulary	Definition
Absorbent	Material that soaks up liquid easily
Bendy	An object that bends easily into a curved shape
Brick	Blocks of baked clay used for building walls
Dull	A colour or light that is not bright
Elastic	A rubber material that stretches when you it and returns to its original size and shape when you let it go
Fabrics	Cloth or other material produced by weaving threads together
Foil	Sheets of metal as thin as paper
Glass	A hard transparent material
Man-made	Things created by people
Metal	A hard substance such as iron or steel
Natural	Things that exist in nature
Opaque	An object or substance that you cannot see through
Plastic	A material that is light in weight
Rock	The hard substance which the Earth is made of
Rough	Uneven and not smooth
Shiny	Something bright which reflects light
Smooth	Something with no lumps, roughness or holes
Soft	Not rough or hard
Stiff	Something firm, which does not bend easily
Stretchy	Slightly elastic
Transparent	If an object is transparent, you can see through it.
Waterproof	Something is waterproof if it does not let water pass through it.
Wood	The material which forms the trunks and branches of trees

Working Scientifically Skills

TAPS
Plan materials – transparency
reflectiveness

TAPS Plan for Focused Assessment of Science

Topic: Materials/light	Year 1 Age 5-6	Title: Ways to test transparency

Working Scientifically
Recognise that sorting questions can be answered in different ways

Concept context
Describe properties of materials

Assessment Focus

- Can children test whether materials are opaque or transparent?
- Can children compare materials on the basis of their transparency?
- Can children discuss different ways to test transparency?

Activity

Explore a range of materials e.g. foil, shiny fabric, glossy acetate, shiny paper, brightly coloured paper, netting… list words to describe their properties on a whiteboard (e.g. shiny/dull, transparent/opaque & translucent). Explain that a material is transparent if we can see details through it and opaque if we cannot see anything at all. Ask children to look through a translucent material (e.g. bubble wrap) and explain that this is translucent because we can see light but not details.

Discuss how to test which are the most transparent, e.g. look through the material at a window or at a lamp, or shine torchlight through or take a photo through it. What can you see?

Groups test and sort a range of materials (could be for a purpose, e.g. to find the best material for making a windscreen for a car). Children return to sit in a circle and consider one group's sorting / ordering – do you agree? Would you move any? Why? Adult collect children's ideas or ask target children or those who have not worked with an adult.

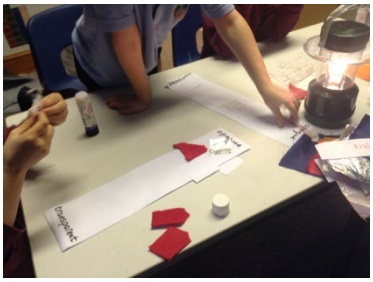
P4

Adapting the activity

Support: Provide sorting hoops or strips of paper labelled transparent / opaque. Adult to prompt children to describe and explain what they are doing.

Extension: Can you test in a different way? Where would you put this tricky one? e.g. coloured acetate (shiny and translucent).

Other: Could test whether shiny, magnetic, bendy.



Questions to support discussion

- How could you test it?
- Which is the most / least transparent? How do you know?
- What other words could you use to describe the materials?
- Does everyone in your group agree? Can you explain to the others why you have put that material there?
- Can you tell me another way to test this object?

Assessment Indicators

Not yet met: Can sort materials into two groups but not clear or gives a reason for the sorting that doesn't link to transparency. May not use a single criterion to sort: "these are colourful, these are shiny". May confuse transparency with other properties e.g. reflection or bright colours.

Meeting: Describe how they sorted the materials according to how transparent they are, and how other groups used different ways to sort the materials.

Possible ways of going further: Able to order the materials from most to least transparent and explain how the test helped them decide on this sequence. Can comment on effectiveness of different ways to test or compare the objects.

P4 Pupil box 4 - assess peers. See TAPS pyramid for more examples.

TAPS Plan for Focused Assessment of Science

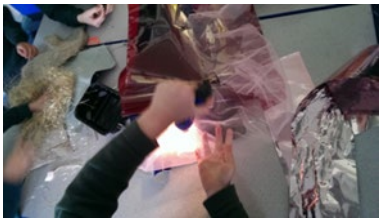
Topic: Materials/light	Year 1 Age 5-6	Title: Ways to test reflectiveness *(alternative plan to transparency)*
Working Scientifically **Plan:** Recognise that sorting questions can be answered in different ways 		**Concept Context** Describe properties of materials

Assessment Focus

- Can children test the reflectiveness of materials?
- Can children compare materials on the basis of their reflectiveness?
- Can children discuss different ways to test reflectiveness?

Activity *Today we are going to be physicists*
(Could be done as a follow up lesson to transparency, if you would like to do more on this)
Explore a range of materials e.g. foil, shiny fabric, glossy acetate, shiny paper, brightly coloured paper, netting… list words to describe their properties on a whiteboard (e.g. shiny/dull, glossy, translucent/opaque).
Discuss how to test which are the most reflective, e.g. put in sunlight / torchlight / use a lamp, does it bounce off onto the wall/table? Can you see yourself in it?
Groups test and sort a range of materials (could be for a purpose, e.g. to find the most reflective materials for making our rockets in DT).
Children sit in a circle and consider one group's sorting / ordering – do you agree? Would you move any? Why? Adult collect children's ideas or ask target children or those who have not worked with an adult.

Adapting the activity
Support: Provide sorting hoops (reflect / not reflect). Adult to prompt children to describe and explain.
Extension: Can you test in a different way? Where would you put this tricky one? e.g. black plastic, coloured acetate (shiny and translucent).
Other: Could test transparency or whether magnetic.



Questions to support discussion

- How could you test it?
- Which is the most or least reflective? How do you know?
- What other words could you use to describe the materials?
- Does everyone in your group agree?
- Can you explain to the others why you have put that material there?
- Can you tell me another way to test this object?

Assessment Indicators
Not yet met: Can sort materials into two groups but not clear or gives a reason for the sorting that does not link to very reflective/less reflective. Or may not use a single criterion to sort: "these are colourful, these are shiny". May confuse reflection with other properties e.g. transparency or bright colours.
Meeting: Describe how they sorted the materials according to how reflective they are, and how other groups used different ways to sort the materials.
Possible ways to go further: Able to order the materials from most to least reflective and explain how the test helped them decide on this sequence. Can comment on effectiveness of different ways to test or compare the objects. May suggest what property of the material causes the reflectiveness.

Pupil box 4 - assess peers. See TAPS pyramid for more examples.

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Kaleidoscope Science Curriculum

Learning Organiser for Year 1 – Seasonal Changes

National Curriculum Summary
Key Subject Concepts

- observe changes across the four seasons
- observe and describe weather associated with the seasons and how day length varies.

Prior Knowledge/Experience

- Understand that the weather is different at different times
- Know that we need to wear different outfits to feel comfortable in different conditions

Key Vocabulary	Definition
Temperature	The measure of how hot something is.
Seasons	The parts a year is divided into.
Weather	The conditions outside.
Leaves	A flat and green organ growing from a stem.

Working Scientifically Skills

TAPS
Seasonal change -recording

TAPS Plan for Focused Assessment of Science

Topic: Seasons throughout the year	Year 1 Age 5-6	**Title:** Seasonal change
Working Scientifically **Do:** Observe over time and record data to help in answering questions 		**Concept Context** Observe changes across the four seasons

Assessment Focus

- Can children observe changes across the seasons?
- Can children record and discuss changes across the seasons?

Elicitation (September) *Today we are going to be phenologists*
What do you know about the seasons? Complete a drawing/note comments about the four seasons.

Activity (each season)
Go on a 'welly walk' to the same place, observe a deciduous and an evergreen tree. Look at the signs of the season and make collections. Identify and take photos of each tree and the signs of the season.
Back in class, explore and discuss collections and scribe comments.
Plot the changes using the photographs of a deciduous tree and an evergreen tree on a seasonal display – use photos of the walk, collections and data
Autumn - falling leaves, seeds, fruits, changing colours, dew on grass, temperature, mini beasts, temperature, clothing
Winter – bare trees, hard ground, lack of plants, temperature, clothing
Spring – buds on trees, new growth, blossom, bird song, grass, warmth, temperature, clothing
Summer –full trees, colours, mini beasts, wild flowers, temperature, clothing
End of school year: revisit initial elicitation to add new observations or create new drawings/descriptions/comparisons of four seasons. 

Adapting the activity
Support: Support observations on the walk and scribe comments.
Extension: To begin to make connections between the seasons, ask children what has changed since last time.
Other ideas: Complete daily weather charts for a week each season.

Questions to support discussion

- What have you observed?
- How have things changed?
- How has the weather changed?
- What are the differences between the seasons?
- Why have things changed?

Assessment Indicators
Not yet met: With support, children can observe and record what they see at the time.
Meeting: Observe, record and describe changes in e.g. plants, temperature and the weather across the four seasons.
Possible ways to go further: Use records of data from previous sessions to begin to make links between their observations and to offer explanations for seasonal change, *e.g. I saw more flowers in spring because it is getting warmer, it is colder in the winter because we get less sunlight.*

Teacher box 1 - plan elicitation. See TAPS pyramid for more examples.

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Learning Organiser for Year 2 – Plants

National Curriculum Summary
Key Subject Concepts

- Observe and describe how seeds and bulbs grow into plants.
- Find out & describe how plants need water, light & suitable temperature to grow/stay healthy

Prior Learning/Experience

- Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
- Identify and describe the basic structure of a variety of common flowering plants, including trees.

Key Vocabulary	Definition
Stem	The main body or stalk of a plant.
Temperature	A measure of how hot or cold something is.
Soil	Top layer of earth in which plants grow.
Germination	The process when a plant begins to grow from a seed.
Pollination	The transfer of pollen to another plant to help make a seed.
Nutrients	Substances that help plants and animals to grow.
Seed dispersal	Dispersal is the spreading of things over a wide area.

Working Scientifically Skills

TAPS
Plant growth -observation

TAPS Plan for Focused Assessment of Science

Topic: Plants	Year 2 Age 6-7	Title: Comparing plant growth in different conditions

Working Scientifically
Do: Observe closely, using simple equipment

Concept Context
Describe how plants needs water, light and a suitable temperature to grow and stay healthy

Assessment Focus

- Can children observe closely, noticing differences and similarities?
- Can children measure and compare the height of plants?

Activity *Today we are botanists.*
Show children pre-grown plants, discuss what children think these plants need to keep healthy. Raise questions they would like to investigate, e.g. *How long can plants last without water / light? Does it matter if the plant is inside or outside? How will less light affect the plant?*
Use pre-grown plants to explore conditions for growth, e.g.
Compare NORMAL CONDITIONS (on window sill + water + light + warm) with:
No/less/more WATER **or** No/less/more LIGHT **or** No/less/more WARMTH.
Discuss what they think will happen to plants without water/sun/warmth and how to record observations e.g. labelled drawings every few days to make plant diaries.
Children need to observe and measure the plants over time using simple equipment e.g. cameras, rulers, measuring tape, magnifiers.
Discuss what the class results show about what a plant needs to grow and to stay healthy.

Adapting the activity
Support: Compare just one of the requirements (e.g. water/no water), record with photos as well as drawings.
Extension: Accurately measure a range of features and record in a table.
Other ideas: Investigate different plants.

Questions to support discussion

- What do you notice about the plants? Can you see any differences?
- Why might the plants look different?
- What similarities are there between the plants?
- How are we going to observe the differences over time?
- What will we record?
- Have our results answered our question? Why?
- What does a plant need to grow?

Assessment Indicators
Not yet met: Describes observable differences at the time of asking e.g. which plant is the tallest and shortest.
Meeting: Observes and records the appearance of the plants over time (drawing or annotated photo). Can compare the height and/or features of the plants over time e.g. *this one was fine to start with but now it's much smaller.*
Possible ways of going further: Make a range of comparisons between the plants in different conditions, e.g. colour, droopiness, height, number of leaves.

Teacher box 4 - gather evidence in a range of ways. See TAPS pyramid for more egs

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Kaleidoscope Science Curriculum

Learning Organiser for Year 2 – Animals including Humans

National Curriculum Summary
Key Subject Concepts

- Notice that animals (incl. humans) have offspring that grow into adults
- Find out & describe the basic needs of animals (incl. humans) for survival (air water food)
- Describe the importance of human exercise, eating the right amount of different foods, and hygiene

Prior Knowledge/Experience

- Identify & names common animals including fish, amphibians, reptiles, birds and mammals
- Name parts of animals and humans.
- Name the senses
- Explore differences between animals.

Key Vocabulary	Definition
Balanced diet	A variety of food groups that you regularly eat
Food groups	A collection of foods that share similar nutritional properties. There are five food groups: protein, fats, dairy, carbohydrates, vitamins and minerals.
Heart rate	The speed at which the heart beats
Germs	A tiny organism that causes a disease in a plant or animal
Bacteria	Small organisms, or living things, that can be found in all natural environments
Infection	A germ or sickness that causes something to be infected
Medicine	The treatment of illness and injuries by doctors and nurses
Amphibian	Land animal that breeds in water
Reptile	Cold-blooded scaly animal
Bird	Two-legged winged animal
Mammal	Warm-blooded animal with a backbone
Vertebrate	Animal with a backbone
Invertebrate	Animal without a backbone
Carnivore	Animal that eats meat
Omnivore	Animal that eats anything
Herbivore	Animal that only eats plants

Working Scientifically Skills

TAPS
Comparing handspans – using observations to suggest questions

TAPS Plan for Focused Assessment of Science

Topic: Animals, Including Humans	Year 2 Age 6-7	Title: Comparing hand spans
Working Scientifically **Review:** Using their observations and ideas to suggest answers to questions		**Concept Context** Recognise growth in humans.

Assessment Focus

- Can children use their observations to compare different hand spans?
- Can children use their observations to suggest answers to their questions about hand spans?

