Physics

Why can you see your reflection in a mirror but not on the floor?

Substantive Knowledge

There must be light for us to see.
• Light comes from a source.
• We need light to see things, even shiny things.
• Light from the sun can be dangerous and that there are ways to protect their eyes
If an object is transparent light will go through it and we will be able to see through it.
• If an object is opaque, it will block the light and no light will get through.
This is what forms shadows.
• The closer to the light source an object is, the bigger the shadow will be. This is because the object blocks more of the light.
• The further away from the light source an object is, the smaller the shadow will be. This is because the object blocks less of the light.
• If an object is perfectly reflective light will bounce back off it and we will see reflections of objects.
• If the material is translucent, it will allow light through, but we won't be able to see through it.

VOCABULARY

Light Source - An object that emits light
Shiny - A smooth surface, usually very clean or polished.
Transparent - A material that allows light to pass through so objects behind can be clearly seen
Opaque - A material that is not able to be seen through
Reflective - A material that allows light rays to be bounced back off of it
Translucent - A material allowing light to pass through but not so an object can be clearly seen.

Disciplinary Knowledge

Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment.
Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
Setting up simple practical enquiries, comparative and fair tests
Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
Identifying differences, similarities or changes related to simple scientific ideas and processes

HONESTY
ENTHUSIASM
AMBITION
RESPECT
TOGETHERNESS

Chemistry

What is the earth made from?

Substantive Knowledge

• A rock is a solid material made up of minerals forming part of the surface of the Earth
• Rocks are exposed on the surface at cliffs, hills and mountains but are also under the surface.
• Some rocks, called ores contain metals
• Some rocks are made of grains squashed together and can contain the remains of long-dead organisms, called fossils. This type of rock is called sedimentary rock, an example would be limestone, sandstone or mudstone
• Some rocks are made of crystals that are locked tightly together. These are called igneous and metamorphic rocks; an example of igneous rock is granite, and an example of metamorphic rock is slate
These three types of rocks all have different properties to each other, including porosity, hardness, reaction to chemicals

The properties of the rock depend on how the rock was formed, e.g. Some igneous rocks form from lava from volcanoes and cool very quickly leading to very small crystals
Soil is made up of small broken-down pieces of rock.
• Soil contains a range of different size rock pieces, e.g., sand grains or stones.
• Soil also contains humus (rotted plant material)
• Soil made of very fine rock is called silt or clay.

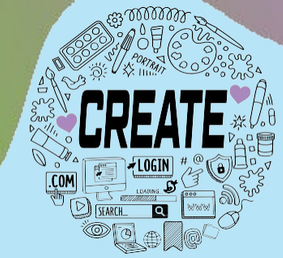
Metamorphic- Rocks formed by the heating and crushing of existing rocks
Porosity - How much empty space there is between grains or crystals
Hardness - How resistant a rock is to damage
Soil - A mixture of minerals and organic matter
Humus -Dead plant matter within soil
Silt Fine sand or clay
Material

VOCABULARY

Rock - A natural solid material made from minerals which make up the surface of the earth.
Crystal - A uniform material with a symmetrical shape
Mineral - A solid substance made up of a range of different elements, e.g. iron, oxygen, carbon.
Ore- A rock that contains a metal that can be extracted.
Grains - Small pieces of broken-down rock that is moved and placed in a new location
Fossil - The remains of animals or plants preserved in rock
Sedimentary - Rocks made of grains cemented together
Igneous - Rocks made magma or lava from volcanoes or deep underground

Disciplinary Knowledge

Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
Asking relevant questions and using different types of scientific enquiries to answer them.
Setting up simple practical enquiries, comparative and fair tests



SCIENTIST STUDY

Standing on the Shoulders of Giants - MARY ANNING

Physics

What is a magnet?

Substantive Knowledge

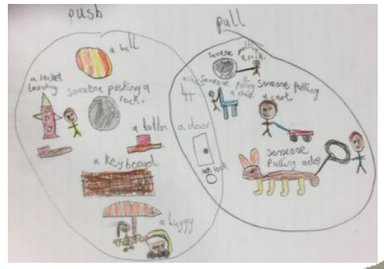
Magnets exert attractive forces on some metals
Magnetic forces work through other materials including air, so magnets don't need to be touching to exert their force. It is called a non-contact force.
Each end of a magnet is called a pole, opposite poles are called north and south.
• Magnets exert attractive forces on each other when the poles facing each other are north and south (opposites).
• Magnets exert repulsive forces on each other when the poles facing each other are the same.
The strength of magnetic forces is affected by:
• The strength of the magnet.
• The distance between the magnet and the object.
• The material the object is made from

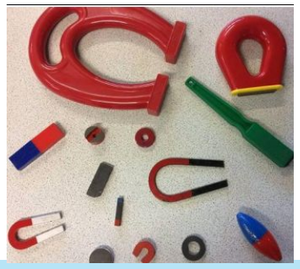
VOCABULARY

magnet - A piece of iron or other material that attracts other iron objects.
force - A push or a pull action that changes the motion of an object
attraction - The coming together of opposite poles
repulsion - The moving away of like poles
metal - A solid material that is hard and shiny, with good electrical and heat conductivity
non-contact force - A force that acts on an object without coming physically in contact with it.
Pole - The ends of a magnet. Either north or south

Disciplinary Knowledge

Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment.
Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
Setting up simple practical enquiries, comparative and fair tests
Asking relevant questions and using different types of scientific enquiries to answer them





HONESTY
ENTHUSIASM
AMBITION
RESPECT
TOGETHERNESS

Biology

How do plants make their food?

