Medium Term Plan
Acids, Alkalis and Earth Science

P levels
Performance attainment targets (P scales) and performance descriptors are used for pupils aged 5 to 16 with special educational needs (SEN) who are working below the standard of the national curriculum tests and assessments. PSTT recognises that the national curriculum levels used in this document are no longer current. We have had so many requests to return these materials to the website that they remain in the documents as a guide for those who have used them in the past. The written statements may be useful to others as an indication of children's development. For further information about P levels see: https://www.gov.uk/government/publications/p-scales-attainment-targets-for-pupils-with-sen

Disclaimer
PSTT is not liable for the actions or activities of any reader or anyone else who uses the information in this document or the associated classroom materials. PSTT assumes no liability with regard to injuries or damage to property that may occur as a result of using the information contained in these plans.

Primary Science Teaching Trust recommends that a full risk assessment is carried out before undertaking in the classroom any of the practical investigations contained in the plans.

Safety Note
PSTT advises teachers to refer to either CLEAPSS website or SSERC website for up to date health and safety information when planning practical activities for children.

Teacher's Notes: Acids, alkalis & earth science

Big Questions

- Are all acids dangerous?
- Is an alkali the opposite of an acid?
- Do acids make fizz?
- Do alkalis make acids safe?
- Is all rock the same?
- Do we need rocks?
- Are rocks recycled?
- Can rocks tell stories?
- Where does soil come from?
- Is soil always a black/ brown colour?
- Does the weather help soil?
- Is there air in soil and why?
- Do roots help soil?

Answers

- Some acids are good for us, e.g. ascorbic acid (Vitamin C).
- An alkali is not the opposite of an acid.
- Acidic solutions react with metal carbonates to release carbon dioxide gas.
- When acid and alkali solutions are mixed together they 'neutralise' each other.
- There are 3 main types of rock: the differences depend on how they were formed.
- Rocks (and the minerals in them) provide us with may essentials in everyday life.
- Rocks are created and destroyed in cycles.
- Layers of rocks can tell us about the past and fossilised plants and animals can tell us what used to be alive.
- Soil comes from rocks, and dead plants and animals.
- Yellow/red soil indicates the presence of iron oxides.
- Acidic rain and wind can attack rocks and turn them into soils.
- The air in soil contins high amounts of carbon dioxide
- Roots stop soil being eroded by the weather,

Learning Objectives

Pupils will have opportunities:

- To explore acids and alkalis and their everyday uses
- To begin to recognise how acids can affect the environment
- To explore rocks and soils

Quick review activities

- Flintstones YouTube clip e.g. baby called 'pebble'. Find examples of as many rocks and their uses in the clip
- The three little pigs story – which was the strongest house?
- Matching photos of everyday uses of rock with samples of the rock e.g. work surface/granite, floor/marble,
- Listen to/ sing along to http://www.youtube.com/watch?v=zTLiJE-j1-I or http://www.youtube.com/watch?v=vSQZjVCAfNg
- Watch these reactions and then try http://www.youtube.com/watch?v=e-Njp175AiM

Vocabulary relevant to this topic

- Acid – a compound containing hydrogen which dissolves in water to produce hydrogen ions, solution with pH < 7, dilute acids may taste sour
- Alkali – a solution that can react with acids and neutralise them, pH > 7, feels slimy/ soapy
- Indicator- solution that changes colour in acids and alkalis
- Solution – liquid with substance dissolved in it
- Neutral – not acid or alkali and has pH 7
- Reaction – a chemical process in which substance act on each other and are changed into different substances
- pH- scale to measure acidity and alkalinity

Vocabulary relevant to this topic

- Mineral –a natural substance that makes up rock
- Rock – made up of one or more minerals
- Air – mixture of oxygen, nitrogen and other gases
- Atmosphere – layer of air round the Earth
- Igneous- rock formed from magma
- Magma –hot liquid rock
- Sediment –small bits of rock
- Sedimentary – rock made from sediment
- Names of some rocks e.g. granite, marble, sand, clay, limestone
- Humus –part of soil made from dead plants and animals, gives soil dark colour
- Permeable –allows water to pass through
- Impermeable- doesn't allow water to pass through
- Crystals- are minerals that join together to make igneous rock
- Ore-rock or mineral that contains metal
- Sour
- Burn
- Harmful
- Corrosive
- Goggles
- Fruit
- Bee sting
- Wasp sting