Activity *Today we are an anatomists.*

Ask the children to compare the size of their hand with that of another child. As a class create a list of questions e.g. Do older children have bigger hands? Do taller children have bigger hands? Can bigger hands pick up more cubes? *('Handspan grab' can create a graph of cubes)*.

Discuss how hand spans could be measured and agree as a class (e.g. draw around hands, spread/closed fingers, start and end place of measurement, to nearest centimetre). With a partner to help, ask each child to measure their own hand.

Record results together as a class.

Ask the children to compare hand spans and suggest reasons answers to the class questions.

Adapting the activity

Support: Compare hand cut outs rather than measurements

Extension: What size hands would a Year 6 child have? Why?

Other ideas: Compare feet – do taller people have the biggest feet?

T4

Questions to support discussion

- How can we accurately measure hand span?
- Who had the smallest/ biggest hand span in the class?
- What size hands did most children have?
- What do you notice about people with the biggest hand span?
- Did size of hands affect how many cubes were picked up?

Assessment Indicators

Not yet met: Can make simple comparisons, saying which hand is smallest or biggest.

Meeting: Can make comparisons using their observations/results to say which hands are bigger and smaller. Suggests reasons for differences in results *e.g. his hand is bigger because he has had longer to grow, she holds more cubes because she spreads out her fingers far to grab them.*

Possible ways of going further: Can make predictions relating hand span to height, *e.g. a Year 6 will have bigger hands / will hold more cubes because....*

Can raise further questions related to height that could be tested, *e.g. when do your hands stop growing?*

T4 Teacher box 4 - gather evidence in a range of ways. See TAPS pyramid for more egs

KALEIDOSCOPE
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Kaleidoscope Science Curriculum

Learning Organiser for Year 2 – Everyday materials and their uses

National Curriculum Summary
Key Subject Concepts

- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

Prior Knowledge/Experience

Distinguish between an object and the material from which it is made

- identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
- describe the simple physical properties of a variety of everyday materials
- compare and group together a variety of everyday materials on the basis of their simple physical properties.

Key Vocabulary	Definition
Characteristic	Quality (e.g. hardness, flexibility)
Classification	A way to sort things with the same characteristic
Man-made	Made by people
Natural	Found in nature
Property	A characteristic of something
Squash	To crush something so that it becomes flat or out of shape
Bend	To change a straight object so that it is curved
Twist	To change the shape of something by turning it
Stretch	To make something longer or wider without tearing or breaking it
Waterproof	Does not absorb water
Opaque	A material is **opaque** if you cannot see through it.
Transparent	A material is **transparent** if you can see through it.

Working Scientifically Skills

Enquiry skills logos to include in books see NS list.

TAPS
Waterproofing – asking questions

TAPS Plan for Focused Assessment of Science

Topic: Materials	Year 2 Age 6-7	Title: Waterproof materials

Working Scientifically
Plan: Ask simple questions and recognise that they can be answered in different ways

Concept Context
Use knowledge and understanding of properties of materials to compare suitability for different uses

Assessment Focus

- Can children discuss/use different ways to test how waterproof materials are?
- Can children compare the tests of waterproofness?

Activity *Today we are materials engineers.*

Provide a collection of different types of materials. Discuss which could be the 'best' material – draw out that need to know best for what. Today we want to know the 'best' for waterproof coat/umbrella/cover for summer fair cakes etc – choose appropriate context. Discuss how to compare how waterproof the different materials are, for example:

- Drip water onto the material until it seeps through
- Pour a set amount of water onto the material
- Wrap up a cotton ball in the material & put into water

Children decide on and carry out a simple test to measure the waterproofness of different materials – groups try different ways to answer the question.
Discuss as a class the different ways in which groups tested waterproofness.
Adult collect utterances or ask target children or those who have not worked with an adult. These could be recorded in floorbooks or annotated photos.

T3

Adapting the activity

Support: Support children to decide which test to carry out.
Extension: Try more than one method of testing.
Other ideas: Test different properties relevant to the purpose. Make product.

Questions to support discussion

- How will you know if it is waterproof?
- How much water will you use? How long will you put it in the water for?
- Can you order the materials: most to least waterproof?
- Do you think everyone else will find the same result?
- How else could you test the material?

Assessment Indicators

Not yet met: Describes their idea/test but it may not help to answer the question and does not consider alternative methods.

Meeting: Explains different tests, *e.g. you can find out which is waterproof by --- or ---*

Possible ways of going further: Comments on the best way to find out and understands that a comparison has to be fair, *e.g. I need to add the same amount of water.*

T3 Teacher box 3 - use Q, discussion & observation. See TAPS pyramid for more egs.

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Kaleidoscope Science Curriculum

Learning Organiser for Year 2 – Living things and their habitats

National Curriculum Summary
Key Subject Concepts

Explore and compare the differences between things that are living, dead, and things that have never been alive

- identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other
- identify and name a variety of plants and animals in their habitats, including micro-habitats
- describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.

Prior Knowledge/Experience

- That different animals are found in different places .e.g. penguins live in the cold, kangaroos in Australia
- That different animals eat different types of food.

Key Vocabulary	Definition
Habitat	The natural home or environment of an animal, plant or organism.
Respire	Breathe
Reproduce	Produce offspring
Micro-habitat	A habitat which is small or limited
Adaptation	The action or process of adapting to suit needs
Predator	An animal that naturally preys on others
Consumer	Something which eats something
Prey	An animal which is hunted and killed by another for food.

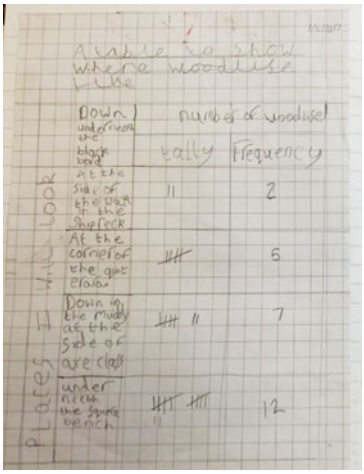
Working Scientifically Skills

TAPS
Woodlice – gather and record data
Nature spotter – identifying and classifying
Living not living – interpret and record using appropriate language

TAPS Plan for Focused Assessment of Science

<table>
<tr><td colspan="2">Topic: Living things and their habitats</td><td>Year 2
Age 6-7</td><td>Title: Woodlice habitat</td></tr>
<tr><td colspan="2">Working Scientifically
Do: Gather and record data to help in answering questions.</td><td colspan="2">Concept Context
Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants</td></tr>
<tr><td colspan="4">Assessment Focus
• Can children gather and record data in a tally chart or on a map?
• Can children discuss their findings in relation to preferred habitats?</td></tr>
<tr><td colspan="4">Activity Today we are a zoologists.
Discuss what a habitat is and different habitats e.g. use pictures of plants/animals and consider where they live. What about this creature? Show picture of a woodlouse (or substitute for another animal which is common in your context at the time of year).
What kinds of habitats do woodlice live in? Consider places in the locality where we could look for woodlice.
Decide whether to tally woodlice in different places or broaden to any invertebrates. T4
Support children to set up a tally chart or map ready to record their results.
Discuss expectations e.g. places allowed to visit, group/class, boundary, return signal etc.
Return to class to consider findings and discuss preferred habitats for woodlice.

Adapting the activity
Support: Provide a table / map of the environment for recording data.
Extension: Record other living things which share the habitat and/or features of the habitat.
Other ideas: Maths link. Repeat in a different environment or season.

 
Questions to support discussion
• How are you going to answer the question?
• Where are you going to gather your data?
• How could you record which animal lives in which habitat?
• What does this part on your chart/map mean?
• Do any animals/ plants share their habitats? Why might this be? What are the characteristics of these habitats?</td></tr>
<tr><td colspan="4">Assessment Indicators
Not yet met: Says how many woodlice were found, e.g. I found 3 woodlice. Needs support to record on a tally chart or map.
Meeting: Can draw a tally chart (after it's been modelled to them) or record on a map and explain why woodlice are found in a particular habitat, e.g. I found 3 here and 3 there because it is dark.
Possible ways of going further Can independently explain their tally chart / map, e.g. There are more spiders here and more woodlice there… Explaining why the woodlice might live there e.g. because of predators.</td></tr>
</table>

T4 Teacher box 4 - gather evidence in a range of ways. See TAPS pyramid for more egs

TAPS Plan for Focused Assessment of Science

Topic: Living things and their habitats	Year 2 Age 6-7	Title: Nature spotters
Working Scientifically **Review:** Identifying and classifying	**Concept Context** Identify and name a variety of plants and animals in their habitats, including micro-habitats	

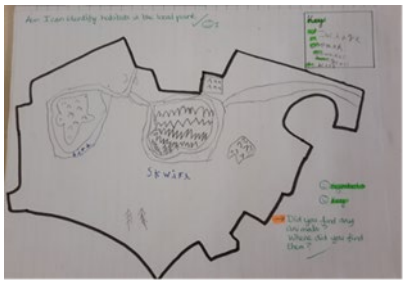
Assessment Focus

- Can children use spotter sheets to identify plants/animals?
- Can children classify the types of plants/animals they have found?

Activity *Today we are conservation officers.*
Explore simple classification keys/spotter sheets – select appropriate for your local habitat (in or out of school grounds) and season, for example:
http://www.woodlandtrust.org.uk/naturedetectives/activities
Take the children on a nature hunt to explore the habitat. Groups could explore: leaves/blossom/trees, flowers, invertebrates (mini beasts), pond life... as appropriate. Remind children about careful handling of animals, returning any creatures to their habitat, not picking wild flowers, not eating, washing hands on return. Children use spotter sheers to identify and classify plants and animals they encounter.
Return to class to discuss their findings. Classify the types of living things found, asking for reasons why their animal does / does not belong to a classification group.

T3

Adapting the activity
Support: Provide a spotter sheet containing very common/easy to distinguish plants/animals.
Extension: Provide a more challenging spotter sheet where close observation is needed to spot the differences between the species.
Other ideas: Visit a different habitat and compare findings.



Questions to support discussion

- What did we see on our walk?
- What kinds of plants/animals did we find?
- How did you identify this animal / plant?
- Did you see any signs that animals had been there?
- Which group does this animal / plant belong to? How do you know?
- Why is this animal not a ……?

Assessment Indicators
Not yet met: Children may name animals already known to them e.g. ants and spiders with little reference to the spotter sheets. Children will not yet be linking the specific animal to its features e.g. *I know it's an ant because we have them in my garden*.

Meeting: Children use spotter sheets to identify plants or animals e.g. *I think that is an earwig because it has a funny tail like on the sheet.* Children begin to classify e.g. *That woodlouse can't be an insect because it doesn't have 6 legs. The squirrel in the tree is all furry so it must be a mammal.*
Possible ways of going further: Children can discuss the limitations of the spotter sheets e.g. *I think it is a kind of ladybird because it has the same kind of back and legs, but it is not the same as on the sheet, but the sheet can't have pictures of all the ladybirds.*

T3 Teacher box 3 - use Q, discussion and observation. See TAPS pyramid for more egs

TAPS Plan for Focused Assessment of Science

Topic: Living Things	Year 2 Age 6-7	Title: Sorting living and non-living

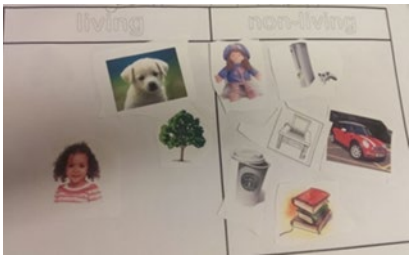
Working Scientifically Review:
Use of appropriate scientific language to communicate their ideas

Concept Context
explore and compare the differences between things that are living, dead, and things that have never been alive

Assessment Focus

- Can children identify differences between things that are living, dead, and things that have never been alive?
- Can sort things into living and non-living, or living, dead and never alive?

Activity *Today we are zoologists.*
Provide a range of objects and pictures to explore, including some plants. Use sorting hoops or similar to explore ideas about which are alive now, which used to be alive and which have never been alive.
Ask the children to explain how they decide, drawing out characteristics of living things. Ask them to continue sorting and add their own ideas.
Explore any new ideas and address any misconceptions.

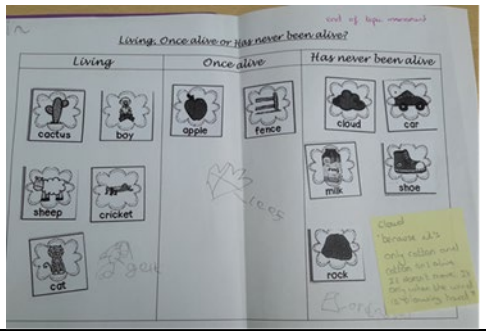


T3

Adapting the activity
Support: Provide pictures or objects which clearly fit into one category to start with.
Extension: Provide additional examples which are less clear e.g. seeds, paper, snail shell.
Other ideas: Take photos on a living/non-living hunt around school or home.

Questions to support discussion

- Are any of these alive?
- Did any of these used to be alive?
- Have any of these never been alive?
- How do you know?
- What else could go in that hoop?



Assessment Indicators
Not yet met: Children can sort items with adult support but are unsure when working independently, or they have not yet developed/able to express their ideas about living/non-living.

Meeting: Children meeting the objective would be able to explain why they had sorted in this way e.g. "*because it moves on its legs and it would probably go and get something to eat and drink if it was hungry*", "*it's living because it can be pregnant and it can get a husband or wife*", "*the rock doesn't grow, eat, move or have babies*".

Possible ways of going further: Children explore ideas further e.g. *the seeds can't grow at the moment, but they will if you give them a drink* (seeds can be dormant).