Substantive Knowledge

Plants do not eat food so have to make their own.
• This food provides then with energy, and materials to grow
• To make the food (sugar) plants need water from the ground, carbon dioxide from the air and light from the sun.
The water is taken up through the roots from the soil
The carbon dioxide is taken in through the leaves
• As well as food, plants also make oxygen which is given out back into the air through the leaves

VOCABULARY

Carbon dioxide - A colourless odourless gas found in the air (0.04%) made up of carbon and oxygen.
Oxygen - A colourless and odourless gas found in the air (21%)
Roots - An organ of a plant that provide anchorage and absorb water and nutrients from the soil
Soil - A mixture of minerals and organic matter
Leaves - An organ of a plant that are green in colour and absorb carbon dioxide from the air as well as sunlight.

DisciplinaryKnowledge

Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
Setting up simple practical enquiries, comparative and fair tests - Planning Mindmap

Making links…

HORTICULTURE CURRICULUM
NATURE JOURNALS
BOTANICAL DRAWING

Biology

How do plants reproduce?

Substantive Knowledge

Flowering plants reproduce by the process of pollination
• Pollination leads to the formation of a seed which can grow into a new plant
• Flowering plants have evolved specific parts to carry out pollination and seed growth
• Those parts are stamen where pollen is produced, stigma where pollen is collected, and the ovaries which contains the eggs that become a seed
when the pollen travels down the stigma and meets the egg
• Flowers have petals also are a range of colours, patterns, and smells to attract insects
Plants and flowers look different because they pollinate in different ways.
• There are two types of pollination Insect and wind
• Insect pollinated flowers are usually bright coloured and strong scents

Wind pollinated flowers have less colourful petals and much less scent
Plants have evolved many different ways to disperse their seeds
• Seed dispersal increases the chances of seeds germinating and growing into a mature plant
A seed contains a miniature, undeveloped version of the plant
• They contain a food store for the first stage of growth (until the plant can make its own food)
• They are surrounded with a protective coat

VOCABULARY

Pollination - The transfer of pollen from one plant to another
Seed - The small, hard part of a plant from which a new plant grows.
Stamen - The male part of the flower which contains the pollen
Stigma - The female part of the flower that receives the pollen
Ovaries - A female part of the plant where the pollen much reach to create the seed
Petals - The segments of a flower that are usually brightly coloured
Dispersal- The spreading of seeds in a variety of ways
Germination - The growth of a seed into a young plant or seedling

Disciplinary Knowledge

Making systematic and careful observations
Identifying differences, similarities or changes related to simple scientific ideas and processes
Setting up simple practical enquiries, comparative and fair tests -
Planning mindmap

MAKING LINKS …

HORTICULTURE CURRICULUM
NATURE JOURNALS
BOTANICAL DRAWING

HONESTY ENTHUSIASM AMBITION RESPECT TOGETHERNESS

Biology

Why do we have a skeleton?

Substantive Knowledge

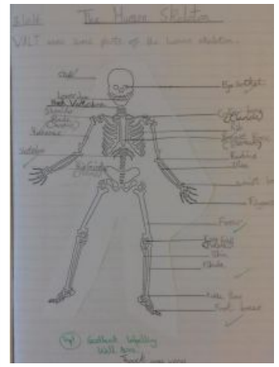
All vertebrates have internal skeletons that protect vital organs.
• Invertebrates have exoskeletons that protect vital organs.
Skeletons support the weight of land animals.
• Stronger bones can support a greater mass.
Bones are connected (but can move relative to each other) at joints.
• Muscles connect to bones and move them when they contract.
• Stronger bones can anchor stronger muscles.

VOCABULARY

Vertebrates- A group of animals that have a backbone, e.g., humans, elephants, dolphins
Invertebrates - A group of animals that do not have a backbone, e.g., Lobsters, woodlice, worms
skeleton - An internal or external framework of bone supporting/ containing the body of an animal
exoskeleton - skeleton that is visible on the outside of the body
vital organs - An organ that is essential for life
support - To hold up or bear the weight of an organism
Mass - A quantity of matter measured in kg.
muscles- A band/bundle of fibrous tissue that can contract, producing movement.
Connect - To bring together or into contact so a link is established
contract - Become shorter and Tighter in order to effect movement of part of the body

Disciplinary Knowledge

Identifying differences, similarities or changes related to simple scientific ideas and processes
Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
Using straightforward scientific evidence to answer questions or to support their findings
Setting up simple practical enquiries, comparative and fair tests - Planning Mindmap.
Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units
Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions



HONESTY ENTHUSIASM AMBITION RESPECT TOGETHERNESS