Background information about this topic

- **Acids** release hydrogen ions (H^+) in aqueous solutions and have a pH value less than 7. Some acidic solutions can taste sour but if they are very dilute they will taste like water. Some are safe to consume, e.g. orange and lemon juice, vinegar, soda water, but others can be corrosive, e.g. sulphuric acid and nitric acid. Strong acids, like concentrated hydrochloric acid, are very dangerous but when diluted with water become less of a hazard. However, it is the ease with which the hydrogen ion combines with other substances that makes it 'strong'.
- A **base** is a substance that can react with acids. They are usually metal oxides, metal carbonates (or hydrogen carbonates) or metal hydroxides. Many bases are insoluble (they do not dissolve in water) but if they do dissolve, they are called an **alkali**. Alkalis are also part of everyday life, e.g. washing up liquid, bleach and toothpaste contain alkalis. They feel soapy or slimy to the touch. Strong alkalis are more damaging to eyes and skin than acids. Sodium hydroxide is a common alkali used in school chemistry.
- When acid and alkali solutions are mixed together they **neutralise** each other and make a new chemical. This is how common salt (sodium chloride) can be made: **acid + alkali --> salt + water**
  Neutralisation is used in:
  1) Indigestion on treatments e.g. the stomach contains hydrochloric acid but if there is too much it can cause a burning pain.
  2) Treating soils e.g. adding lime to acid soils to help plants grow well.
  3) Treating wasp (alkali) and bee (acid) stings.
- Pupils may equate 'neutral' with safe when actually many neutral substances (i.e. not acid or alkali) are dangerous, e.g. petrol, potassium cyanide, phosphorus, gun powder.
- The **pH scale** is used to measure the strength of acids and alkalis. Very acidic solutions have a pH around 1 and very strong alkali around pH 14. Other dyes can also change colour to indicate is something is acid or alkali, e.g. litmus, red cabbage, but not how strong it is.

- **Rock** is a natural material that is found on the Earth's crust. The Earth is at least 4,800 million years old and the oldest rock about 4,000 million years old. The age can be determined on radioactive decay, fossil types and younger rocks are usually on top of older ones. There are three main types of rocks: igneous, sedimentary and metamorphic, based on how they were formed.
- **Igneous rock** is very hard, dark, heavy, often with crystals or holes and no fossils. It is formed from molten rock (magma or lava) which can cool above (extrusive) or below (intrusive) the ground, e.g. basalt, granite, pumice.
- **Sedimentary rock** is formed as a result of weathering (action of water, wind, ice) and erosion (moving the small weathered particles of rock away, perhaps in a river). The small particles or pieces of bone/shell settle as sediment which is compressed into layers in rivers, seas and deserts. They may contain fossils, have grains 'cemented together', and are usually light in weight and colour, e.g. shale, limestone.
- **Metamorphic rock** is sedimentary rock changed by heat or pressure – a bit like cooking a cake! They often make a high pitched 'clink' when tapped, have light and dark bands and large interlocking grains. Any fossils are destroyed or distorted, e.g. slate, marble.
- The **Rock Cycle** is complex. It shows that rocks change over time into other rocks as they recycle. Some rocks can be glassy, some have crystals and some are aggregates. Rock is made from one or more minerals. Different rocks can be identified by their properties, e.g. colour, texture, hardness, permeability.
- Rock comes in different sizes and there are lots of everyday words used for these bits of rock, e.g. boulder, stones, pebbles, gravel and sand.
- We eat rocks too! **Minerals** in breakfast cereals, like iron and zinc, come from minerals in rocks. **Salt** is dissolved from rocks. Bread contains a small amount of limestone to make it white and gypsum. Gypsum is also used in small amounts to make some ice cream, cheese and other foods. Gypsum is found in rocks that formed in the seas. Water also contains minerals from rocks.