T3 Teacher box 3 - use Q, discussion and observation. See TAPS pyramid for more egs

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Kaleidoscope Science Curriculum

Learning Organiser for Year 3 – Plants

National Curriculum Summary
Key Subject Concepts

- Identify & describe the functions of parts of flowering plants: roots, stem/trunk, leaves & flowers.
- Explore requirements for plant growth (air, light, water, nutrients from soil, room to grow) & how it varies from plant to plant.
- Investigate the way water is transported within a plant
- Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation & dispersal

Prior Learning/Experiences

- Observe and describe how seeds and bulbs grow into plants.
- Find out & describe how plants need water, light & suitable temperature to grow/stay healthy

Key Vocabulary	Definition
Absorb	Take in or soak up
Anther	The terminal part of a stamen consisting usually of two lobes each containing two sacs in which the pollen matures
Carbon dioxide	A colourless and odourless gas which is used in the process of photosynthesis
Dispersal	The action or process of distributing over a wide area
Filament	The filament is the stalk that holds the anther.
Germination	The development of a plant from a seed.
Nutrition	Food or nourishment
Ovary	The part of the flower which makes the seeds.
Photosynthesis	The process in which green plants use sunlight to make their own food
Pollen	A fine powder produced by a certain plant when they reproduce.
Pollination	The process that allows plants to reproduce.
Sepal	The sepal is a support structure for the petal. It is typically green and helps to protect and hold up the petal. All the sepals together are called the calyx.
Stamen	The stamens of a flower are the small, male, delicate stalks which grow at the flower's centre and produce pollen.
Stigma	The top part of the flower which takes in pollen

Working Scientifically Skills

TAPS
Function of a stem – use evidence to answer questions
Measuring plants – making observations and measurements using standard units

TAPS Plan for Focused Assessment of Science

Topic: Plants	Year 3 Age 7-8	Title: Function of a plant stem
Working Scientifically **Review:** Use straightforward scientific evidence to answer questions or to support their findings		**Concept Context** Investigate the way in which water is transported within plants

Assessment Focus

- Can children make careful observations?
- Can children use observations to suggest how water is transported?

Activity *Today we are botanists.*

Show children a complete head of celery and/or white carnations and ask them to name the parts (noting the stem). Explain to the children that they are going to put the celery stem/carnation upright in a vase/container of water coloured with red/blue food colouring. *(Test colouring in advance if possible because not all brands work).* What could happen?

Make careful observation before placing in water e.g. draw and label.

Leave overnight/all day. Carefully observe and reflect on what has happened and how well (or not) the dye has been transported. Use their scientific evidence to explain how water is transported in plants e.g. labelled drawings of whole and cut celery.

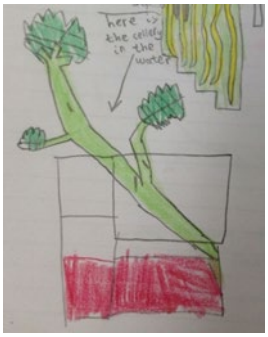
T7

Adapting the activity

Support: Draw a group explanation

Extension: Predict what will happen when the stem is split in two and each end placed in a different coloured food dye.

Other idea: Try different colours and plants.



Questions to support discussion

- What can you see inside the celery? What has happened?
- What is happening to the coloured water?
- What do you think will happen if the stem is split in 2 and placed in different coloured waters?
- Do you think the leaves will change colour? If so, why?
- Can you explain how water is transported in a plant?
- What scientific evidence do you have to support your explanation?

Assessment Indicators

Not yet met: Can draw/say what has happened simply, e.g. *the colour went up*.

Meeting: Observes what has happened and can make suggestions, e.g. *I know there are tubes in the stem, the water goes up the stem and it might go up to the leaves if I leave it for longer.*

Possible ways of going further: Children can predict what they would expect to happen if the stem was split and each section placed in two different dyes. They raise further questions about how water transportation can be shown in other types of plants *e.g. If we split the celery between two food dyes, I think half the stem will be blue and half will be red because the water from each container will be transported up the stem. I wonder if we*

could make a white flower change colour?

T7 Teacher box 7 - time to reflect. See TAPS pyramid for more examples.

TAPS Plan for Focused Assessment of Science

Topic: Plant Growth	Year 3 Age 7-8	Title: How much water do plants need?
Working Scientifically **Do:** Making systematic and careful observations and measurements using standard units 		**Concept Context** Explore the requirement of plants for life and growth, and how they vary from plant to plant.
Assessment Focus • Can children use simple apparatus to measure water/height? • Can children record their measurements?		

Activity *Today we are botanists.*
Ask, how much water do these plants need to grow? Discuss how to set up an investigation as a whole class. Either draw on previous maths work or teach the children how to measure volume of water and the height of the plant. As they carry out the investigation, the children will need to make their own measurements of the water and the plant and record the height of the plant. Provide beakers/measuring cylinders, but amount of water should be easy to measure, e.g. 200ml, expect measurement of length to the nearest half cm.
Over the course of the investigation, plan to check groups measuring the water and plant to observe their accuracy (TA support would be helpful here). Children could also peer check measures. Ask the children to explain why accurate measurements are important.

T3

Adapting the activity
Support: Provide water containers with a single level marked. Provide rulers/card strips with cm coloured stripes that can be counted.
Extension: Provide beakers/measuring cylinders, but amount of water to measure involves understanding of the scale, e.g. 130ml. Independent choice of measuring equipment for length, but expect to nearest mm.
Other ideas: Link to measuring in maths.

Questions to support discussion
- How much water shall we give the plants?
- How shall we measure how much the plant has grown?
- How can we make sure that we know how much water we have given them?
- Can you show me how you measure the water?
- Can you show me how you measure the plant?
- Why do we need to be accurate when we measure the water/plant?
- Ext: What is the importance of being accurate when taking measurements?

Assessment Indicators
Not yet met: With support, can measure a volume of water and height of the plant (to nearest cm).
Meeting: Can measure accurately the volume of water (to nearest 10 ml) and height of a plant (to nearest half cm).
Possible ways of going further: Measures accurately volume of water given to plants, and heights (mm). Explain importance of and suggests ways to improve accuracy (repeat readings).

Teacher box 3 - use Q, discussion & observation. See TAPS pyramid for more egs.

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Kaleidoscope Science Curriculum

Learning Organiser for Year 3 – Animals including Humans

National Curriculum Summary
Key Subject Concepts

- Identify that animals (incl. humans), need the right types & amount of nutrition, that they can't make their own food, they get nutrition from what they eat
- Identify that humans and some animals have skeletons & muscles for support, protection & movement.

Prior Knowledge/Experience

- Notice that animals (incl. humans) have offspring that grow into adults
- Find out & describe the basic needs of animals (incl. humans) for survival (air water food)
- Describe the importance of human exercise, eating the right amount of different foods, and hygiene

Key Vocabulary	Definition
Carbohydrate	A main food groups which provide our main source of energy.
Dairy	A food group which provide our main source of calcium (healthy teeth and bones).
Disease	A condition that causes harm to the health of a person, animal, or plant.
Energy	Strength to be able to move and grow.
Fats	A food group which helps us to absorb vitamin and provides growth, although best in small amounts.
Heathy diet	A good balance of all the food groups.
Movement	A particular action or way of changing place or position.
Muscles	Fibrous Tissue in an animal which helps produce movement.
Nutrients	Substance that living things need to stay alive and healthy.
pelvis	A bowl shape bone that structure that supports the spine.
Protein	A food group which provides us a high nutritional value.
Rib cage	A group of 12 pairs of ribs that protects the organs in your chest which helps to breathe.
skeleton	The bones of a human or animal
Skulls	A bone that protects the brain
Sugars	Something that is added to food to give it a sweet taste.
tendons	A tough band connecting muscle to bone

Working Scientifically Skills

TAPS –
Skeletons – ask questions and carry out tests

TAPS Plan for Focused Assessment of Science

Topic: Animals including humans	Year 3 Age 7-8	Title: Investigating the human skeleton

Working Scientifically
Plan: Ask relevant questions and use different types of scientific enquiries to answer them

Concept Context
Identify that humans have skeletons and muscles for support, protection and movement

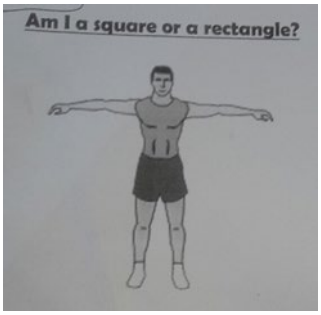
Assessment Focus

- Can children ask questions about the diversity of human skeletons?
- Can children turn questions into a form that can be investigated?

Activity *Today we are going to be osteologists*
Discuss differences between human skeletons, taking care when discussing differences between children in class. Consider which bones can be more easily measured e.g. skull, foot, part of arm/leg etc. Ask children to use these ideas to create a question to be investigated, e.g.
Are adult heads bigger than children's heads?
Do taller children have longer arms/bigger feet etc?
Am I/Are you a square? (look at arm span versus height)
Ask children to explain how they will answer their question. Support them to carry out their **pattern seeking enquiries** to answer their own questions.

ShU3

Adapting the activity
Support: Model how to ask relevant questions and support directly with turning them into an investigable form. Ask later if outcome was what they expected or if it surprised them.
Extension: Ask children to independently turn questions into an investigable form.
Other ideas: Ask questions about animal skeletons.



Questions to support discussion

- What other questions could we ask that are a bit like this one?
- How could you investigate your question?
- What will you be measuring?
- What equipment will you need?
- Do you think we will find a difference between…?
- What do you predict you will find out?
- What do you think will be the general trend in your results?

Assessment Indicators
Not yet met: Can ask questions about the human body, e.g. *How big are people's heads? I wonder who has got the biggest feet?* Unable to relate the question to a suitable enquiry.
Meeting: Can ask questions, and turn them into a form that can be investigated *e.g. Do Y6 children have bigger heads than Y4 children?*
Possible ways of going further: Investigate more than one criteria e.g. Will taller people have wider arm spans and wider hand spans?

ShU3

This investigation can be for any age and can have a different Working Scientifically focus e.g. do across the school and look for progression.
Shared Understanding box 3 – progression. See TAPS pyramid for more examples.

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Learning Organiser for Year 3 – Rocks

National Curriculum Summary
Key Subject Concepts

- Compare & group different types of rocks based on appearance & physical properties
- Describe how fossils are formed when things that have lived are trapped within rock
- Recognise soils are made from rocks and organic matter

Prior Learning/Experiences

- Understand that rock is a type of material which will have its own properties

Key Vocabulary	Definition
Absorb	
Crystals	
Fossils	The remains or impression of an animal or plant in a rock
Grain	
Igneous	Rocks formed when magma cools
Magma	Rock in a liquid form
Metamorphic	Rocks made from layers of the Earth's crust being heated and squashed
Mineral	
Molten	
Natural	
palaeontology	
Permeable	A material that liquid can pass through
Pressure	
Properties	
Sediment	
Sedimentary rocks	Rocks made when layers of sand, mud and pebbles are pressed down over time
texture	The way something feels
weathered	
Clay soil	
Sandy soil	

Working Scientifically Skills

TAPS
Rock report – reporting on findings from enquiries

TAPS Plan for Focused Assessment of Science

Topic: Rocks	Year 3 Age 7-8	Title: Reporting on Rocks
Working Scientifically **Review:** Reporting on findings from enquiries		**Concept Context** Compare and group together different kinds of rocks on the basis of their properties

Assessment Focus

- Can children group rocks based on properties?
- Can children talk about / draw a diagram / write about their findings?
- Can children draw conclusions about the least / most wearing rock?

Activity *Today we are geologists.*
Provide a purpose for the investigation e.g. to find the best material for a new paved area in school. Suggest that you would like to find out which rock would last the longest/be the least wearing/the strongest. Decide whether to do a rub test and/or a scratch test etc.
Rub: Children to rub rocks on sandpaper and collect scrapings onto white paper.
Scratch: Try scratching the rocks with e.g. a fingernail, a matchstick, a metal nail etc.
Ask children to order the rocks and justify their selection of strongest rock.
How will you report your findings (to persuade), e.g. draw, write, present?

Adapting the activity
Support: Provide a smaller number of rocks. T4
Extension: What kind of report would you do for children / head teacher / governors? Why?
Other ideas: Consider other properties of rock e.g. appearance, permeability etc.

Questions to support discussion

- Why can't I choose the prettiest one?
- What did you find out doing the rub test?
- Which rock would you recommend? Why?
- How can you prove to me that this rock is harder than that one?
- Which is the least/most wearing rock? How do you know?

Assessment Indicators
Not yet met: Says which rock is 'best' but does not give reasons for this conclusion or use their results to make comparisons between the rocks.

Meeting: Uses their results to order the rocks and can say (orally or with diagrams/writing) which rock is strongest/harder wearing.

Possible ways of going further: Recommendations are clearly drawn from results and are presented appropriately for the audience. The report contains an explanation of how trustworthy the data is and explains that other factors may need to be tested, *e.g. marble is strong but may be slippery if it gets wet.*

T4 Teacher box 4 - gather evidence in a range of ways. See TAPS pyramid for more egs

KALEIDOSCOPE
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Kaleidoscope Science Curriculum

Learning Organiser for Year 3 – Light

National Curriculum Summary
Key Subject Concepts

Recognise that they need light in order to see things and that dark is the absence of light

- notice that light is reflected from surfaces
- recognise that light from the sun can be dangerous and that there are ways to protect their eyes
- recognise that shadows are formed when the light from a light source is blocked by an opaque object
- find patterns in the way that the size of shadows change.

Prior Learning/Experiences

- have experienced playing with shadows
- understand that it is easier to see in the light than the dark.

Key Vocabulary	Definition
Beam	A light traveling in one direction
Block	An obstacle
Bright	Giving or reflecting much light
Dark	The absence of light.
Dim	Not shining brightly or clearly
Emits	To give off or produce (the Sun emits light)
Light	A form of energy that travels in a wave from a source.
Opaque	If a material is opaque, you cannot see through it
Reflects	Send back from a surface and not pass through it
shadows	An area of darkness where light has been blocked.
Source	An object that makes its own light.
Translucent	If a material is translucent, some light can pass through it.
Transparent	If a material is transparent, you can see through it.
Travel	To move in a direction.

