Year 3: Rocks and Soils

SCIENTIFIC CONTEXT: Chemistry

KEY VOCABULARY:

Igneous	Having solidified from lava, or magma.
Sedimentary	Sedimentary rocks are made when sand, mud and pebbles get laid down in layers.
Metamorphic	A result of a transformation of a pre-existing rock. The original rock is subjected to very high heat and pressure, which cause obvious physical and/or chemical changes.
Fossil	The remains or traces of plants and animals that live a long time ago.
Permeable	Allows liquid and gases to pass through.
Organic matter	Matter that has come from a recently living organism.

Key Questions

1) **Can you name different groups of rocks?**
2) **Can you name some properties of rocks?**
3) **How are fossils formed?**
4) **What is soil made from?**

As Scientists we will:

Pupils should be taught to:

- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties,
- describe in simple terms how fossils are formed when things that have lived are trapped within rock,
- recognise that soils are made from rocks and organic matter.

Working Scientifically:

Pupils should be taught to:

- Make careful observations, identifying similarities and differences,
- Report on findings from enquiries,
- Record findings using simple scientific language and drawings,
- Set up simple practical enquiries, comparative and fair tests.

Notable Scientist: Mary Anning

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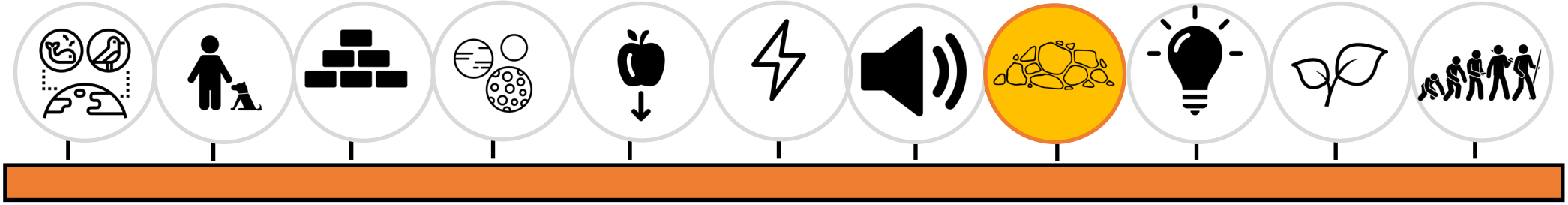

What I need to know:

Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil. Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water

Opportunities for science capital:

Lyme Regis: Multiple activities can be booked at Lyme Regis Museum e.g. fossil hunting walks, Mary Anning and the Jurassic Coast.

Invite in a geologist.

Part of science capital includes scientific media consumption- documentaries, reports etc. So, I have added a couple of links which give daily science news for children. Checking in on these every now and then would be beneficial to help children see science in the wider world.

https://www.sciencenewsforstudents.org/

https://www.sciencejournalforkids.org/

Assessment:

By the end of the topic, children should be able to: compare and group together different kinds of rocks on the basis of their appearance and simple physical properties, describe in simple terms how fossils are formed when things that have lived are trapped within rock, and recognise that soils are made from rocks and organic matter.

They should be beginning to make careful observations, identifying similarities and differences, report on findings from enquiries, record findings using simple scientific language and drawings and set up simple practical enquiries, comparative and fair tests.

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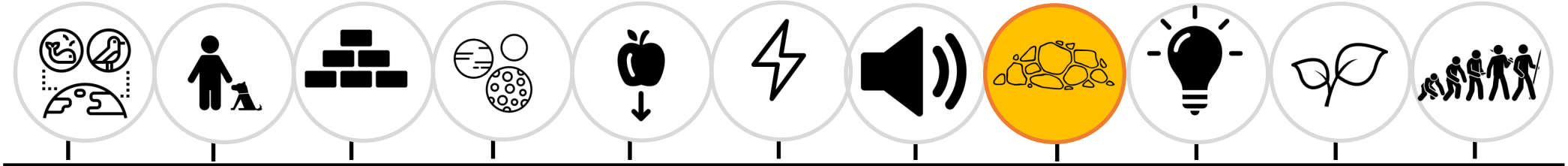

Theme 1: Igneous, sedimentary and metamorphic.

Starter:

Complete KWL grid

Recap Year 2 learning, properties of materials. What vocabulary can they remember?

Main:

Substantive knowledge:

Explain to the children that rocks form in the Earth's crust. They are found on every part of the Earth's surface, although they are often covered by soil or water. Tell the children that the following film will show how rocks form, and ask them to note the names of the three main rock types: https://www.tigtagworld.co.uk/film/rock-types-PRM00589/

Organise the children into groups of four or five. Give each group a sheet of paper, pencils/pens, and the Rock types activity sheet and the Rock images.