- **Soil** is a mixture of small bits of rock and dead organisms (**humus**). The characteristics of the soil depend on the rock it is formed from. Soil is formed by weathering which breaks the rocks into small particles of rock/mineral that are then mixed with dead plants and animals (humus).
- Different soil types are formed from different sized rock particles, e.g. **sandy soils** have large particles, **clay soils** have small particles and **silt** has particles between the two sizes which means that sandy soils drain well but leach minerals, and clay soils will water-log but hold onto minerals.
- Soils contain spaces that hold water and minerals dissolved in the water (for roots to absorb), and also air between the soil and water particles. Air is needed by soil organisms and also by plant roots so that they can respire.

Acids, alkalis & earth science P1-3

Objective 1: To explore acids and alkalis and their everyday uses

Descriptions of intended outcomes at different levels of attainment

- Tolerates being involved in an activity e.g. allows substance to be placed on hand or in mouth (P1i)
- Shows random fleeting response to activity e.g. shows like or dislike to substance by facial expression (P1ii)
- Accepts and engages in coactive exploration of substances (P2i)
- Shows more consistent and differentiated response to the same experience (P2ii)
- Begins to respond to stimulus e.g. Pupils will take substance out of mouth or reach out for more or close mouth (P3i)
- Actively explores for more extended periods (P3ii)

Activities you might like to try include:	Resources:
Pupils to experience colour changes using different indicators in different household items. Pupils could paint with large brushes or hands or feet onto collage of litmus paper using different acid and alkali solutions	Litmus paper or universal indicator paper or liquid, red cabbage juice etc. household items to test e.g. toiletries, foods, cleaning liquids. Ref CLEAPPS website for guidance investigating indicators. Large paint brushes, collage of litmus paper, spray containing weak solutions of acids

Points to Note:

Be aware of skin allergies.

Acids, alkalis & earth science P1-3

Objective 2: To begin to recognise how acids can affect the environment

Descriptions of intended outcomes at different levels of attainment

- Encounters a range of sensory evidence during activities (P1i)
- Shows emerging awareness of activities and experiences (P1ii)
- Begins to show interest in events and objects (P2i)
- Communicates consistent preferences e.g. dislike of having water flicked onto face (P2ii)
- Positively or negatively anticipates event (P3i)
- Requests stimulus through gesture e.g. pointing to a rock for adult to put acid on (P3ii)

Possible Activities:	Resources:
Experience moisture in the air around them using a fine mister. Flick water from a toothbrush onto hand or face. Experience collecting and testing rain water with universal indicator.	Fine spray container: toothbrush, water, container, Universal Indicator Solution , rainwater

Acids, alkalis & earth science P1-3

Objective 2: To begin to recognise how acids can affect the environment

Optional activities you might like to try include:	Resources:
Experience moisture in the air around them using a watering can. Make up a sensory story about acid rain using information from https://www3.epa.gov/acidrain/education/site_kids/lucy/3.htm and have a range of artefacts to feel.	Watering can trough, sensory story, artefacts, e.g. piece of coal, dead plant, dead tree branch, mister for rain, red light for acid and blue light for alkali, plastic fish, sounds of coughing, damaged bricks,
Experience moisture in the air around them in a hot house or at a swimming pool. Experience putting 'acid rain' on different rocks to see of the fizz.	

Acids, alkalis & earth science P1-3

Objective 3: To explore rocks and soils

Descriptions of intended outcomes at different levels of attainment

- Participation is fully prompted e.g. hand is placed in sand (P1i)
- Shows random fleeting response to activity e.g. Smiling when find object (P1ii)
- Changes body language is a more sustained way e.g. in response to the experience of finding the rocks (P2i)
- Performs actions by trial and improvement e.g. feeling soil (P2ii)
- Purposefully uses equipment to observe a change e.g. pouring water through soil (P3i)
- Chooses a best or favourite result e.g. best rock they found buried (P3ii)

Possible Activities:	Resources:
Pupils are helped to find rocks which are hidden in a tray of sand or a bowl of water or a feely bag Pupils experience handling clay using their hands or tools Pupils experience feeling different soils	Rock samples, deep trays, sand, water, feely bag Modelling clay, range of soils, trays to put soils in

Acids, alkalis & earth science P1-3

Objective 3: To explore rocks and soils

Optional activities you might like to try include:	Resources:
Pupils go outside on a 'rock hunt' to collect different types of rocks e.g. pebbles and stones using objects/photos/ symbols as prompts. Pupils experience the difference between air dried clay and wet clay. Pupils experience mixing different soils with water or pouring water through soils.	Access to outside environment, air dried clay, wet clay, range of soils, trays to put soils in, water, large funnels with cotton wool plug to keep soil in place,
Pupils select and use equipment with support to unearth/dig a hole and collect rocks/stones. Pupils experience adding water to air dried clay. Pupils experience different soils being sieved.	