Working Scientifically Skills

TAPS
Making shadows – record data to answer questions

TAPS Plan for Focused Assessment of Science

Topic: Light	Year 3 Age 7-8	Title: Can everything make a shadow?
Working Scientifically **Do:** Gather and record data to answer questions.		**Concept Context** Recognise that shadows are formed when the light from a light source is blocked by an opaque subject.

Assessment Focus

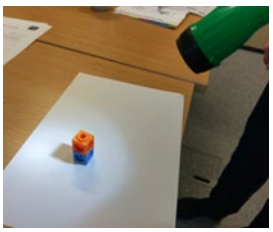
- Can children make a series of careful observations?
- Can children record their observations in a systematic way that relates to the question?

Activity *Today we are going to be physicists*

Provide the children with a collection of materials to explore (some transparent, some translucent and some opaque).

Ask the children to investigate which materials form shadows when a torch is shone on them (e.g. colour, darkness, no shadow?)

Ask them to record their observations to answer the question about which materials form a shadow (e.g. draw, write, sort, photo, order, table). Can they categorise or order the materials and/or shadows in some way? T4



Adapting the activity

Support: Prompt children to describe shadow & scribe their comments.

Extension: Challenge the children to characterise the differences they observe between the shadows e.g. pale / dark.

Other ideas: Make shadow puppets with opaque and translucent parts.

Questions to support discussion

- Where will you write down the materials you are testing?
- How will you record what you have seen?
- What would be a good heading for this column?
- Does this material form a good shadow?
- What do you notice about this material/shadow?
- Where have you recorded what happened with this material?

Assessment Indicators

Not yet met: Can use their observations to decide whether or not a shadow has been formed by the material, *e.g. has sorted materials into two piles or recorded tick/cross.*

Meeting: Can make observations and decide how to record them to answer the question, *e.g. independently records best to worst shadow.*

Possible ways of going further: Recording communicates clearly how it answers the question, using appropriate vocabulary such as opaque, translucent and transparent.

T4 Teacher box 4 - gather evidence in a range of ways.
See TAPS pyramid for more examples.

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Kaleidoscope Science Curriculum

Learning Organiser for Year 3 – Forces

National Curriculum Summary
Key Subject Concepts

- Compare how things move on different surfaces –
- notice that some forces need contact between two objects, but magnetic forces can act at a distance
- observe how magnets attract or repel each other and attract some materials and not others
- 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
- describe magnets as having two poles
- predict whether two magnets will attract or repel each other, depending on which poles are facing.

Prior Learning/Experiences

- Understand that some things with wheels move by pulling or pushing
- Have experienced magnets pulling/pushing

Key Vocabulary	Definition
Attract	To pull towards each other.
Friction	A force that acts between two surfaces or objects that are moving, or trying to move across each other.
Force	A push or pull on an object.
Gravity	Gravity is a force of attraction that pulls together all matter. The more matter something has, the greater the force of its gravity.
Magnetic	A metal attracted to a magnet.
Magnetic field	The area around a magnet where there is a magnetic forces which will pull magnetic objects towards the magnet.
Newtons (N)	A unit used to measure force. (Named after Isaac Newton).
Poles (N/South)	North and South poles are found at different ends of a magnet.
Pull	To take hold of (something) and use force to bring it nearer to oneself.
Push	To use pressure against in order to move.
repel	To force away or apart from each other.
Resistance	A force that acts in the opposite direction of moving objects.
surface	The top layer or exterior of an object.

Working Scientifically Skills

TAPS
Car ramp –gather record and present data to answer questions
Shoe grip –set up practical enquiries
Magnet tests – set up practical enquiries –fair tests

TAPS Plan for Focused Assessment of Science

Topic: Forces	Year 3 Age 7-8	Title: Shoe Grip

Working Scientifically **Plan:** Set up simple practical enquiries	**Concept Context** Some forces need contact between two objects

Assessment focus

- Can children plan and set up a fair test?

Activity *Today we are going to be materials engineers*
Invite children to examine a collection of shoes and to look at the shoe's grip. Ask children to plan (in small groups) their own way of testing the shoe's grip but give teacher support where needed. Have useful equipment visible, e.g. ramps (for lifting until the shoe slips), Newton meters (for pulling). A further option could be for runs across the hall to be timed wearing shoes, trainers, socks and bare feet. Record the plans in words and/or diagrams. T4

Adapting the activity
Support: Ask children to explain what they are changing and what they are keeping the same each time. Could focus on comparing just two shoes & explaining why one slides more easily than the other.
Extension: Ask the children to explain how their plan will be a fair test and any limitations to ensuring this.
Other ideas: Children could explore how shoes perform on different surfaces.

Questions to support discussion

- How can we find out which shoe has the best grip?
- What could we measure?
- What would you need to keep the same to make your test fair?
- Is your plan working, or did you need to adapt it?
- Which shoes had more grip? How do you know?
- Which shoe needed the most force/tilt of the ramp? Why could that be?

Assessment Indicators
Not yet met: Can make suggestions about how to answer the question, and with support, can devise a simple test. Needs support to explain what has to be kept the same.

Meeting: Can devise a way of answering the question. Can say what was changed and what was kept the same.
Possible ways of going further: Can give examples of other independent variables to test and suggest a comparative test to investigate these, *e.g. different surfaces, different angles of the ramp.* Can explain the limitations to keeping all other variables the same *e.g. When we change the type of shoe the mass or type of material may also affect the grip but we are unable to control these.*

T4 Teacher box 4 - gather evidence in a range of ways.

TAPS Plan for Focused Assessment of Science

Topic: Forces and magnets	Year 3 Age 7-8	Title: Testing the strength of magnets

Working Scientifically
Plan: Set up simple practical enquiries, comparative and fair tests

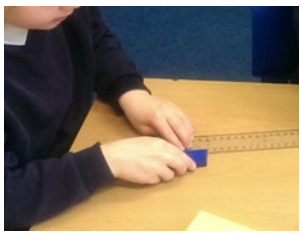
Concept Context
Notice that some forces need contact between two objects, but magnetic objects can act at a distance.

Assessment Focus

- Can children decide on an approach to compare magnet strength?
- Can children recognise and control variables where necessary?

Activity *Today we are going to be physicists*
Provide the children with a collection of magnets and other materials (e.g. card, fabric, tissue, thin wood, aluminium foil, paperclips) to explore. Ask them to find out ways to test whether the magnets are all equally strong *e.g. through paper/card or layers of each, how close magnet needs to be before it attracts a paper clip etc.*
Ask the children to report their findings verbally, e.g. explaining how they carried out their investigation to their peers. P4
As a class, discuss the different ways of testing magnet strength and talk about the advantages and disadvantages of each approach. Discuss why it is a good idea to try different ways of answering a question (to get a more reliable answer).

Adapting the activity
Support: Ask which magnet is the strongest. Ask, 'How do you know?' and use the response to help the children plan to systematically test each magnet.
Extension: Challenge children to order the magnets from strongest to weakest. Challenge the children to find several different ways of comparing the strength of magnets and see if these result with the magnets in the same order of strength.



Questions to support discussion

- How can we find out which magnet is the strongest?
- What will you measure?
- Which materials will you use?
- Do the magnets need to be touching the objects to find out?
- Can you now put the magnets in order from strongest to weakest?
- Can you think of any other ways to test which is the strongest?
- Which magnet was the strongest? Did you get the same results with every way you tested it?

Assessment Indicators
Not yet met: With support, can make suggestions about how to find which magnet is the strongest, *e.g. see how many paperclips the magnet will pick up.*

Meeting: Can decide on an approach to answer the question, and what observations/measurements need to be made, *e.g. hold each magnet above the paperclips and measure the greatest distance each magnet can still attract them from.*
Possible ways of going further: Can compare different ways of answering the question and whether they lead to the same sequence of strength of magnets, e.g. *The order was different when you measure the distance the paperclips jump because it is not very easy to know when this happened.*

P4 Pupil box 4 - assess peers. See TAPS pyramid for more examples.

TAPS Plan for Focused Assessment of Science

Topic: Forces	Year 3 Age 7-8	Title: Cars down ramps
Working Scientifically **Do:** Gather, record and present data (in a table or bar chart) to help in answering questions		**Concept Context** Compare how things move on different surfaces

Assessment Focus

- Can children make an accurate record of their measurements?
- Can children use their results to explain how the car moves on different surfaces?

Activity *Today we are going to be mechanical engineers*

Discuss the purpose of an escape lane and the kind of surfaces which could be used to slow down vehicles. Explore how far cars go after a hill (down a ramp) which is sitting on the carpet. In small groups discuss how they will measure how far the car goes on different surfaces and how they can record this. Emphasise that we are testing the surface, so everything else must stay the same to be fair – as a class, list the control variables.

P3

Generate success criteria with the children for drawing tables. Groups investigate with each drawing their own results table. Children could self assess their results tables against the success criteria.

Ask children to explain how the surface makes a difference.

Adapting the activity

Support: Ask questions to prompt groups to think about the accuracy of their measurements and the clarity of their recording.

Extension: Children take repeat readings and compare them with their original measurements.

Questions to support discussion

- How do you think it will be different if we move the ramp to the table?
- What if we put a cloth/books/foil/blanket/wood at the end of the ramp?
- How will we know if it makes a difference? How will we measure?
- What do we need to do to keep it fair?
- What will you write down? Could you draw a table ready to collect the distances?
- Where on your table is the result for the carpet etc?
- Can you put your findings on a bar chart?

Assessment Indicators

Not yet met: Measures distance with the equipment provided, recording with support. Predictions/explanations describe how things move (in isolation) e.g. *the car goes fast on plastic*.

Meeting: Takes and records accurate measurements using standard units and presents findings in a table (or bar chart). Can compare how things move, e.g. *it goes quicker on wood and slower on grass.*

Possible ways of going further: Systematically takes repeat readings and records all measurements in a table or bar chart. Can explain findings in terms of friction or describe general patterns e.g. *it will go further on a smoother surface because bumps slow it down.*

P3 Pupil box 3 - assess own ideas. See TAPS pyramid for more examples.

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Kaleidoscope Science Curriculum

Learning Organiser for Year 4- Living Things and their habitats

National Curriculum Summary
Key Subject Concepts

- Recognise that living things can be grouped in a variety of ways
- Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
- Recognise that environments can change and that this can sometimes pose dangers to living things.

Prior Learning/Experiences

Explore and compare the differences between things that are living, dead, and things that have never been alive

- identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other
- identify and name a variety of plants and animals in their habitats, including micro-habitats
- describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.
-

Key Vocabulary	Definition
Classification key	Placing animals and plants in a series of specialised groups because of similarities in structure.
Consumers	A thing that eats something else
Food chain	A sequence of animals that eat the next member of thechain
Food web	Similar to a food chain but showing more than one animals that eats the same thing
Producers	A thing that is the start of a food chain – eaten by the consumers/

Working Scientifically Skills

Local Study – Gather, record and classify data

TAPS Plan for Focused Assessment of Science

Topic: Living things and their habitats	Year 4 Age 8-9	Title: Local Environment Survey

Working Scientifically **Do:** Gather, record and classify data	**Concept Context** Recognise that living things can be grouped in a variety of ways

Assessment Focus

- Can children group living things in different ways?

Activity *Today we are environmental scientists.*

Recap previous work on classifying and habitats. Consider school grounds/local area as a habitat and go on a search for living things (incl. plants) in the grounds. Take a camera/draw/make lists of larger things and collect smaller things. Classify the living things into groups e.g. vertebrates / invertebrates / plants. Create subsets within groups e.g. flowering / non-flowering plants, birds / mammals/ invertebrates etc.

Adapting the activity

T4

Support: Support children in identifying animals and plants. Provide key words.
Extension: How else could you sort? What connections are there between the groups? Research other groups of animals which could be found at different times of the day or which may have been hidden.
Other ideas: Create a report to draw conclusions about the local environment and its suitability for supporting life.

Questions to support discussion

- Where are you going to look?
- What living things have you found?
- What do these plants/animals have in common?
- Did you *not* find anything you might have expected?
- How can you classify these living things?
- What other groups of vertebrates are there which we didn't find today?
- Which members of other groups not represented today would be likely to visit our school grounds / local area during the day or night?

Assessment Indicators

Not yet met: Children can identify various living creatures by obvious differences and begin to suggest methods of grouping them.

Meeting: Children identify that animals and plants can be classified in a number of possible ways including vertebrates and invertebrates, flowering and non-flowering plants.

Possible ways of going further: All groups are sorted by the same characteristic and some groups may be sub-divided. Connections are made between types of living creatures and plants found in each group, e.g. *most insects live in a dark place under rocks or logs*.

T4 Teacher box 4 - gather evidence in a range of ways. See TAPS pyramid for more egs

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Kaleidoscope Science Curriculum

Learning Organiser for Year 4- Animals including Humans

National Curriculum Summary
Key Subject Concepts

- Describe the simple functions of the basic parts of the digestive system in humans
- Identify the different types of teeth in humans and their simple functions
- Construct and interpret a variety of food chains, identifying producers, predators and prey.

Prior Knowledge/Experiences

- Identify that animals (incl. humans), need the right types & amount of nutrition, that they can't make their own food, they get nutrition from what they eat
- Identify that humans and some animals have skeletons & muscles for support, protection & movement.

Key Vocabulary	Definition
Canine	Tooth used to tear and rip
decay	To rot away
Digestion	The process of digesting food
Enamel	Yellowish-white hard material covering a tooth
Excretion	To get rid of waste matter
Faeces	Bodily waste passed through the anus (pooh!)
Incisor	Tooth used to bite off and chew
Ingest	To take food into the body
Intestines	The tubes between the stomach and the anus ('the gut')
Life Processes	The 7 basic functions of living things (movement, sensitivity, reproduction, nutrition, excretion, respiration, growth)
Molar	Tooth used to crush and grind
Oesophagus	The tube between the throat and the stomach
Organ	A structure in the body like liver, kidney
Plaque	A sticky coating on teeth which collects bacteria
Premolar	The teeth behind the canine and in front of the molars.
Saliva	Mostly made up of water and helps you chew, taste and swallow food

Working Scientifically Skills

Teeth - Use results to draw simple conclusions, suggest improvements and raise further questions.