Give the groups a few minutes to discuss and create a list of the different ways that rocks are used. Ask each group to share their ideas and write these on the whiteboard. **Note:** You can display the Rock types classroom visual on the whiteboard for the children to check their answers.

Disciplinary knowledge:

Modelling

Working scientifically objective: making careful observations.

Modelling the formation of rock types: https://www.tigtagworld.co.uk/mindmap/#/lessons/CLASS00271/activities/practical/ACTVTY00512

Plenary/assessment:

Four examples of rocks are shown, but which is the odd one out and is not a type of rock?

https://www.tigtagworld.co.uk/film/rocks-odd-one-out-PRM00507/

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Theme 2: Comparing and grouping rocks, appearance.

Starter:

Recap: explain to an alien how igneous, sedimentary and metamorphic rocks are formed.

Main:

Substantive knowledge:

Introduce vocabulary for properties of rocks and display on working wall– hard, soft, rough, smooth, shiny, dull, permeable, brittle, contains crystals.

Disciplinary knowledge:

Identifying, grouping and classifying

Working scientifically objective: making careful observations, identifying similarities and differences.

Compare and group together different kinds of rocks on the basis of their appearance. Give children a range of rocks, magnifying glasses and ask the children to work in groups to sort the rocks in different ways using their own criteria.

For those needing supporting, they could group into only two different criteria (e.g. shiny/dull).

Plenary/assessment:

In books, write simple descriptions describing the appearance of different types of rocks.

For those needing support, this could be a matching activity.

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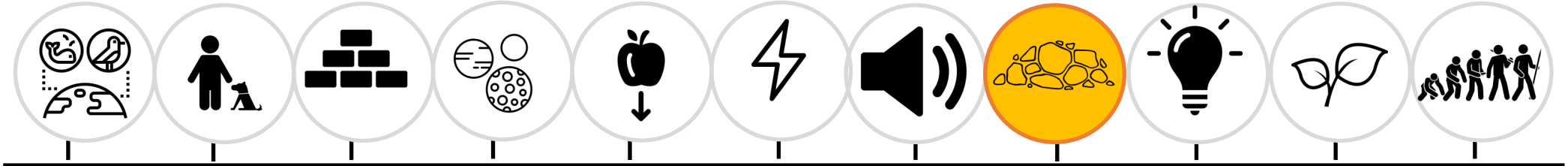

Theme 2: Comparing and grouping rocks, properties.

Starter:

Zoom in, zoom out: https://explorify.uk/en/activities/zoom-in-zoom-out/glitter-and-sparkle

Recap: create dominoes game to recap vocabulary for properties of materials.

Main:

Disciplinary knowledge

Investigation stations: set up different tables testing different rocks for different properties for children to go and explore. Use a table with the headings: hard or soft, permeable or impermeable, high density or low density for children to sort rocks into as they visit each station.

Table 1: testing hardness— scratch test or rub test.

Table 2: permeability- use a pipette to drop water droplets onto rocks, does the water travel through?

Table 3: density- is it high density (sinks), or low density (floats).

Table 4: non-fiction books on rocks so children can carry out research.

Working scientifically objective: reporting on findings from enquiries.

Comparative test

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?

See full plan with assessment criteria: Rocks report

Plenary/assessment:

Report findings with the purpose of persuading school staff to build a paved area in school from a particular type of rock. Could be presentation, drawing, piece of writing etc.

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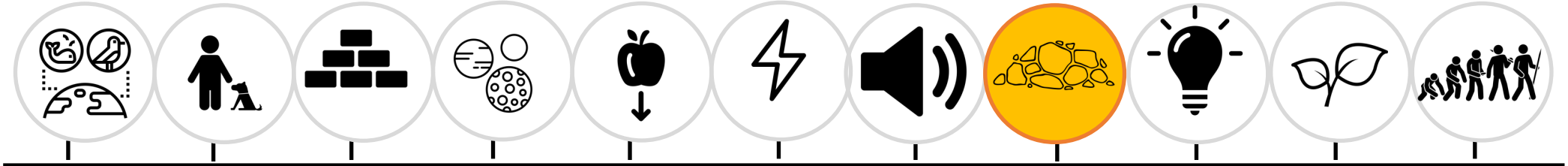

Theme 3: Fossils

Starter:

Beat the clock! You have three minutes to write down as much as you can about our rocks topics so far. On your marks, get set, GO!