Points to Note:

Close supervision re placing rocks in mouth.

Wash hands after handling soils.

Acids, alkalis & earth science P4-6

Objective 1: To explore acids and alkalis and their everyday uses

Descriptions of intended outcomes at different levels of attainment

- Shows interest in activities and explores using vocalisation (P4i)
- Communicates awareness of obvious colour changes (P4ii)
- Completes a simple task with guidance (P5i)
- Identifies simple differences e.g. colour difference (P5ii)
- Recognises a safety warning label (P6i)
- Records using the objects they are testing e.g. put substances that turn litmus red in one group (P6ii)

Possible Activities:	Resources:
Pupils look at labels of household chemicals and identify the hazard symbols. Squeeze juice from citrus fruits and test using an indicator (to introduce the idea that acids cause an indicator to change colour). Pupils experience the removal of limescale from a furry kettle using vinegar.	range of household chemicals in containers, citrus fruits, acid drops, vinegar, lemon juice, orange juice, lime juice. Ref CLEAPPS website for guidance investigating indicators and investigating soaps and detergents. sodium bicarbonate, e.g. limescale remover

Acids, alkalis & earth science P4-6

Objective 1: To explore acids and alkalis and their everyday uses

Optional activities you might like to try include:	Resources:
Pupils to experience colour changes using different indicators in different household items. Under supervision pupils make their own indicator using red cabbage or and then use this to identify and record a colour change using photos (before and after). Pupils experience mixing lemon juice and bicarbonate of soda.	Litmus paper or universal indicator paper or liquid, red cabbage juice, etc. red cabbage, plastic beakers, boiling water (note risk assessment needed), tea strainer or sieve. Household items to test e.g. cleaning liquids, toiletries, foods, bicarbonate of soda, lemon juice. Ref CLEAPPS website for guidance investigating indicators and a vinegar and sodium bicarbonate practical activity.
Pupils explore other protective clothing e.g. gloves, aprons, footwear. Under supervision pupils make their own indicator using other dark fruits or veg e.g. beetroot, blueberries, grapes, blackberries and then use this to identify and record a colour change using drawing and colouring. Pupils experience testing indigestion tablets to show that they contain alkalis.	

Points to Note:

Reinforce that not all colourless liquids are water and are safe.

You can use litmus paper but this can often confuse pupils.

Avoid use of empty bottles of strong household chemicals.

Ref CLEAPPS website for guidance investigating indicators, hot liquids, and acid/sodium bicarbonate reaction.

Acids, alkalis & earth science P4-6

Objective 2: To begin to recognise how acids can affect the environment

Descriptions of intended outcomes at different levels of attainment

- Makes simple choices about which material to test from a limited range (P4i)
- Explores objects provided using any sensory mode (P4ii)
- Responds to simple scientific questions e.g. is this fizzing? (P5i)
- Responds to and follows instructions involving more than one step e.g. testing soil (P5ii)
- Responds to simple scientific questions that require a more detailed response than P5 e.g. can you something else that is acid? (P6i)
- Engages in experimentation using simple equipment (P6ii)

Possible Activities:	Resources:
Pupils leave containers outside to collect rainwater for acid testing using Litmus paper. Compare results with tap water. Pupils test the strength of rainwater, vinegar , tap-water and lemon juice using long pH paper strips which they match to an enlarged pH scale on a washing line.	Containers e.g. trays Litmus paper Tap water Vinegar Tap water Lemon juice pH Indicator paper dispenser (reel) washing line and pegs

Acids, alkalis & earth science P4-6

Objective 2: To begin to recognise how acids can affect the environment

Optional activities you might like to try include:	Resources:
Pupils use universal indicator solution or paper to test rainwater, water from around the local environmnet, e.g. streams, lakes, puddles and tap water for differences in pH. Pupils explore dropping acid rain to different rocks.	Range of waters, universal indicator or paper, test tubes, droppers, Acid rain (vinegar or dilute HCl) range of rocks to test include chalk and limestone, droppers, plates to put rocks on,
Pupils use universal indicator solution to test soils from around the local environment. Record by placing the appropriate colour card on the soil. Join in a sensory story about Acid Rain e.g. see P1-3 or https://www3.epa.gov/acidrain/education/site_kids/lucy/3.htm	

Points to Note:

Universal indicator paper for testing the pH of a range of different liquids can be purchased from TTS.