TAPS Plan for Focused Assessment of Science

Topic: Animals including humans	Year 4 Age 8-9	Title: Teeth (eggs) in Liquids
Working Scientifically **Review:** Use results to draw simple conclusions, suggest improvements and raise further questions.	**Concept Context** Function of teeth – to find out about what damages teeth and how to look after them.	

Assessment Focus

- Can children use results to draw conclusions?
- Can children suggest explanations for their findings?

Activity *This week we are dental scientists.*

Discuss how children look after their teeth. Explain that we will be using hard boiled eggs to represent teeth to investigate tooth decay. As a class set up a fair test to investigate the effects that different liquids have on teeth e.g. cola, water, vinegar, milk, sports drink and orange juice. Discuss how they can make the comparison fair, i.e. as to quantity of liquid, types of containers, time and location (if using milk do they all need to be in the fridge?)

Leave for one week, although children can check on the experiment daily to see if they can notice and changes. After one week, unveil the eggs by tipping into a white bowl and photograph. Children to record their observations (look, feel, smell, etc.) and rate the eggs in order of damage to shell observed. Children to consider how they could improve the test and what further questions arise that they could investigate.

P6

Adapting the activity

Support: Focus on comparing just two liquids. Ask questions to prompt reasons for findings.
Extension: Could link with persuasive writing/advertising. Children could predict what would happen if the eggs were placed in other drinks eg hotter drinks, more/less sugary drinks etc.
Other ideas: Research animal teeth.

Questions to support discussion

- What do you think will happen? Why?
- Why have some 'decayed' more than others?
- What do you think is in the liquid that is making this happen?
- Were there any surprises?
- How is this this similar to your teeth? How is this different?
- What would happen if the eggs were cleaned daily with toothpaste?
- What other question would you like to investigate and how would you do this?

Assessment Indicators

Not yet met: Describes differences, e.g. *the egg is OK in milk/water but not in coke.*

Meeting: Can order liquids according to damage done to eggs and suggest reasons why. Able to raise further questions, *e.g. I thought sports drink/orange juice was a 'healthy' drink but it was not, I wonder whether these drinks contain a lot of sugar?*

Possible ways of going further: Would be able to think about other liquids or factors including acid and carbonated drinks and suggest causal relationships, *e.g. the more acid/sugar in the drink, the worse the damage.* Can recognise problems with the test, e.g. *use of eggs not teeth, eggs were in liquid for 1 week but I do not keep coke in my mouth for 1 week!*

P6 Pupil box 6 - identify next steps. See TAPS pyramid for more examples.

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Learning Organiser for Year 4- Electricity

National Curriculum Summary
Key Subject Concepts

- Identify common appliances that run on electricity
- Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
- Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- Recognise some common conductors and insulators, and associate metals with being good conductors.

Prior Learning/Experiences

- Recognise that some objects use mains electricity – things we have to 'plug in'
- Recognise that some objects use batteries to make them work.
- Know that they can 'switch' items on and off.

Key Vocabulary	Definition
Bulbs	A small simple light source that uses wire filaments to glow when electricity is present.
Buzzers	An electrical device that makes a buzzing sound and is used for signalling
Cells/battery	A device that produces electrical energy from chemical energy
Circuits	A closed system of wires through which electricity can flow
Components	A part or element of a larger whole.
Conduct	Transmit electricity (or heat)by conduction
Conductors	A material that transfers heat or electricity
Current	A flow of electricity e.g. this completes the circuit so that a current flows to the lamp
Insulate	Protect something that prevents electricity travelling through it.
Insulators	A material or covering that electricity can't travel through
Switches	A small device, usually pushed up or down, to control the flow of an electric current.
Voltage	The pressure from a power source that pushes current through a conducting loop to enable them to do work eg light a bulb.
Wires	Thin strips of metal that carry electrical charge

Working Scientifically Skills

Electricity - Report on findings from enquiries.

TAPS Plan for Focused Assessment of Science

Topic: Electricity	Year 4 Age 8-9	Title: Does it Conduct Electricity?
Working Scientifically **Review:** Report on findings from enquires, including oral and written explanations, displays or presentations of results and conclusions.		**Concept Context** Recognise some common conductors and insulators, and associate metals with being good conductors. Construct a simple series electrical circuit.

Assessment Focus

- Can children explain results and their conclusions?
- Can children recognise common conductors and insulators?

Activity *Today we are electrical engineers.*

Introduce the terms conductors and insulators.
Example context: soldiers wear 'smart' clothing which conducts electricity: http://www.bbc.co.uk/news/technology-17580666
E.g. a soldier in the desert that has ripped part of 'smart' clothing losing part of the GPS circuit, so unable to provide location for rescue. Explain that the soldier has a pack containing a variety of objects: which could be used to complete a circuit to activate the GPS?
Provide each group with a 'soldier's backpack' containing a collection of objects/ materials (including different metals and plastics). Discuss how to find out whether electricity can pass through the materials. Groups test by putting materials into a gap in a circuit with a bulb/buzzer.
Focus pupil recording/presenting on explaining what the results show. E.g. they could produce a radio or video message to send to the soldier explaining how to produce a working circuit and why they are confident that this will work, providing scientific evidence and a list of all possible conductors (in case some are damaged). Reecap on the terms insulators and conductors.

Adapting the activity

T4

Support: Provide a table template & support children recording their results
Extension: Challenge with extra items to see if they fit the pattern (e.g. lemon, pencil lead, rusty nail.) Challenge children to apply their findings to explain safety rules.

Questions to support discussion

- Which objects completed the circuit? Does that make them conductors or insulators?
- Which things conducted electricity? What materials were they made from?
- Which did not conduct electricity? What materials were they made from?
- Which objects will you advise the soldier to use to repair the circuit? Why?
- Can you think of anything else that might/might not conduct electricity? Explain your choices.

Assessment Indicators

Not yet met: Can identify some (not all) objects that allow/do not allow electricity to pass through them but does not yet make generalisations.
Meeting: Can describe the circuit and explain how their results (orally/written form) show that metals conduct electricity and most other materials do not.
Possible ways of going further: Can also suggest other items to fit into the pattern and explore exceptions to the rule. Can apply the terms conduct/insulate to explain safety rules, e.g. not putting knife in toaster.

T4 Teacher box 4 - gather evidence in a range of ways. See TAPS pyramid for more egs

KALEIDOSCOPE
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Kaleidoscope Science Curriculum

Learning Organiser for Year 4- Sound

National Curriculum Summary
Key Subject Concepts

- Identify how sounds are made, associating some of them with something vibrating
- Recognise that vibrations from sounds travel through a medium to the ear
- Find patterns between the pitch of a sound and features of the object that produced it
- Find patterns between the volume of a sound and the strength of the vibrations that produced it
- Recognise that sounds get fainter as the distance from the sound source increases.

Prior Knowledge/experiences

- That musical instruments make 'sounds' which can be loud or soft.
- That different sized instruments make different pitched sounds.
- Know that sounds sound louder if you are nearer to them.

Key Vocabulary	Definition
Amplify	Increase in size (or sound)
Amplitude	The amount you amplify something.
Decibel	The degree of loudness
Energy	The capacity to do work
Frequency	The number of oscillations per second in the form of waves
Insulate	To prevent transmission of sound (by surrounding it by an insulator)
Medium	The material through which something passes
Pitch	Level of sound (high or low)
Sound wave	Waves of energy that we hear as sound
Source	Point of origin/starting point
Transmit	To send from one place to another
travel	To be transmitted or move
Vibrations	Moving back and forth very rapidly
Volume	Loudness

Working Scientifically Skills

TAPS
String telephones - identify differences and similarities or changes to ideas and processes.
Pitch - Ask relevant questions and use different types of scientific enquiries to answer them

TAPS Plan for Focused Assessment of Science

Topic: Sound	Year 4 Age 8-9	Title: String Telephones
Working Scientifically **Review:** Identify differences, similarities or changes related to simple scientific ideas and processes		**Concept Context** Recognise that vibrations from sounds travel through a medium to the ear

Assessment Focus

- Can the children explain how to make the best possible string telephone?
- Can the children suggest reasons for the improvements?

Activity *Today we are acoustic engineers.*

Explore how to use a string telephone. Discuss how this works; vibrations in air, vibrations in string, the cup amplifies the vibrations, vibrations travel to ear.

Provide a range of pots (yoghurt pots, paper/plastic beakers, polystyrene cups etc) and different types of string/wool.

In groups, ask children to investigate what makes the best string telephone, supporting with questioning as necessary. Give time for the children to reflect and test their designs so that they can be modified and improved.

After the investigation, children demonstrate their telephones to the class and explain why their telephone is/is not good. Discuss how their research has informed their design – detailing improvements they have made and reasons for making those improvements.

Adapting the activity

T7

Support: During investigation ask questions to support evaluation, e.g. What have you changed? Which is better? Why is it better?

Extension: Can you eavesdrop on another phone call? (Connect another string).

Other ideas: Use a data logger to measure sound (decibels)

Questions to support discussion

- How does the sound travel through your telephone?
- What have you changed on your telephone?
- Which was the best telephone? Why?
- How can you make your telephone better?
- How will you know if your telephone is better?
- Does your telephone always work? What stops your telephone working?
- What modifications did you make to your original telephone design? Why? Did they have the

desired effect?

Assessment Indicators

Not yet met: Can select the best string telephone but not explain why in terms of properties.

Meeting: Can talk about features which make a good telephone, *e.g. all work when the string is tight, the bigger cup is better.*

Possible ways of going further: Can relate observations to vibrations, *e.g. it doesn't work when you hold the string because you stop it vibrating.*

Teacher box 7 - time to reflect. See TAPS pyramid for more examples.

TAPS Plan for Focused Assessment of Science

Topic: Sound	Year 4 Age 8-9	Title: Investigating Pitch
Working Scientifically **Plan:** Ask relevant questions and use different types of scientific enquiries to answer them		**Concept Context** Find patterns between the pitch of a sound and features of the object that produced it
Assessment Focus • Can children suggest how to alter the pitch? • Can children carry out simple tests of these ideas?		

Activity *Today we are acoustic scientists.*
Show children some homemade 'musical instruments': elastic bands over shoe box, 'straw flute/pan pipes', 'sound sandwich' (lolly stick and straw harmonica), stretched balloon 'drum skin' over tube, glass bottle containing water to blow or tap. Explore how to play them to make a sound and ask the children to suggest which parts are vibrating. Ask children to record a range of questions that they could investigate, focusing on changing pitch (e.g. How does the width of the elastic band affect pitch?) Children then work in small groups investigating their questions, considering different ways to alter pitch.

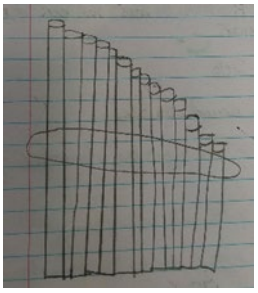
T3

Adapting the activity

Support: Provide question stems/scaffolded question cards, e.g. How does the ---------- affect the ------etc.
Extension: Experiment with different instruments.
Other ideas: Oscilloscope (borrow from local Secondary School / You Tube videos).

Questions to support discussion

- What are the differences between these sounds?
- Which sound is the highest/lowest?
- How could we alter the pitch?
- Does your question include what you want to change and what you are going to notice?
- How will you investigate your question?



Assessment Indicators

Not yet met: Can ask questions, e.g. *which makes the highest sound?* Makes some suggestions about what to do, but needs help in phrasing the question.

Meeting: Can ask questions and turn them into a form that can be investigated. E.g. *How does the size of the drum affect the pitch?*

Possible ways of going further: Can use their results to make a prediction to set up further comparative fair tests, e.g. *I know that a small drum makes a high pitch so will a small recorder make a higher pitch than a long one?*

T3 Teacher box 3 - use Q, discussion and observation. See TAPS pyramid for more egs.

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Kaleidoscope Science Curriculum

Learning Organiser for Year 4- States of Matter

National Curriculum Summary
Key Subject Concepts

- Compare and group materials together, according to whether they are solids, liquids or gases
- Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Prior Learning/Experiences	
• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	
Key Vocabulary	**Definition**
Condensation	Changing from a gas to a liquid
Cooling	Lowering the temperature of something
Evaporation	Changing from a liquid to a gas
Freezing	If a liquid or substance containing a liquid freezes it becomes solid because of low temperatures
Gas	A gas can escape from an unsealed container. It fills up the space it is in and does not have a fixed volume.
Heating	Raising the temperature of something
Liquid	A liquid fills up the shape of the bottom of a container. It forms a pool, not a pile and also has a fixed volume.
Melting	To change from a solid to a liquid state through heat or pressure
Particles	A tiny amount or small piece
Precipitation	Rain, snow, sleet or hail that falls to or condenses on the ground.
Process	A series of actions used to produce something or reach a goal
Properties	The ways in which an object behaves
Solid	A solid holds its shape and has a fixed volume
Temperature	A measure of how hot or cold something is
Vibrations	When something vibrates it shakes with repeated, small quick movements
Water cycle	The process by which water on the earth evaporates, then condenses in the atmosphere, and returns to earth in the form of precipitation.
Working Scientifically Skills	
TAPS Cornflour slime – questioning	

TAPS
Progression in Science

Example topic: Materials	Primary 5/6 Age 8-10	Activity Title: Cornflour slime
Science skill focus Questioning	**Curriculum link: Change over time** Materials can exist in different states (CoT2) 	
Progression Focus ● Can children use their observations to ask deeper and wider questions? ● Can children build on their own and others' ideas and experiences?		

Activity *Today we are chemists.*
Discuss the properties of water and cornflour before mixing, noting the children's descriptions, questions and predictions for what will happen when they are mixed (e.g. using mini-whiteboards, post-its or making a list on board).
Consider how to make the cornflour slime/oobleck e.g. take turns, aprons, outside/cover floor.
Explore their questions and predictions in small groups, for example, beginning with a cup of cornflour and half a cup of water, mixing with hands until the consistency of honey. Observe how when lifted, the mixture runs through your fingers, but when you apply force, it solidifies (this is a Non-Newtonian fluid – a liquid which acts like a solid under pressure).
Ask the children to explore further: raising post-it questions to test e.g. trying different amounts of pressure (1 finger etc), can it be held/squeezed/twisted, can it be rolled into a ball, can it bounce, adding more water/flour…. Collate questions and discuss findings.