Main:

Substantive knowledge:

Play film: https://www.tigtagworld.co.uk/film/fossils-PRM00680/

Model: Using a leaf (one with pronounced veins work best), a sheet of paper, and a pencil or crayon. Make rubbings of the leaf by placing the leaf on a firm surface, covering with paper and rubbing over the leaf shape with the crayon. Point out the level of detail contained in their rubbings, and explain that fossils are also imprints, which preserve traces of living things for millions of years.

Ask: Why are preserved imprints exciting for scientists? Play film to clarify this point: https://www.tigtagworld.co.uk/film/rocks-clip-PRM00506/

Disciplinary knowledge:

Problem solving

Problem solving: full instructions for problem solving activity on explorify- https://explorify.uk/en/activities/problem-solvers/if-fossils-could-talk

Plenary/assessment:

Disciplinary knowledge:

Working scientifically objective: recording findings using simple scientific language and drawings.

Use your findings from the problem solving activity to draw a diagram showing the process of fossil formation using scientific vocabulary.

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Theme 4: Soil

Starter:

Odd one out: frozen in time

https://explorify.uk/en/activities/odd-one-out/frozen-in-time

Main:

Substantive knowledge:

Work through all of the activities and videos on tig –tag: https://www.tigtagworld.co.uk/mindmap/#/lessons/CLASS00272/activities/main

Substantive knowledge:

Comparative/fair test

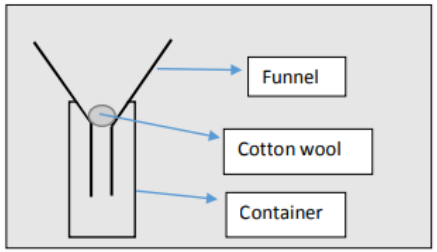
Working scientifically objective: setting up simple practical enquiries, comparative and fair tests.

Drainage dilemma! Can we find out which soil allows water to drain through most easily?

Use the comparative/fair test planning sheet and as a whole class discuss variables you could measure (such as how much water drains through, how long it takes for water to start to drain through) what variables to keep the same to ensure it's a fair test (such as same amount of soil each time, same amount of water, same size funnel) and make predictions.

Setting up the test: take a selection of soils (choose from sand, clay, silt, peat, chalk and loam soil types). Put a cotton wool plug inside a funnel. Stand the funnel inside a container . This is your soil test equipment. You will need to make one for each type of soil . Your soil will go in the funnel and you will be able to pour water over it to see how much drains through into the container.

Carry out the investigation.



Plenary/assessment:

Give each child a sheet of paper and pencils/pens. Ask them to draw an annotated diagram of the soil, which includes information about its structure and its importance to living things.

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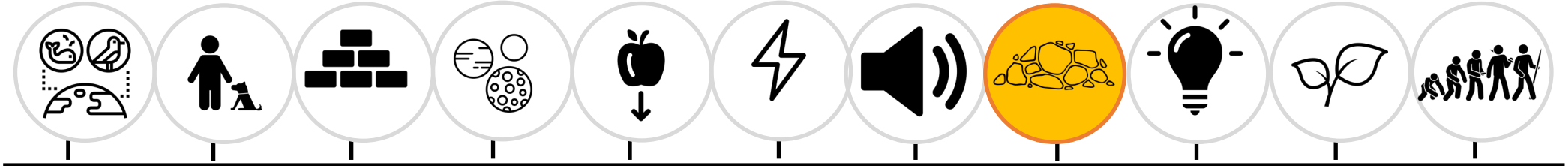

Theme 5: Mary Anning

Starter:

Recap activity

'Spot the difference': Give out photographs of Lyme Regis when Mary Anning was alive and present day. Ask pupils to note as many differences as they can. What are the important differences? What do they think might have caused the changes?

Main:

Substantive knowledge:

All resources from (follow link for Mary Anning): https://pstt.org.uk/resources/curriculum-materials/big-jurassic-classroom

The Mary Anning Story: Explain to the pupils that they are going to build up a picture about a person who lived in Lyme Regis called Mary Anning. Explain that this involves **inferring**, or making an educated guess based on the artefacts and evidence: something that historians and geologists both do. This activity works well when you have real artefacts to show to the children, but if you can't get hold of them then pictures will do. Take each 'item' out of a box one at a time and ask the students to answer the questions on their sheet about each item (or you could do this as a Q & A and collate their answers on the board). Items include a rock hammer, apron or bonnet, encyclopaedia, or any other items you can find that will relate to the Mary Anning Story.

Give the pupils the Mary Anning Story to read and answer the questions on the sheet (WS 8.2) (you may prefer to tell them the story yourself or use the role play cards and encourage the children to role play scenes before asking them to answer the questions.

Plenary/assessment:

Ask pupils to complete the sentence, "I think Mary Anning was significant because…"

Complete 'What I've Learnt' on KWL grid.