Acids, alkalis & earth science P4-6

Objective 3: To explore rocks and soils

Descriptions of intended outcomes at different levels of attainment

- Observes the outcome of a simple physical change (P4i)
- Shows interest in the activities, rocks and soils (P4ii)
- Follows a more complex experiment with a range of prompts (P5i)
- Tries out a range of equipment in familiar situations (P5ii)
- Begins to make connections e.g. some rocks hold more water than others (P6i)
- Completes a procedure following simple instructions (P6ii)

Possible Activities:	Resources:
Present pupils with a collection of rocks to group to feel and observe. Pupils test rocks for permeability by dropping small quantities of water onto different rocks placed onto blotting paper and observe. Pupils experience fizzing when vinegar or lemon juice is added to rocks, e.g. chalk to see if they all fizz. Which is the fizziest? Pupils explore the feel of different soils. Pupils dig a deep hole outside (about 60 cm?). Take photos and then look for any changes in colour, size of particles, presence of stones or pebbles,	Rock samples, droppers, blotting paper, vinegar or lemon juice, range of soils, magnifiers,

Acids, alkalis & earth science P4-6

Objective 3: To explore rocks and soils

Optional activities you might like to try include:	Resources:
Pupils place different rocks into water in litre bottle and use a visualiser to observe bubbling. Pupils observe when they scratch rocks with sandpaper or a coin. Pupils explore pouring water through different soils. Pupils shake up soil in jar of water and let it settle to see different layers.	Range of rocks of different types and sizes, litre bottles, water, visualiser, sandpaper, coin, range of soils, funnels with cotton wool bungs, water, jugs, jam jars with lids,
Pupils place rocks in water to see if they float. Pupils make a series of observations, e.g. photos over 3 or more weeks of limestone where acid has been added on a regular basis. Pupils explore sieving different soils. Explore making paint from different dry soils by grinding well in pestle and mortar and then mixing with artist acrylic and use to paint.	

Points to Note:

Pupils may think bricks are rocks and that rocks are large, heavy, jagged.

Rock samples can often be borrowed from local museums or secondary schools.

Soil shaken with water separates into layers depending on particle size – heaviest particles on the bottom. Humus and leaves tend to float on the top of the water.

Acids, alkalis & earth science P7-8

Objective 1: To explore acids and alkalis and their everyday uses

Descriptions of intended outcomes at different levels of attainment

- Makes a connection between the start and end of a test e.g. colour of indicator before acid or alkali added (P7i)
- Identifies some obvious hazards (P7ii)
- Identifies obvious risks and reduces risk e.g. suggests wearing goggles (P8i)
- Locates some of the right equipment of use for their tests (P8ii)

Possible Activities:	Resources:
Identify a range of familiar household acidic products e.g. vinegar, fizzy water. Discuss their uses and any safety precautions. Test familiar acidic household products with universal indicator to observe colour changes. Giants Hand demonstration experiment: put a small amount of vinegar into a plastic beaker, put bicarbonate of soda into fingers of a latex glove. Attach the glove to beaker and allow bicarbonate of soda to fall into the beaker. As carbon dioxide is released the glove will expand http://resources.schoolscience.co.uk/salters/pdfs/voltwo/SCC2_Prac5.pdf Make indicator using red cabbage and use it to test a range of household items.	Household acids e.g. vinegar, lemon juice, lime juice, orange juice, pop, universal indicator, test tubes, droppers, red cabbage, plastic beakers, boiling water (note risk assessment needed), tea strainer or sieve. Household items to test e.g. cleaning liquids, toiletries, foods, bicarbonate of soda, lemon juice. Ref CLEAPPS website for guidance investigating indicators and a vinegar and sodium bicarbonate practical activity.