Adapting the activity

Support: Help to make a 'honey' consistency. Provide question stems: 'What if…?'
Extension: Do objects float or sink in it? (paper clip, small plastic toy etc).
Other ideas: Put slime in sealed bag on top of loudspeaker and observe changes in response to vibrations.

Questions to support discussion

- What do you expect it to feel like? What does it feel like?
- What questions do you have about the mixture?
- Which questions can we investigate?
- Have you tried to squeeze it? Roll it?
- What other 'what if' questions could we ask?
- When does it behave like a solid? Liquid?

Pupil learning indicators

Not fully achieved: Pupils explore the slime with their hands but struggle to verbalise their own investigable questions. They describe the material when prompted but do not link this to their knowledge of solids and liquids.
Achieved: Pupils make suggestions, raising investigable questions. They test out their ideas and can describe their findings in relation to the properties of solids and liquids *e.g. I asked what would happen if you poke if with different fingers. I thought the little finger would sink in like a liquid, but it's more bouncy like a solid.*
Exceeded: Pupils test their questions independently and systematically e.g. adding measured amounts of water, testing different sized 'balls' of oobleck. They may make links with other materials.

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Kaleidoscope Science Curriculum

Learning Organiser for Year 5 – Living things and their habitats

National Curriculum Summary
Key Subject Concepts

- describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
- describe the life process of reproduction in some plants and animals.

Prior Knowledge/Experiences

- Recognise that living things can be grouped in a variety of ways

- Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
- Recognise that environments can change and that this can sometimes pose dangers to living things.

Key Vocabulary	Definition
Anther	The part of the stamen that produces the pollen
Cell	The smallest part of an animal or plant that is able to function independently.
Dispersed	Scattered, separated or spread through a large area
Dissect	To carefully cut something up in order to examine it
Embryo	An unborn animal or human being in early stages of development
Fertilisation	Male and female cells meet to form an embryo or seed
Germination	The process of growth from a seed.
Metamorphosis	A person or thing that develops and changes into something completely different.
Ovary	A female organ which produces eggs
Ovule	A small egg
Pollination	To pollinate a plant or tree means to fertilise it with pollen.
Reproduction	When an animal or plant produces one or more individuals similar to itself.
Stamen	A male fertilizing organ of a flower.
Stigma	The top of the centre part of a flower which takes in pollen.

Working Scientifically Skills

TAPS
Life Cycle research - Report and present findings from enquiries, in oral and written forms such as displays and other presentations, using appropriate scientific language.

TAPS Plan for Focused Assessment of Science

Topic: Living things and their habitats	Year 5 Age 9-10	Title: Life cycle research
Working Scientifically **Review:** Report and present findings from enquiries, in oral and written forms such as displays and other presentations, using appropriate scientific language.		**Concept Context** Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
Assessment Focus • Can children present their research clearly?		

- Can children present using scientific language?

Activity *Today we are going to be zoologists*

Ask children to research the life cycles of two different species using a range of secondary sources. This could be in small groups or individually. Discuss possibilities for presenting their research (if possible, provide a purpose e.g. presenting to younger children/parents etc.) For example, different children could choose to make a model, a mime/drama, a rap/song or a poster/book. Agree on criteria for successful presentation of research e.g. clear order to life cycle, comparison between two life cycles, use of scientific vocabulary etc. Children present their research to the intended audience. Groups could peer assess against agreed success criteria.

P4

Adapting the activity

Support: Provide a short list of animals and support children to choose two which are quite different. Create a word bank of scientific words to include.
Extension: Consider the implications of the similarities/differences between the life cycles e.g. what does it mean for how/where they can live/reproduce?
Other ideas: Children create their own new species for a classification group and design its life cycle based on the life cycle of similar animals within that group.

Questions to support discussion

- What are the most important stages you have found out about the life cycles?
- How will you make this clear in your presentation?
- How is this different to your other animal?
- What similarities between your animals have you found?
- Which key science words do you need to include in your report?

Assessment Indicators

Not yet met: Children report either with little reference to their research, or using sections verbatim.

Meeting: Children select relevant facts from their research to compare the life cycles of different animals. They describe the main stages of each life cycle. *e.g. The lifecycle of a cricket has 3 stages: egg, nymph and adult whilst the lifecycle of a frog has 5 main stages: eggs, tadpole, tadpole with legs, young frog and adult frog.*

Possible ways of going further: Children make links to other areas e.g. animal classification, habitats, survival, life processes.

P4 Pupil box 4 - assess peers. See TAPS pyramid for more examples.

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Kaleidoscope Science Curriculum

Learning Organiser for Year 5/6 – Animals including Humans

National Curriculum Summary
Key Subject Concepts

- Describe the changes as humans develop to old age (incl. changes experienced in puberty).
- Identify & name the main parts of the human circulatory system, & describe the functions of the heart, blood vessels and blood.
- Recognise the impact of diet, exercise, drugs & lifestyle on the way their bodies

function.
- Describe the ways in which nutrients and water are transported within animals incl. humans

Prior Knowledge/Experience

- Describe the simple functions of the basic parts of the digestive system in humans
- Identify the different types of teeth in humans and their simple functions .

Key Vocabulary	Definition
Adolescent	The process of developing from a child into an adult (teenager)
Asexual reproduction	Offspring gets genes from one parent so are clones
Foetus	An unborn or unhatched offspring of a mammal
Gestation	The process or period of developing inside the womb
Offspring	A person's child or children/an animals young
Puberty	The period during which adolescents become capable of reproduction
Reproduction	The production of offspring by a sexual or asexual process
Sexual reproduction	Offspring get genes from both parents, inheriting a mix of features from birth.

Working Scientifically Skills

Growth Survey –Take measurements using a range of equipment

TAPS Plan for Focused Assessment of Science

Topic: Animals including humans	Year 5 Age 9-10	Title: Growth survey
Working Scientifically **Do:** Take measurements using a range of equipment 	**Concept Context** Describe the changes as humans develop to old age.	
Assessment Focus • Can children record and present results clearly?		

Activity *Today we are going to be biologists*

What could we measure to show how humans develop as they grow older?
Groups decide e.g. forearm length, arm span, foot length, etc. Discuss how we could measure this and the number of children/adults we would need to measure. How accurate do our measurements need to be? Decide on how many decimal places or unit. Ensure that children understand that they also need to record the age of the person.
Children go to different year groups to measure specified number of children.
Bring data together to create class table.
Ask groups to create scatter graphs to present the data, can use ICT to do this.

T4

Adapting the activity

Support: Check children understand how to measure accurately. Provide axes for graph. Prompt pattern description by providing sentence structure e.g. *The older the child, the longer their …*
Extension: Children to measure to different decimal places. Measuring head size, arm span, forearm etc. Spot anomalies and give possible reasons for them.
Other ideas: Measure adults or family and explore growth across lifespan. Explore growth patterns in other animals.

Questions to support discussion

- How many children will you measure? Why?
- What does your graph show?
- What could this tell us about human development?
- Are there any anomalies? What reasons could there be for the anomalies?
- Why do we draw a line of best fit?

Assessment Indicators

Not yet met: Can measure accurately in cm. Can record data in pre-made structure. Can identify highest and lowest results, describes pattern with support.

Meeting: Can measure accurately in cm and mm. Can record data in their own structure. Can identify a pattern, suggest reasons for this pattern, and identify any anomalies.

Possible ways of going further: Comments on accuracy of measurements, *e.g. if different people are measuring you must agree where to start.* Gives possible reasons for anomalies and indicates how these might be reduced if the investigation was to be repeated.

T4 Teacher box 4 - gather evidence in a range of ways. See TAPS pyramid for more egs

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Kaleidoscope Science Curriculum

Learning Organiser for Year 5 – Earth and Space

National Curriculum Summary
Key Subject Concepts

- Describe the movement of the Earth, and other planets, relative to the Sun in the solar system
- Describe the movement of the Moon relative to the Earth

- Describe the Sun, Earth and Moon as approximately spherical bodies
- Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

Prior Knowledge/Experiences

- observe changes across the four seasons
- observe and describe weather associated with the seasons and how day length varies.

Key Vocabulary	Definition
Axis	An imaginary line through the middle of something
Galaxy	An extremely large group of stars and planets. Our galaxy is called the Milky Way
Gravity	the force which causes things to be pulled to the ground.
Orbit	the curved path in space that is followed by an object going round a planet, moon, or star.
Planet	a large, round object in space that moves around a star.
Solar System	the Sun and all the planets that go round it.

Working Scientifically Skills

Solar system research - Report and present findings from enquiries using appropriate scientific language

TAPS Plan for Focused Assessment of Science

Topic: Space	**Year: 5** Age 9-10	Title: Solar system research
Working Scientifically **Review:** Report and present findings from enquiries using appropriate scientific language		**Concept Context** Describe the movement of the Earth, and other planets, relative to the Sun in the solar system

Assessment Focus

- Can children report and present information to answer their questions about space?

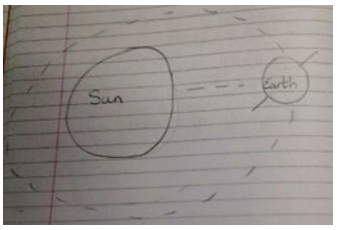
Activity *Today we will be space scientists.*

Use an animation, photo or video clip to begin a discussion about our solar system. Raise questions about different planets in our solar system e.g. movement, relative movement, size etc.
Provide books or access to the internet. Help to phrase search questions.
How will you share your research? Agree options e.g. labelled diagram or model, information leaflet, drama, animation, presentation etc.
Small groups could research different planets or different features. Present/share outcomes with rest of the class. Groups could peer assess against agreed success criteria e.g. clarity.

P4

Adapting the activity

Support: Support children with search terms and vocabulary e.g. orbit.
Extension: Present comparisons between the features of different planets.
Other ideas: Present research to other classes or audiences.



Key questions for discussion

- What is your research question? What are you trying to find out?
- What can you tell me about your planet so far? What other questions do you have?
- What have you found out that you did not know before?
- How does this compare to other planets?
- How can you present the information in a way that others can understand?
- How can you keep the audience/reader interested?

Assessment Indicators

Not yet met: Presents planet research in a way which lacks clarity or new information.

Meeting: Presents planet research clearly, demonstrating an understanding of the planet's position in the solar system.

Possible ways of going further: Presents in an interactive way, which engages the audience. Compares a range of features about different planets.

P4 Pupil box 4 - assess peers. See TAPS pyramid for more examples.

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Kaleidoscope Science Curriculum

Learning Organiser for Year 5 – Forces

National Curriculum Summary
Key Subject Concepts

- Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- Identify the effects of air resistance, water resistance and friction, that act between

moving surfaces

- Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

Prior Learning/Experiences

- Compare how things move on different surfaces –
- notice that some forces need contact between two objects, but magnetic forces can act at a distance
- observe how magnets attract or repel each other and attract some materials and not others
- 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
- describe magnets as having two poles
- predict whether two magnets will attract or repel each other, depending on which poles are facing.
-

Key Vocabulary	Definition
Gravity	the gravitational attraction of the mass of the earth, the moon, or a planet for bodies at or near its surface
Air resistance	An opposing force caused by air
Water resistance	An opposing force caused by water
Friction	The force that slows movement between two bodies in contact
Lever	a rigid bar used to exert a pressure or sustain a weight at one point of its length by the application of a force at a second and turning at a third on a fulcrum
Pulley	a wheel used to transmit power by means of a band, belt, cord, rope, or chain passing over its rim to change the direction and point of application of a pulling force and in various combinations to increase the applied force especially for lifting weights
Gear	A toothed wheel

Working Scientifically Skills

TAPS
Spinners –Measure taking repeated readings

TAPS Plan for Focused Assessment of Science

Topic: Forces	Year 5 Age 9-10	Title: Spinners
Working Scientifically **Do:** Measure, taking repeat readings 	**Concept Context** Identify the effect of air resistance that acts between moving surfaces.	
Assessment Focus • Can children systematically collect results?		

- Can children improve accuracy by repeating measurements?

Activity *Today we are going to be aeronautical engineers*

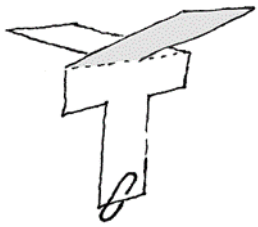
Explore: make and drop a spinner. In groups consider variables and formulate a question *e.g. How does the length of wing/number of paper clips/size of paper affect the time it takes to fall?* Group roles may be useful e.g. dropper, timer, recorder, fair test checker. Children design their own table to record measurements with a focus on how they can make their results more reliable – repeat the test and take an average.
Groups or individuals to draw graphs then discuss patterns and accuracy of results. T7

Adapting the activity

Support: Provide table to collect readings and axes for graph.
Extension: Children spot anomalies in data and provide possible reasons for them. Explore another question to investigate.
Other ideas: What if…we dropped it from a higher position, changed the shape of the wings, the material etc. Why do sycamore seeds spin?

Questions to support discussion

- How are measuring as accurately as possible?
- Why did you repeat your measurements? Are there any measurements which you would repeat again?
- What kind of graph will you draw? Why did you choose a (line graph)? How did you choose your scales on the graph?
- What happened to the time when you changed the ….?
- Is there a pattern in your results? Can you describe it?
- Can you explain any anomalies in your results?



Assessment Indicators

Not yet met: With support, measures and records results in given table /graph. Needs help to work out averages.

Meeting: Systematically takes repeat measurements and either chooses middle value or finds mean average to accurately plot points on a line graph.

Possible ways of going further: Is able to explain why repeat readings improve reliability, and spots anomalous results. Can describe pattern and shows evidence of understanding of forces e.g. *the longer the wings the bigger the air resistance so it takes longer to fall, until the wings get too big*.

T7 Teacher box 7 - time to reflect. See TAPS pyramid for more examples.

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Kaleidoscope Science Curriculum

Learning Organiser for Year 5 – Properties and changes of materials

National Curriculum Summary
Key Subject Concepts

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

- know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
- use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
- demonstrate that dissolving, mixing and changes of state are reversible changes
- explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Prior Knowledge/Experiences

- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
- Compare and group materials together, according to whether they are solids, liquids or gases
- Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Key Vocabulary	Definition
Dissolves	Where a solid becomes incorporated into a liquid
Conductor	A material or device that conducts or transmits heat or electricity.
Filter	Something that lets liquid or gas pass through but holds back solid particles.
Insoluble	Will not dissolve in liquid
Insulator	Any material or device that prevents electricity, heat or sound to go through it.
Irreversible	Changes in materials which are permanent and cannot be undone, e.g. burning
Magnetic	The property of attraction – a force caused a moving electric charge.
Permeable	Having openings or pores to allow liquids or gases to pass through
Resistance	An opposing force.
Soluble	Will dissolve in liquid
Solution	A liquid mixture where a solid has dissolved into a liquid
Thermal	Relating to or caused by heat
Sieve	a device with meshes or perforations through which finer particles of a mixture (as of ashes, flour, or sand) of various sizes may be passed to separate them from coarser ones.

Working Scientifically Skills

TAPS
Dissolving - Plan a scientific enquiry to answer a question recognising & controlling variables
Insulation layers - Use test results to make predictions to set up further comparative and fair tests

TAPS Plan for Focused Assessment of Science

Topic: Properties and changing materials	Year 5 Age 9-10	Title: Dissolving
Working Scientifically **Plan:** Plan a scientific enquiry to answer a question recognising & controlling variables 		**Concept Context** Know that some materials will dissolve in a liquid to form a solution.
Assessment Focus • Can children plan a fair test to investigate factors affecting the speed at which solids		

dissolve in water?

Activity *Today we are going to be chemists.*

Ask children to think of everyday example of dissolving solids in water (e.g. sugar in tea, salt in cooking water). Ask them to suggest ways of making the sugar dissolve faster (e.g. stirring, temperature of the water, size of sugar grains, volume of water). Ask them to choose a factor to investigate and to plan a fair test. Post it planners or planning boards could be used to focus on types of variable. Carry out tests and discuss outcomes.

T4

Adapting the activity

Support: Within a scaffold/teacher support, make some suggestions about what could be kept the same/measured. Children explain how the planned test has been made fair.

Extension: Plan a fair test independently, identifying and controlling relevant variables. Compare and improve plans with an emphasis on how taking an average of repeated readings makes the results more reliable.

Other ideas: Consider how to test continuous variables e.g. temperature.

Questions to support discussion

- What is your question?
- How will you investigate this?
- How will you keep your test fair?
- What will you change?
- What will you measure?
- What will you keep the same?
- Can you explain why you have made these decisions?

Assessment Indicators

Not yet met: Unclear about change or control variables, when planning or during the testing.

Meeting: Can plan a fair test identifying one thing to change, one thing to measure/observe and important factors to keep the same. E.g. *We will change the type of liquid and measure the amount of time taken for the sugar to dissolve. We will keep the amount of liquid and the temperature of the liquid the same.*

Possible ways of going further: Identifies a range of factors to keep the same. Plans an appropriate range of intervals for chosen variable, e.g. 50 ml, 100 ml, 150 ml. *E.g. We will increase the amount of water by 50ml each time. To make sure that our test is fair, we will keep the following the same: Amount of stirring, temperature of the water, size of sugar grains etc. We will take three sets of readings for each volume of water and take an average reading to increase the reliability of our results.*

T4 Teacher box 4 - gather evidence in a range of ways. See TAPS pyramid for more egs

TAPS Plan for Focused Assessment of Science

Topic: Properties and Changes of Materials	Year 5 Age 9-10	Title: Insulation layers
Working Scientifically **Do:** Use test results to make predictions to set up further comparative and fair tests 	**Concept Context** Compare everyday materials on basis of their thermal conductivity. Give reasons, based on evidence from comparative and	

	fair tests, for the particular uses of everyday materials.

Assessment Focus

- Can children carry out an investigation to test a hypothesis?

Pre-activity *Today we are going to be packaging technologists.*
You want to see which cup will keep your tea warm for longer. Show different cups of hot water, e.g. paper cup, stacked paper cups, thermos mug. Measure the temperature of the water, repeat after about one hour (e.g. at the beginning and end of lunchtime).

Activity

Use the results of the pre-activity to make predictions about insulation (e.g. a good insulator has more layers / traps air / made of….). Provide a collection of different materials and invite the children to discuss their ideas about which might be good for keeping the drink warm. The children could order the materials according to which will be best insulators or select one to test for layering and record their predictions, giving reasoning based on the previous test results. Children plan and carry out an investigation to test their predictions.

Adapting the activity

Support: support the children with making choices about how to plan and carry out the test, e.g. by exaggerating 'unfairness', suggesting the use of a thermometer/probe, worksheet for structure.
Extension: Children to predict/choose which alternative material could insulate their beaker better, thinking about properties of the materials.
Other ideas: Which materials will insulate a hot baked potato / ice cube?

Questions to support discussion

- Where have you seen things insulated?
- What makes a good insulator? What other materials could be used as thermal insulators?
- What will you measure?
- How will you make it a fair test?
- Which material/layers do you predict will keep the water warmest for longest? Why?
- What evidence from the first test supports your prediction?

Assessment Indicators

Not yet met: Suggests which insulators might be best but this is not linked to evidence from the first test. Needs support to carry out fair test

Meeting: Uses evidence from the first test to support their prediction. Carries out a fair test independently. From own findings identifies which material is the best insulator, *e.g. this one because it took longer to cool.*

Possible ways of going further: Compares own data with the original hypothesis & suggests reasons for similarities and differences, including any anomalies, *e.g. this one took longer to cool because....*

Pupil box 1 - identify existing ideas. See TAPS pyramid for more examples.

KALEIDOSCOPE
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Kaleidoscope Science Curriculum

Learning Organiser for Year 6- Living things and their Habitats

National Curriculum Summary
Key Subject Concepts

- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
- Give reasons for classifying plants and animals based on specific characteristics.

Prior Knowledge/Experiences

- Recognise that living things can be grouped in a variety of ways
- Explore and use classification keys to help group, identify and name a variety of living

things in their local and wider environment • Recognise that environments can change and that this can sometimes pose dangers to living things.	
Key Vocabulary	**Definition**
Adaptation	Something that changes to suit new conditions
Characteristics	A distinguishing feature, quality, or trait
Habitat	The environment that an animal or plant usually lives or grows
Invertebrate	Animal without a backbone
Micro-organism	A microscopic organism, especially a bacterium or virus.
Organism	Any living biological entity, animal, plant, fungus, bacterium.
Vertebrate	Animal with a backbone
Working Scientifically Skills	
Outdoor Keys - Record the results of a survey using a classification key Invertebrate Research - Report and present findings using appropriate scientific language	

TAPS Plan for Focused Assessment of Science

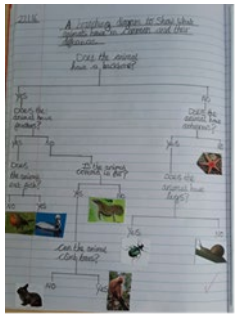
Topic: Living things and their habitats	Year 6 Age 10-11	Title: Outdoor keys
Working Scientifically **Do:** Record the results of a survey using a classification key 	**Concept Context** Give reasons for classifying plants and animals based on specific characteristics	
Assessment Focus • Can children create questions which separate animal/plant groups? • Can children create a clear classification key, using scientific language?		
Activity *We are going to be environmental scientists.* Remind children about how to use/make a classification key e.g. using wildlife from a different		

habitat, design a branching key (using IT or large sheets of paper). Emphasise the requirement for yes/no questions and scientific language.
We do not yet have a classification key specific to our local environment – what living things would we expect it to include? Discuss classification groups (in/vertebrates, flowering/nonflowering plants etc) appropriate to local habitat. Conduct a local wildlife survey of plants and animals in or around the school grounds, collecting plant samples or drawings/photos of animals/plants to help to make a key.
Ask pupils to make a key to identify 6-8 local animals and/or plants. Children try others' keys to see it can successfully classify a member of their sample.

Adapting the activity

P4

Support: Provide key features for different animal groups to help children e.g. in/vertebrates, insects, spiders etc. Prompt with questions to support developing a classification key, e.g. Does the sample have leaves? Does the sample have wings?
Extension: Encourage children to use keys, computers and books to identify and name the unknown plants and animals in their local habitat.
Other ideas: Play 'Guess Who?' games to help develop key questions.



Questions to support discussion

- What is similar/different about these?
- What yes/no question can you ask to separate these two groups?
- What characteristics does this living thing have?
- What are the key features of member of vertebrates / invertebrates / flowering plants / non-flowering plants / fungi etc.

Assessment Indicators

Not yet met: With support, children can group animals and plants according to basic characteristics but may not yet know scientific names or be able to identify more subtle differences *e.g. a worm does not have a skeleton.* Key questions may lack clarity or not result in a yes/no answer.

Meeting: Children meeting the objective would be able to ask yes/no questions which demonstrate understanding of key differences between types of living things. Children can use the structure of a classification key, placing and ordering questions to support classification *e.g. Does it have a segmented body? Yes – worm, No – does it have a shell? Etc.*

Possible ways of going further: Can explain the limitations of their key, *e.g. I found a yellow ladybird rather than a red one.* Research further to develop a branching key to identify a selection of plants and animals which are less commonly known.

P4 Pupil box 4 - assess peers. See TAPS pyramid for more examples.

TAPS Plan for Focused Assessment of Science

Topic: Living things and their habitats	**Year: 6** Age 10-11	Title: Invertebrate research
Working Scientifically **Review:** Report and present findings using appropriate scientific language		**Concept Context** Give reasons why a particular invertebrate belongs to a certain group
Assessment Focus		

- Can children report and present information about an invertebrate classification group?

Activity *Today we are zoologists.*
(To be completed after some input on animal classification).
Show children some invertebrate film clips (e.g. David Attenborough). Explain that their task is to research different invertebrates (show egs).
Discuss: how will you share what you have found out? Agree options e.g. poster, labelled diagram or model (playdough), written report, information leaflet, drama, animation etc.
Give small groups a different invertebrate group to focus on (annelids, molluscs, insects, arachnids, crustaceans and myriapods). Each group must give an example and describe the features which make it a member of its classification group. Present/share with rest of the class.
Groups peer assess against agreed success criteria.

P4

Adapting the activity

Support: Prompt children to describe features: how do you know it is a mollusc? How is it different to an insect?
Extension: Use branch diagrams to classify unfamiliar animals. Ask pupils to find unusual animals for others to classify.
Other ideas: Children to design their own species of living thing that would fit into one of the classification groups.

Questions to support discussion

- Why is your invertebrate a member of the …. group? Why could it not fit within a different group?
- What other invertebrates are also members of this group?
- Which scientific visual aids will you prepare to illustrate how your invertebrates are classified?
- How can you ensure that you clearly present the information about your group in a way that others can understand?

Assessment Indicators
Not yet met: Report and present information about an animal. Explains some differences between animals, but lack of clarity about the classification groupings.
Meeting: Explain all of the key characteristics of that group and how they differ from other groups. Able to justify why their chosen animal belongs to one invertebrate group and not another. E.g. a *ladybird is an insect as it has an exoskeleton, a three-part body and three pairs of jointed legs.*
Possible ways of going further: Able to explain how invertebrates from a broad range of habitats are classified with reasons why. Could answer questions about an unfamiliar invertebrate and decide which group it belongs to.

P4 Pupil box 4 - assess peers. See TAPS pyramid for more examples.

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Kaleidoscope Science Curriculum

Learning Organiser for Year 5/6 – Animals including Humans

National Curriculum Summary
Key Subject Concepts

- Identify & name the main parts of the human circulatory system, & describe the functions of the heart, blood vessels and blood.
- Recognise the impact of diet, exercise, drugs & lifestyle on the way their bodies function.

Prior Learning/Experience

- Describe the changes as humans develop to old age (incl. changes experienced in puberty).

- Describe the ways in which nutrients and water are transported within animals incl. humans

Key Vocabulary	Definition
Aorta	Main and largest artery which carries blood from the left ventricle of the heart around the body (but not to the lungs)
Arteries	Tubes that carry oxygenated blood
Blood vessels	Flexible tubes which carry blood around your body, e.g. vein, artery, capillaries.
Capillaries	Smallest blood vessels that connect veins and arteries
Carbon dioxide	Colourless, odourless gas that is formed as you breathe.
Circulatory system	The blood system in your body
Deoxygenated	Without oxygen
Heart	The organ that pumps blood around your body
Lungs	A pair of organs in your thorax (chest) in which oxygen from the air is inhaled , is transferred into the blood while carbon dioxide is removed and exhaled.
Nutrients	
Organ	A collection of tissues joined together for a specific function, e.g. kidneys, heart, lungs, liver.
Oxygenated	To enrich with or add oxygen.
Pulse	The measure of your heart beating
Respiration	Taking oxygen into the cells in your tissues and removal of carbon dioxide
Vein	Tubes that carry deoxygenated blood
Vena cava	Largest vein that carries deoxygenated blood from the lower body to the right atrium of the heart.
Ventilation	The movement of air between the environment and lungs via inhalation and exhalation
Via	By way of.