Acids, alkalis & earth science P7-8

Objective 1: To explore acids and alkalis and their everyday uses

Optional activities you might like to try include:	Resources:
Revisit using household alkalis in place of acids and test with indicator. Using photographs of pupils working safely the pupils identify examples of good practice. Pupils try to arrange colours of pH scale in order and add numbers if appropriate.	Household alkalis, e.g. toothpaste, bleach, soaps, onion juice, test tubes, droppers, camera, universal indicator solution/paper. Cards with colours of pH scale and cards with numbers 1-14.
Experience using sodium bicarbonate to test for acids. It will fizz when acid is dropped onto it. Make indicator using other fruits or veg, e.g. blueberries or beetroot.	

Points to Note:

See CLEAPSS website for guidance on investigating acids and alkalis.

Acids, alkalis & earth science P7-8

Objective 2: To begin to recognise how acids can affect the environment

Descriptions of intended outcomes at different levels of attainment

- Makes a simple record of their findings (P7i)
- Shows understanding of some simple scientific vocabulary (P7ii)
- Explores and observes similarities, differences and changes (P8i)
- Begins to ask some of their own questions e.g. about acid rain (P8ii)

Possible Activities:	Resources:
Pupils to view film `Invisible menace` to show the effects of acid rain on rivers. https://www.youtube.com/watch?v=Ms4v0Ekvyuw Pupils test a range of different local waters, rain water and tap water for pH and begin to arrange results in order.	Invisible Menace` National Geographic Channel (You Tube) , range of waters, universal indicator or paper, test tubes, droppers

Acids, alkalis & earth science P7-8

Objective 2: To begin to recognise how acids can affect the environment

Optional activities you might like to try include:	Resources:
Spot differences between plants, animals (e.g. fish) and materials that have/ have not been affected by acid rain.	Images of the effects of acid rain from Google images
Pupils test and record the pH of different soils from the local environment. Place a raw egg in shell in beaker of acid (lemon juice or vinegar) and take photos every few days to show changes.	Universal indicator paper, pots for collecting soil samples, water, stirrer egg shell, lemon juice, vinegar

Acids, alkalis & earth science P7-8

Objective 3: To explore rocks and soils

Descriptions of intended outcomes at different levels of attainment

- Makes more detailed observations e.g. using simple vocabulary/symbols to describe what they saw (P7i)
- Begins to respond to encouragement to repeat or modify task e.g. use more acid (P7ii)
- Shows an awareness of amounts to use (P8i)
- Records results simply e.g. takes photos (P8ii)

Possible Activities:	Resources:
Present pupils with a collection of rocks to group to feel and observe using hand lenses. Sort by texture Pupils test rocks for permeability by dropping small quantities of water onto different rocks placed onto blotting paper and observe. They find the most and least permeable ones Pupils experience fizzing when vinegar or lemon juice is added to rocks e.g. chalk to see if they all fizz. Which is the fizziest? Which ones contain chalk? Pupils observe and compare different soils Pupils dig a deep hole outside (about 60 cm?). Take photos and then identify any changes in colour, size of particles, presence of stones or pebbles and identify these on their photos Show a video on different types of rocks http://www.youtube.com/watch?v=acqRoasmxzg and make edible models http://www.pages.drexel.edu/~ks73/Ediblerocks.htm	Rock samples, droppers, blotting paper, vinegar or lemon juice, range of soils, magnifiers, Resources for different rock types and rock cycle e.g. different foods

Acids, alkalis & earth science P7-8

Objective 3: To explore rocks and soils

Optional activities you might like to try include:	Resources:
Pupils place different rocks into water in litre bottle and use observe bubbling. They sort rocks according to whether they bubble or not. Pupils scratch rocks with different items e.g. finger nail, plastic knife, sandpaper, coin. Pupils explore pouring water through different soils and if appropriate time this. Pupils shake up soil in jar of water and let it settle to see different layers. They look at different samples to see of the layers are the same . Revisit the rock cycle using crayons and talk about different rock types. http://www.navigatingbyjoy.com/2013/03/31/how-to-simulate-the-rock-cycle-with-crayons/	Range of rocks of different types and sizes, litre bottles, water, sandpaper, plastic knife, coin, range of soils, funnels with cotton wool bungs, water, jugs, jam jars with lids, resources for rock cycle using crayons