Working Scientifically Skills

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Kaleidoscope Science Curriculum

Learning Organiser for Year 6- Light

National Curriculum Summary
Key Subject Concepts

- Recognise that light appears to travel in straight lines
- Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye
- Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Prior Learning/Experiences	
Recognise that they need light in order to see things and that dark is the absence of light • notice that light is reflected from surfaces • recognise that light from the sun can be dangerous and that there are ways to protect their eyes • recognise that shadows are formed when the light from a light source is blocked by an opaque object • find patterns in the way that the size of shadows change.	
Key Vocabulary	**Definition**
	Recap Y3 Light vocabulary
Angles	The extent one line moves apart from another – measured in degees
Working Scientifically Skills	
Light - Identify different types of scientific enquiries to answer their own questions Investigating shadows - Take accurate measurements and records data on a graph	

TAPS Plan for Focused Assessment of Science

Topic: Light	Year 6 Age 10-11	Title: Raising and sorting light questions *(near start of topic)*
Working Scientifically **Plan:** Identify different types of scientific enquiries to answer their own questions 		**Concept Context** Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.
Assessment Focus • Can children raise a range of questions about light? • Can children identify ways to answer a range of questions?		
Activity *Today we are going to be physicists.* Provide a discussion-starting stimulus e.g. pictures of light in different contexts: shining		

through clouds, shadow puppets, headlights, eye. Explore children's ideas around light. Challenge small groups to raise questions about light e.g. 20. Then ask them to sort these into groups for how they could be answered e.g. research, direct observation, testing, we may never know... Share questions from different groups, supporting children to turn some into a form which could be investigated. Select questions which could be: answered now by research; answered in a later lesson by observation or investigation; placed on the class 'Wonder Wall' to consider at the end of term.
(Before the children can plan different types of enquiries they need to recognise how they might find out the answer to questions. Once able to recognise the different types they will then be able to independently choose an appropriate enquiry type and plan accordingly).

Adapting the activity T3
Support: Provide question stems: what, why, what if…
Extension: Plan investigations to answer their own questions
Other ideas: Provide a range of light sources, mirrors, magnifying glasses etc to stimulate further discussion and questions.

Questions to support discussion:
- What questions do we have about light?
- How would you find out the answer to that question?
- Are there any which we could investigate ourselves?
- Which questions could we answer with research? Observation? Investigation?
- Are there any questions which we could never answer?
- Which questions do you think scientists are exploring now? In the future?

Assessment Indicators

Not yet met: Asks questions which have a direct stimulus, but needs support to develop a range of questions and/or to consider how they could be answered.

Meeting: Contributes a range of questions, including some which can be turned into a form which can be investigated. Can identify how they could go about answering their questions.

Possible ways of going further: Raises a range of investigable questions, but also recognises that there are many which cannot yet be answered.

T3 Teacher box 3 - use Q, discussion and observation. See TAPS pyramid for more egs.

TAPS Plan for Focused Assessment of Science

Topic: Light	Year 6 Age 10-11	Title: Investigating shadows
Working Scientifically **Do:** Take accurate measurements and records data on a graph		**Concept Context** Use the idea that light appears to travel in straight lines to explain why shadows have the same shape as their objects
Assessment Focus • Can children make accurate measurements? • Can children plot their results accurately on a line graph?		

Activity *Today we are going to be physicists*

Introduce the investigation by shining a light on an object and asking how the shadow of the object could be changed (e.g. size of object/number of blocks, distance/angle of torch). List potential investigation questions. Ask children to select a question which will result in numerical data and carry out the investigation. As a class, generate clear success criteria for taking precise measurements and drawing accurate line graphs to display results. Focus on recording of results. Children could peer assess graphs against the success criteria, giving each other feedback for improvement.

P4

Adapting the activity

Support: Could use a planning framework to clarify investigation question, variables to be measured, changed and kept the same. Support drawing an appropriate graph e.g. example axes.
Extension: Ask children how the angle of the light affects the shadow. Ask children to use their graph to make further predictions and test them.
Other ideas: Research use of and limitations of sundials

Questions to support discussion

- What could we change that might change the shadow?
- What could we measure about the shadow?
- What units of measurement will we use?
- How are you making sure that it is a fair test?
- What kind of a graph can you draw with that data?
- What scale would be the most appropriate to use for each axis?
- How will you label each axis?
- It there a pattern or trend in your results?

Assessment Indicators

Not yet met: Requires support to take accurate measurements and and needs help to plot points accurately on a line graph.

Meeting: Uses appropriate equipment to measure, e.g. a protractor for angle of light, a ruler to measure length of shadow to nearest mm. Takes precise measurements which are recorded accurately on a line graph.

Possible ways of going further: Uses line graph to make further predictions, *e.g. if the angle of the light is 60°, the shadow will be 5cm.*

P4 Pupil box 4 - assess peers. See TAPS pyramid for more examples.

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Kaleidoscope Science Curriculum

Learning Organiser for Year 6- Electricity

National Curriculum Summary
Key Subject Concepts

- Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit
- Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches
- Use recognised symbols when representing a simple circuit in a diagram.

Prior Knowledge/Experiences
• Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • Recognise some common conductors and insulators, and associate metals with being good conductors.

Key Vocabulary	Definition
Cell	A battery (converts chemical to electrical energy)
Component	A part of a circuit
Closed Circuit	A complete electrical connection around which current can flow
Open Circuit	An incomplete electrical connection around which current cannot flow.
Switch	A small device, usually pushed up or down, to control the flow of an electric current.
Generator	A machine that makes electrical energy
Voltage	A measure of the difference in electrical energy between two parts of a circuit.

Working Scientifically Skills
Bulb Brightness - Plan a scientific enquiry to answer a question, recognising and controlling variables.

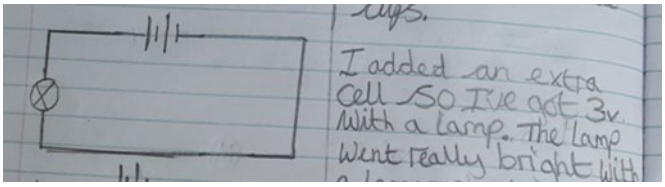
TAPS Plan for Focused Assessment of Science

Topic: Electricity	Year 6 Age 10-11	Title: Bulb brightness
Working Scientifically **Plan:** Plan a scientific enquiry to answer a question, recognising and controlling variables. 		**Concept Context** Compare variations in how electrical components function.
Assessment Focus • Can children create a scientific question which identifies the 'change' and 'measure'? • Can children identify control variables to plan a fair test?		

Activity *Today we are going to be electrical engineers.*
Provide a mix of basic circuit components and challenge pairs or trios to make a quick simple circuit. Compare and discuss the differences in bulb brightness and how to measure/observe this e.g. light seen through layers of paper, datalogger, observation. Main task: to investigate how they can change the brightness of the bulb choosing from the available equipment (to include different lamps, cells and different thickness/length of high resistance/fuse wires). Each pair/trio to generate a list of variables which could be changed in their circuit and how they will observe/measure the effect of this change. Create a scientific question which identifies the 'change' and 'measure'. Record their plan e.g. question, variables and diagram of test circuit. Carry out and discuss investigations.

T4

Adapting the activity
Support: Planning framework to scaffold. Help to decide how to measure the brightness.
Extension: Repeat using a different measurement technique. Choose another question to investigate.
Other ideas: Try with motors or buzzers.



Questions to support discussion:
- What factors could affect the bulb brightness?
- Which variable will you change? (independent variable)
- Which variable will you measure / observe? (dependent variable)
- Which variables will you keep the same? (control variables)
- What is your question? Does it include the 'change' and 'measure'?
- Have you found an answer to your question? If yes, what? If not, can you explain why your investigation wasn't able to give you a clear answer?

Assessment Indicators

Not yet met: Can identify what they would like to change but may need support to explain what must be kept the same.

Meeting: Identify a range of factors which may affect the brightness of the bulb and define a succinct scientific question to test, *e.g. What will happen to the (brightness of the bulb), if we change the (length of wire)?* Able to plan a fair test unaided, identifying the different types of variables: what to measure, what to change, what to keep the same

Possible ways of going further: Can identify control variables for a range of investigation questions, *e.g. if we look at wire length we need to keep the voltage the same but if we look at voltage we need to keep the wires the same.* Notes difficulties with the 'life' of the components.

T4 Teacher box 4 - gather evidence in a range of ways. See TAPS pyramid for more egs

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Kaleidoscope Science Curriculum

Learning Organiser for Year 6- Evolution and Inheritance

National Curriculum Summary
Key Subject Concepts

- Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
- Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents
- Identify how animals and plants are adapted to suit their environment in different ways

and that adaptation may lead to evolution.	
Prior Learning/Experience	
• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation & dispersal • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • describe the life process of reproduction in some plants and animals.	
Key Vocabulary	**Definition**
Adaptation	A change that improves the chance of survival for an animal or plant within their environment
Ancestor	An early animal or plant from which a later type has evolved
Breeding	The process of bearing offspring-producing plants or animals by sexual reproduction.
Characteristics	The qualities or features that belong to an animal or plant
Environment	The external conditions or surroundings in which a plant or animal lives
Evolution	A process of change that takes place over many generations
Generation	All the beings of approximately the same age, specified as parents, grandparents. etc.
Inherit	If you inherit a characteristic, you are born with it because one or more ancestors had it
Mutation	A characteristic which develops that is not inherited.
Natural Selection	The process by which species who are best adapted to their environment survive and reproduce above others less well adapted
Offspring	The immediate descendents of a person/animal/plant
Reproduction	The process of animals or plants produce one or more individuals similar to itself.
Species	Any of the groups in which the members can naturally interbreed.
Working Scientifically Skills	
Egg Strength - Explain degree of trust in results Fossil Habitats - Identifying scientific evidence that has been used to support or refute ideas or arguments.	

TAPS Plan for Focused Assessment of Science

Topic: Evolution (OR Forces)	Year 6 Age 10-11	Title: Egg strength
Working Scientifically **Review:** Explain degree of trust in results 	**Concept Context** Identify how animals are adapted to suit their environment in different ways	
Assessment Focus • Can the children explain how they are testing the strength of the eggs? • Can the children consider the trustworthiness of their method/results?		

Activity *Today we are going to be naturalists*

Why does a hen sit on her eggs? Why do they not break?
We know eggs can be fragile, but they are also strong.
What would be a scientific way of finding out how strong a chicken's egg is?
Children (in groups) set up a suitable test to measure strength and consider accuracy of measurements. Access to a range of weights/books, newton meters, lids, clingfilm (to protect books), card/toilet roll (to make egg stand), plasticine, egg per group to test to destruction. Compare the results from different groups and discuss the degree of trust in different methods.

Adapting the activity

P6

Support: Ask children to take on a specific role in the group. Ask them to explain what they are doing and why. Support through questioning as necessary.
Extension: Children raise further questions they wish to investigate and identify how these might be tested. E.g. Which is the strongest type of egg?
Other ideas: Link with Maths lesson on averages and/or graphs.

Questions to support discussion

- Which do you think is the best position to test?
- How will the egg be held in place? (cushioning? – what difference could this make?)
- What will you 'measure': weights/ newtons/marbles/books etc.?
- How will the weight be added (increments / position) and recorded?
- How much confidence do you have in your results? Do you think you would get the same results again?
- How does your group's data compare to the class results?

Assessment Indicators

Not yet met: Understands the need to be 'fair' / 'same' across all eggs. When prompted, can look for possible problems with the test (holding egg differently, putting weights on with different force).

Meeting: Can identify a range of factors that need to be consistent, e.g. egg position, how weight applied, how egg held in place, etc. Can consider which variables were hard to control and offers suggestions for improving the test.

Possible ways of going further: Can anticipate potential problems, evaluates throughout the process and makes adjustment – but mindful that changes could affect the consistency of results. Problem solves, *e.g. We ran out of actual weight so used substitutes and weighed them on scales.*

P6 Pupil box 6 - identify next steps. See TAPS pyramid for more examples.

TAPS Plan for Focused Assessment of Science

Topic: Evolution and inheritance	Year 6 Age 10-11	Title: Fossil habitats
Working Scientifically **Review:** Identifying scientific evidence that has been used to support or refute ideas or arguments.	**Concept Context** Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.	
Assessment Focus • Can children use evidence (from fossils or research) to develop ideas?		

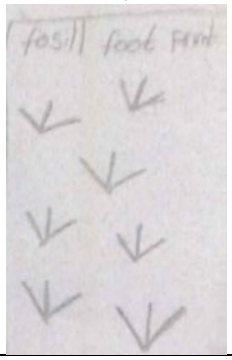
- Can children discuss whether evidence supports ideas?

Activity *Today we are going to be palaeontologists.*

Show a picture of a fossilised skeleton/creature and discuss the children's ideas about fossils, what it was, what it ate, where it lived etc. (Could provide only one part to start with, or parts to different groups, to show how we only have part of the information). Discuss strong/weak evidence e.g. strong evidence that has skeleton/teeth etc, place where fossil was found suggests habitat, similarities with modern creatures suggest colour etc.
Provide children with photos or real/resin fossils (trilobite, ammonite, ichthyosaurus etc, plus any found locally or linked/displayed at local museums). Ask them to use the fossils and their own research to develop ideas about the creatures e.g. labelled drawing with size, possible appearance, diet, habitat, what other fossils could exist eg what prints could be left behind. Could colour code or star ideas for which there is the strongest evidence.

Adapting the activity

Support: Provide examples of animals alive today that have similar physical characteristics.
Extension: Make food webs for the prehistoric creatures using secondary sources.
Other ideas: research palaeontologists, top trumps of fossils, models to demonstrate, explanation writing about fossil formation.



Key Questions

- What is a fossil? How was it made? (The rock has filled the gap where the animal was, so not the remains of an animal).
- What do you think it looked like? How can you tell?
- What do you think it ate? How can you tell?
- Where do you think it lived? How can you tell?
- If the creature looked like that, what fossils could be left behind?

Assessment Indicators

Not yet met: Ideas about the creature are limited or lacking in use of evidence from fossil, research or comparisons with modern animals.

Meeting: Can explain how fossils are formed. Can identify evidence to support ideas, from fossil, research or comparisons with modern animals.

Exceeding: Considers what can be known about appearance, habits and habitats from fossil evidence. Describes potential sources of error.

Pupil box 3 - assess own ideas. See TAPS pyramid for more examples.