Acids, alkalis & earth science P7-8

Objective 3: To explore rocks and soils

Pupils place rocks in water to see if they float and sort accordingly Pupils make a series of observation e.g. photos over 3 or more weeks of limestone where acid has been added on a regular basis and add words or symbols to describe what has happened to photos. Pupils explore sieving different soils and comparing what is left in the sieve with what has gone through. Explore making paint from different dry soils by grinding well in pestle and mortar and then mixing with artist acrylic and use to make/ add to a display of their work on soils. Model the rock cycle using chocolate http://www.earthsciweek.org/forteachers/2011/ChocolateRockCycle_Feb_cont.html	

Points to Note:

Pupils may think bricks are rocks and that rocks are large, heavy, jagged.
They may also think rocks are made of just one substance - rock.

Pupils may not realise that stones and gravel are smaller pieces of rock or that some rocks contain crystals and are made of more than one mineral.

The rock cycle is a difficult concept, partly because of the long time scale, but pupils do need to begin to understand that rock changes.

Acids, alkalis & earth science L1-3

Objective 1: To explore acids and alkalis and their everyday uses

Descriptions of intended outcomes at different levels of attainment

- Names some common household acids (L1i)
- Records results in pre-drawn tables (L1ii)
- Responds to prompts by making simple suggestions on how to find the answer to a question under investigation (L1iii)
- Describes some simple properties of acids (L2i)
- Ranks results in order e.g. most effective antacids (L2ii)
- Draws on their observations and ideas to offer answers to the questions under investigation (L2iii)
- Considers the best way to find the answer to a question under investigation e.g. fair test, survey, open exploration, research (L3i)
- Says what they are keeping the same or changing to make a fair test (L3ii)
- Explains what their results show linking cause and effect (L3iii)

Possible Activities:	Resources:
Pupils explore and describe the appearance and smell of a range of household acids that can be safely handled, eg vinegar, fruit juices. Create an exhibition of household materials (without hazard warnings) that contain acids and pupils find the names of acids contained in them. Find out what happens when acid is added to alkali and vice versa. Pupils extract dyes from plant material or provided solutions and record simply the effect of adding household acids and alkalis to the dyes. Demonstrate the use of universal indicator to obtain a pH number and pupils test common acids, e.g. vinegar and lemon juice to observe the colour changes, to identify weak and strong acids and alkalis.	Lemon juice, acid drops, vinegar, washing powder, tap water, pickles onions, distilled water, fizzy water, bicarbonate of soda, toothpaste, soap solution, cleaning solutions, toiletries, food packaging, universal indicator, test tubes or beakers. Red cabbage, raw beetroot, blackcurrants. Pestle, mortar, or juicer, beakers, hot water, universal indicator chart. Ref CLEAPSS website for guidance on investigating indicators and alkalis.

Acids, alkalis & earth science L1-3

Objective 1: To explore acids and alkalis and their everyday uses

Optional activities you might like to try include:	Resources:
Introduce common alkalis to test and identify weak and strong alkalis. Use black currants or other red fruits to make indicators and test how good they are. Make a poster of common substances, acidic, alkaline and neutral including safety aspects. Investigate adding different metals to different household acids (vinegar). Investigate what happens when acid is added to warm milk (55°C). Try different milks and acids and compare how much 'plastic milk' is formed. Adding indigestion tablets to a model stomach full of acid (test tube). The tablets will effervesce and neutralise the acid. Ask pupils to compare different indigestion tablets to see which are most effective. Find out which acid makes the best invisible ink. Write on paper with different acids, allow them to dry and then hold near a heat source e.g. warm lamp. Make sherbet in hygienic conditions: http://www.planet-science.com/categories/experiments/chemistry-chaos/2012/05/fizzy-sherbet.aspx Vary the amounts and find out what difference it makes. Pupils could carry out a survey to find out which sherbet people prefer.	Common alkalis to test, e.g. bicarbonate, toothpaste universal indicator, test tubes, droppers, range of everyday substances to use to neutralise them, e.g. lemon juice, vinegar, bicarb, onion juice, toothpaste etc, large sheets of paper, magazines, labels off household items, blackcurrants, red fruits, beakers, hot water, sieves, metals to test e.g. magnesium, zinc, iron, copper, tin, test tubes, droppers, different types of milk, lemon juice, vinegar, beakers Ref CLEAPSS website for guidance on investigating indicators and alkalis.

Acids, alkalis & earth science L1-3

Objective 1: To explore acids and alkalis and their everyday uses

Points to Note:

Pupils may think that all colourless liquids are water.

Eye protection should be used when working with acids and alkalis.

Teachers should follow school procedures for dealing with spills and splashes.

Note new hazard symbols now available from CLEAPSS.

Acids, alkalis & earth science L1-3

Objective 2: To begin to recognise how acids can affect the environment

Descriptions of intended outcomes at different levels of attainment

- Draws on everyday experience to help answer questions (L1i)
- Uses everyday vocabulary to describe simple features of events they observe (L1ii)
- Shares own ideas and listens to the ideas of others (L1iii)
- Makes suggestions about how to find things out or how to collect data to answer a question they are investigating (L2i)
- Uses simple scientific vocabulary to describe ideas and observations (L2ii)
- Expresses personal feelings/opinion about the effects of acid rain or electric cars (L2iii)
- Using scientific language when reporting on their findings (L3i)
- Presents simple scientific data and information in more than one way (L3ii)
- Explains the purpose of scientific or technological developments e.g. electric cars, reducing the effects of acid rain (L3iii)

Possible Activities:	Resources:
Find out what can be done to reduce the production of acid rain or its effects, e.g. http://www.ypte.org.uk/environmental/acid-rain/1 Pupils test a range of different local waters, rain water and tap water for pH and begin to arrange results in order. Revisit the Water Cycle by viewing films/videos or songs: https://www.youtube.com/watch?v=PUzfMIigeyc Create an `acid rain cycle` poster warning about the negative effects. Investigate if acid rain affects plants. Pupils could generate their own questions to investigate. Record observations of plants watered with “acid rain” over 2 weeks.	range of waters, universal indicator or paper, pH meter, test tubes, droppers Seedlings in plastic pots Spray bottles pH meter/ pH paper pipettes distilled water marker pens/ labels

Acids, alkalis & earth science L1-3

Objective 2: To begin to recognise how acids can affect the environment

Optional activities you might like to try include:	Resources:
Show http://www.youtube.com/watch?v=ICQxEwpEuus and ask pupils to make a PowerPoint presentation of acid rain cycle or their own movie using Comic Life http://comiclife.com/ Research the benefits of electric cars. Invite STEM ambassadors to engage pupils in local environmental projects. Role play effects of acid rain created by gases from factories.	Internet access, speakers, IWB, computers, information on acid rain e.g. http://www.tes.co.uk/teaching-resource/Acid-Rain-activity-6259208/ , secondary resource about electric cars
Use the Upd8 activity and resources on acid rain. http://www.upd8.org.uk/activity/160/Acid-rain-Britain-recovers.html Sequence words or captions about the acid rain cycle. Give an assembly or presentation about acid rain maybe linked to being an Eco School. Show video about the damage caused by acid rain. http://www.bbc.co.uk/learningzone/clips/causes-and-impact-of-acid-rain/4418.html and then ask pupils to create an acid rain landscape where plants, animal and buildings have been affected by acid rain e.g. model, collage.	

Points to Note:

Pupils may think that plants need a lot of water.

Acids, alkalis & earth science L1-3

Objective 3: To explore rocks and soils

Descriptions of intended outcomes at different levels of attainment

- Uses everyday terms to describe simple features of rocks (L1i)
- Identifies what has changed when observing rocks and soils (L1ii)
- Makes suggestions in response to evaluation questions e.g. could we do this a different way? (L1iii)
- Sorts and group rocks based on their observations (L2i)
- Spots when a simple test is unfair (L2ii)
- Presents evidence in an ordered way (L2iii)
- Selects equipment from that provided to address question under investigation (L3i)
- Describes simply the connection between rocks and soil (L3ii)
- Suggests improvement to their working methods (L3iii)

Possible Activities:	Resources: