Science in Year 3

Working Scientifically

Year 3/4

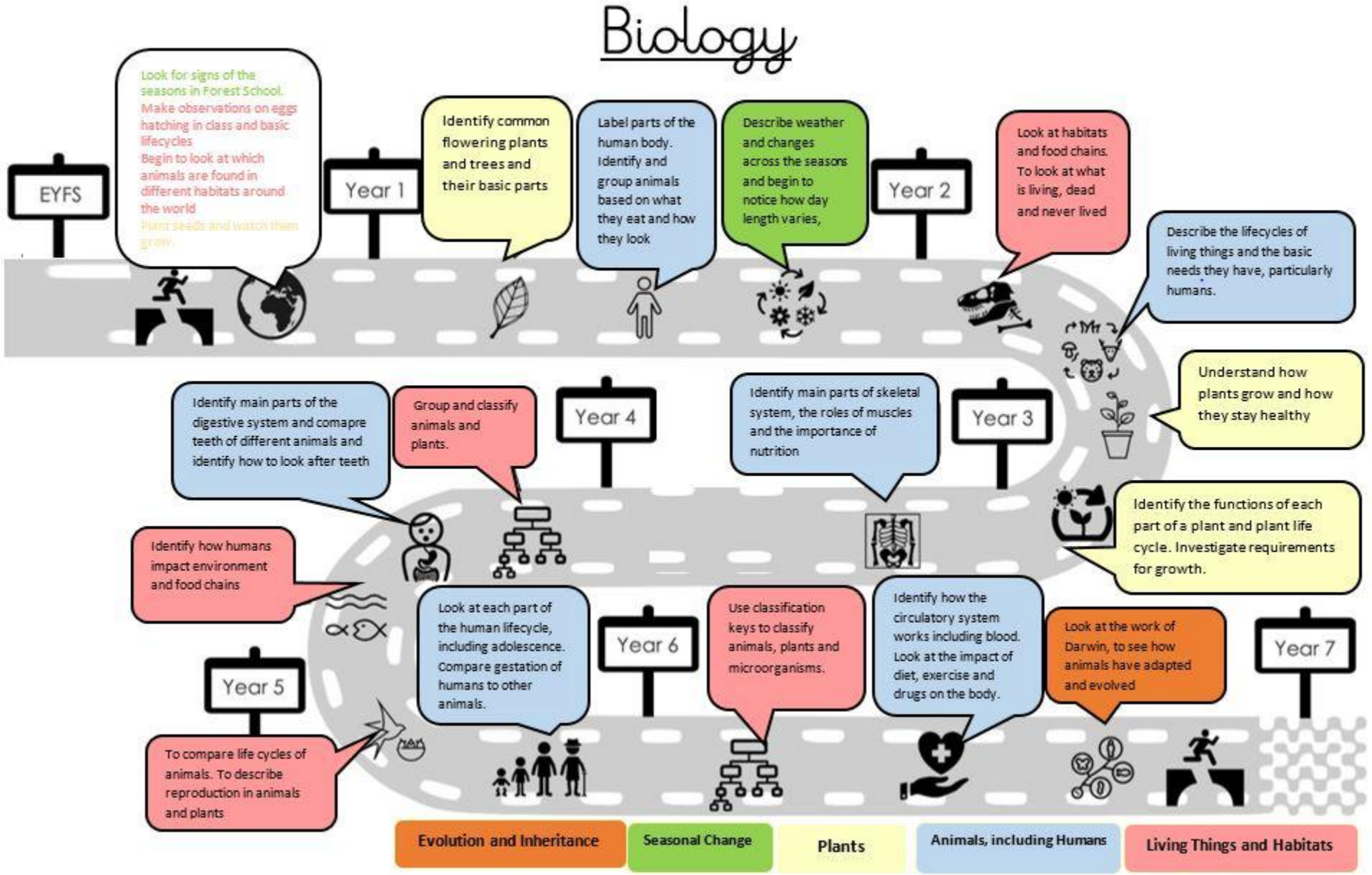
Working Scientifically Skills

Statutory requirements

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- 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
- 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
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

Biology


EYFS
Look for signs of the seasons in Forest School.
Make observations on eggs hatching in class and basic lifecycles
Begin to look at which animals are found in different habitats around the world
Plant seeds and watch them grow.
Year 1
Identify common flowering plants and trees and their basic parts
Label parts of the human body. Identify and group animals based on what they eat and how they look
Describe weather and changes across the seasons and begin to notice how day length varies,
Year 2
Look at habitats and food chains. To look at what is living, dead and never lived
Describe the lifecycles of living things and the basic needs they have, particularly humans.
Year 3
Understand how plants grow and how they stay healthy
Identify the functions of each part of a plant and plant life cycle. Investigate requirements for growth.
Identify main parts of skeletal system, the roles of muscles and the importance of nutrition
Year 4
Identify main parts of the digestive system and comapre teeth of different animals and identify how to look after teeth
Group and classify animals and plants.
Year 5
Identify how humans impact environment and food chains
To compare life cycles of animals. To describe reproduction in animals and plants
Year 6
Look at each part of the human lifecycle, including adolescence. Compare gestation of humans to other animals.
Use classification keys to classify animals, plants and microorganisms.
Identify how the circulatory system works including blood. Look at the impact of diet, exercise and drugs on the body.
Year 7
Look at the work of Darwin, to see how animals have adapted and evolved
Evolution and Inheritance
Seasonal Change
Plants
Animals, including Humans
Living Things and Habitats

Year 3	Area of NC: Animals, including humans (Biology)

Animals, including humans

Statutory requirements

Pupils should be taught to:

- identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat
- identify that humans and some other animals have skeletons and muscles for support, protection and movement.

<u>Pupils do not need to be taught the following content, which they will learn in later year groups:</u>

In Year 4 children will learn about the digestive system.

In Year 6 children will learn about the circulatory system as well as learn more complex nutritional information and the effect diet can have on the body/heart. In Y3 organs do not need to be looked at.



- I see, I think, I wonder – healthy plate of food
- PMI – What if we had no bones/skeleton?
- PMI – What id our bones were made from jelly?
- Odd one out – Pasta, pizza, fruit
- Odd one out – Giraffe, octopus and human (skeleton/no skeleton)
- Odd one out – Pasta, banana, breakfast bar.

SEE ALSO: <u>RETRIEVAL IDEAS</u>



- Explain the importance of eating healthily and the need for food to survive.
- Name the basic parts of the human body (they have not looked at the names of bones).
- Talk about the similarities and differences between some animal bodies.

TIER 3 VOCABULARY:

Cartilage, rib cage, vertebrate, invertebrate, skeletal system, tendons, ligaments, clavicle, patella, femur, tibia, fibula, radius, ulna, humerus, nutrients, vitamins, minerals, protein, carbohydrates, fibre.

SEE ALSO: https://www.stem.org.uk/primary/resources

Learning Objective	**Objective Broken Down into Differentiation**		
	Below	***Expected***	***Above***
Identify main parts of the skeletal system	Pupil, with support, can identify, name, and label the basic bones in the human skeleton	Pupil can independently name the main bones in the human skeleton	Pupil can name a large number of bones in the human body and knows how many bones there are in the human body
Identify the role of muscles in our body	Pupil understands that muscles help the movement of bones	Pupil recognises how bones are joined to and move in the skeleton of animals and humans, explaining the effect of and how muscles work	Pupil can describe the 3 types of muscle and identify their different functions e.g. role in lifting, running, sitting.
Explain why humans and other animals have skeletons and muscles	Pupil can recognise some function of the skeleton and muscles	Pupil can accurately describe the functions of the skeleton and muscles giving examples of which parts support, help them move or provide protection.	Pupil can explain the functions of the skeleton, muscle and joints in animals and humans and can begin to provide disadvantages that not having a skeleton would bring for the animal
Identify the different food groups and explain that animals, including humans, get nutrients from food.	Pupil understands that animals cannot make their own food and get nutrition from the food they eat Pupil can name some foods and the food groups they belong to	Pupil can explain that animals get nutrition from the food they eat and different foods give different nutrients and amounts of energy Pupil can name the nutrients found in food and the function of each food group	Can classify food into those that are high or low in particular nutrients. Can answer their questions about nutrients in food based on their gathered evidence.

Explain the importance of a nutritionally balanced diet	Pupil can describe some consequences of a poor or limited diet	Pupil can describe the dangers of poor and limited diets on the body, health and fitness of humans and can explain that to be healthy we need to eat the right types of food to give us the correct amount of these nutrients.	Pupil understands the effect of nutrition on the development of bones and muscles Pupil can discuss that a balanced diet for a human is different to other animals or for women, men and children and compare the differences/similarities

Year 3	Area of NC: Plants (Biology)

Plants

Statutory requirements

Pupils should be taught to:

- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
- investigate the way in which water is transported within plants
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

<u>Pupils do not need to be taught the following content, which they will learn in later year groups:</u>

They do not need to classify plants into different groups or use classification keys to identify them as this will be done in Y4 and Y6.

In year 5 they will learn about the reproduction of plants.



- Big Question - If a tree starts life as a tiny shoot, where does the enormous trunk come from?
- PMI – What if plants can walk?
- PMI – What If plants could survive without water?
- Odd one out – Root, Stem, Flower
- Picture of a dying plant – What do you think, know and wonder?

- Odd one out - butterfly, a ladybird and a spider (pollinating animals)

SEE ALSO: RETRIEVAL IDEAS



- Name the basic parts of plants and tress (but not functions).
- Name some wild and common plants and understand the difference between evergreen and deciduous trees.
- Explain the difference between seeds and bulbs. Name the basic needs of plants and explain how they grow at different rates.

TIER 3 VOCABULARY:

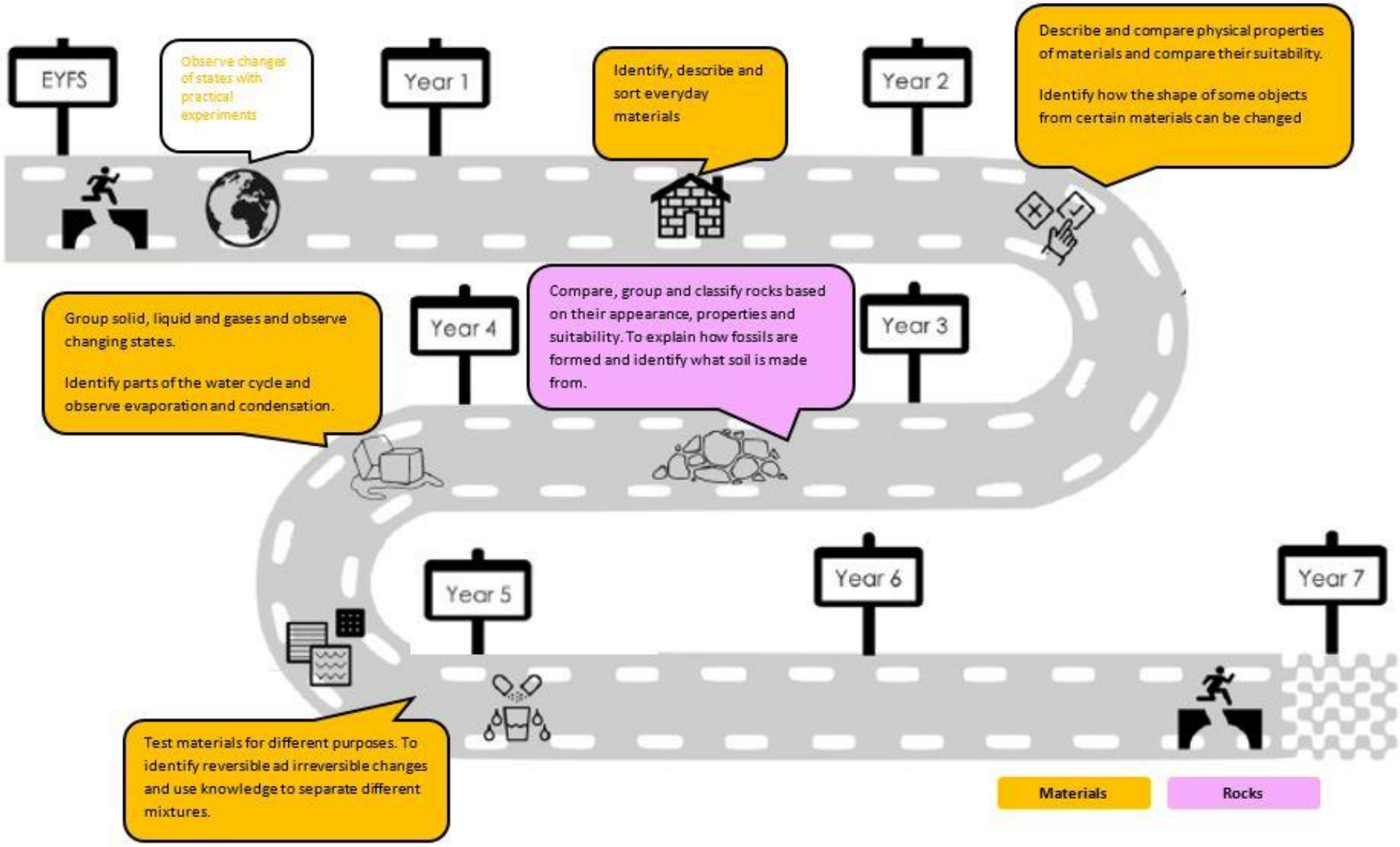
Nectar, anther, ovary, ovule, pollen, stigma, style, stamen, pollination, fertilisation, seed dispersal, germination, botanist.

SEE ALSO: https://www.stem.org.uk/primary/resources

Learning Objective	**Objective Broken Down into Differentiation**		
	Below	***Expected***	***Above***
Identify and describes the functions of different parts of flowering plants (roots, stem/trunk, leaves and flowers) **Forest school**	Pupil can identify each part of the flowering plant and recognise some functions	Pupil can identify and describe each function of a flowering plant	Pupils can describe the impact upon a plant if a part fails to function

Identify the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant	Pupil can name and describe some of the requirements of a plant for life and growth	Pupil can name and describe all the requirements of a plant for life and growth, understanding that it can vary from plant to plant	Pupils can describe, for a range of plants, that they need different requirements for life and growth and the impact if some requirements are missing.
Explain the way in which water is transported within plants.	Pupil recognises that plants need water to grow and be healthy as well as naming the root as the part of the plant through which water enters the plant	Pupil can explain how water is transported around the plant	Pupil uses correct vocabulary and reference a practical enquiry to explain the transportation of water around a plant to keep it healthy
Explain the life cycle of a flowering plant, (including seed formation/germination, pollination and seed dispersal).	Pupil knows that flowers are important in pollination and seed dispersal	Pupil can describe the life cycle of flowering plants, including pollination, seed formation, seed dispersal and germination. Pupil can give different methods of pollination and seed dispersal, including examples.	Pupil can suggest external factors which can limit the processes of pollination, fertilisation and seed dispersal, and how this could affect plants

Chemistry


EYFS
Observe changes of states with practical experiments
Year 1
Identify, describe and sort everyday materials
Year 2
Describe and compare physical properties of materials and compare their suitability.
Identify how the shape of some objects from certain materials can be changed
Group solid, liquid and gases and observe changing states.
Identify parts of the water cycle and observe evaporation and condensation.
Year 4
Compare, group and classify rocks based on their appearance, properties and suitability. To explain how fossils are formed and identify what soil is made from.
Year 3
Year 5
Year 6
Year 7
Test materials for different purposes. To identify reversible ad irreversible changes and use knowledge to separate different mixtures.
Materials
Rocks

Year 3	Area of NC: Rocks and Soils (Chemistry)

Rocks

Statutory requirements

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.

Pupils do not need to be taught the following content, which they will learn in later year groups:

In Y6 children will look in more detail at what fossils tell us about the Earth and the living things that inhabited it millions of years ago.



- Odd one out – gravestone, wooden bridge, stone bridge.
- PMI – three little pigs houses.
- Which rock would be the best for a skate ramp?
- Why don't all rocks look the same?
- Discuss – a rocky beach is better than a sandy beach?
- Discuss – all rocks are heavy.
- PMI – There are no rocks in the world.

SEE ALSO: RETRIEVAL IDEAS



- Can you think of any things that are made from rock?
- Are all rocks the same? Why do you think that?
- What is soil?
- Where can we find soil?
- What do you think soil is made of?
- Why do plants need soil?

TIER 3 VOCABULARY

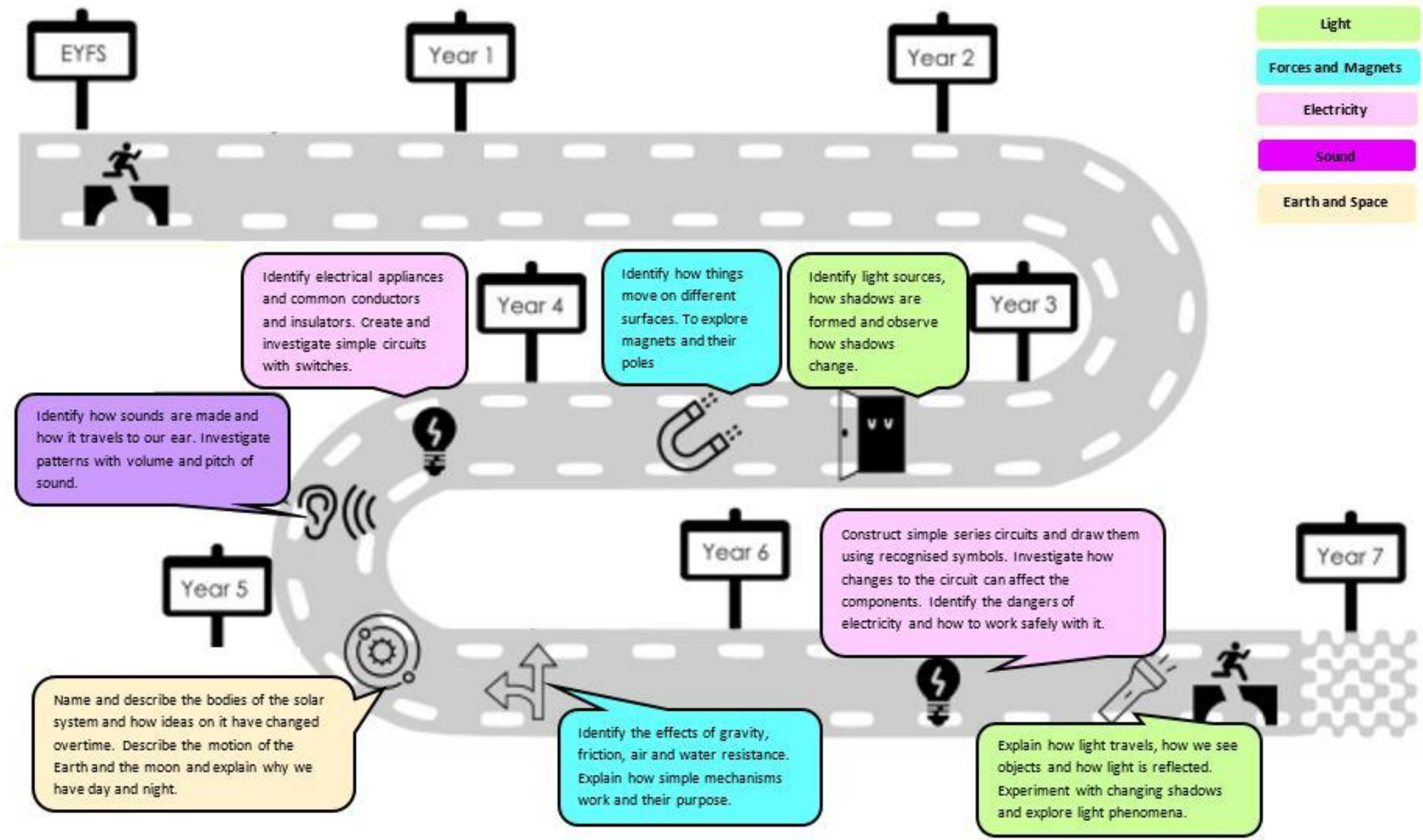
Igneous, sedimentary, metamorphic, palaeontologist, fossil, weathering, erosion, permeable, impermeable, porous, organic matter, topsoil, subsoil, peat.

SEE ALSO: https://www.stem.org.uk/primary/resources

Learning Objective	**Objective Broken Down into Differentiation**		
	Below	***Expected***	***Above***
Compare and group together different types of rocks based on their appearance and simple physical properties	Pupil can name some types of rock and give physical features of them	Pupil can group rocks in a variety of different ways based on their appearance and physical properties. They can use appropriate vocabulary with accurate reasoning relating to colour, hardness, grain or crystal composition	Can devise tests to explore the properties of rocks and use data to rank the rocks

Describe how different rocks are useful and suitable for different purposes **Forest school**	Pupil, with support, can explain why they think one rock may be more suitable than another for a given purpose	Pupil can give sensible reasons, based on their physical properties and appearance, as to whether a rock will be suitable for a given purpose. Children should use accurate vocabulary.	Can link rocks changing over time with their properties and provides accurate reasoning as to whether a certain rock would be suitable for a given purpose. Pupil should be able to devise their own tests to see if the rock would be suitable.
Explain how fossils are formed	Pupils, with support, can order the steps in which fossils are formed. Pupil understands fossils are impressions of animals or plants that lived in the past	Can explain how a fossil is formed step by step	Can present in different ways their understanding of how fossils are formed e.g. in role play, comic strip, chronological report, stop-go animation etc.
Identify that soils are made from rocks and other organic matter **Forest school**	Can identify plant/animal matter and rocks in samples of soil	Can explain that soils are made from rocks and also contain living/dead matter (organic/non-organic), can use a diagram to show their understanding.	Can devise tests to explore different soils

Physics


EYFS
Year 1
Year 2
Year 3
Year 4
Year 5
Year 6
Year 7
Light
Forces and Magnets
Electricity
Sound
Earth and Space
Identify electrical appliances and common conductors and insulators. Create and investigate simple circuits with switches.
Identify how things move on different surfaces. To explore magnets and their poles
Identify light sources, how shadows are formed and observe how shadows change.
Identify how sounds are made and how it travels to our ear. Investigate patterns with volume and pitch of sound.
Construct simple series circuits and draw them using recognised symbols. Investigate how changes to the circuit can affect the components. Identify the dangers of electricity and how to work safely with it.
Name and describe the bodies of the solar system and how ideas on it have changed overtime. Describe the motion of the Earth and the moon and explain why we have day and night.
Identify the effects of gravity, friction, air and water resistance. Explain how simple mechanisms work and their purpose.
Explain how light travels, how we see objects and how light is reflected. Experiment with changing shadows and explore light phenomena.

Year 3	Area of NC: Forces and Magnets (Physics)

Forces and magnets

Statutory requirements

Pupils should be taught to:

- 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.

<u>Pupils do not need to be taught the following content, which they will learn in later year groups</u>:

In Y5 children will learn about gravity, air resistance and water resistance as well as the effects of gears, levers and pulleys.



- Odd one out - iron filings, sawdust, pile of coins
- PMI – What if there was a world without friction?
- PMI – What if used bricks made from magnets to build things?

SEE ALSO: RETRIEVAL IDEAS



This is the first time children are learning about forces. During their materials units in Y1 and Y2 magnetic materials may have been mentioned as a property.

TIER 3 VOCABULARY:

Magnetic, non-magnetic, magnetic pole, friction, attraction, repulsion, magnetic force, contact force, non-contact force, magnetism.

SEE ALSO: https://www.stem.org.uk/primary/resources

Learning Objective	**Objective Broken Down into Differentiation**		
	Below	***Expected***	***Above***
Compare how things move on different surfaces	Pupil recognises that objects need greater/less force to move over different types of surface	Pupil can use scientific vocabulary to describe how objects move on different surfaces and give reasons as to why objects may require more or less force to move over different surfaces	Pupil can use their results to make predictions for further tests e.g. it will spin for longer on this surface than that, but not as long as it spun on that surface.
Identify how force makes different things move	Pupil recognises that objects need a force applying to move them (push or pull)	Pupil knows that for an object to move a larger force is applied to overcome the stationary force holding it in place	`Pupil can independently link that when a force is applied it will not always act the same if the object is on a different surface

Observe how magnets behave with different magnetic/non-magnetic materials	Pupil is beginning to recognise that some materials are magnetic and others non-magnetic	Pupil can independently compare and groups a wide variety of everyday materials on the basis of whether they are magnetic or not`	Pupil can use classification evidence to identify that some metals but not all are magnetic
Describe magnets as having two poles	Pupil describes magnets as having two poles (N & S).	Pupil can explain that a magnet has different poles which can repel or attract each other depending on which poles are facing.	Pupils consistently, independently and accurately use scientific vocabulary to explain how magnets repel and attract in relation to the north and south poles. Their explanations will include arrowed diagrams. Pupil can identify the poles as the strongest part of the magnet.
Make reasoned predictions about the behaviour of magnets	With support, a pupil can predict whether two magnets will repel or attract	Pupil can look at a marked diagram of magnets and predict whether the magnets will repel or attract	Pupil can use their knowledge of poles and how they act to name unmarked poles on a magnet.
Identify and investigate ways magnets can be used and are useful in everyday life	With support, pupil can give examples of magnets in their local environment	Pupil can explain some possible everyday uses for magnets	Pupil can devise investigations which will have an everyday use to show the properties of a magnet

Year 3	Area of NC: Light (Physics)

Light

Statutory requirements

Pupils should be taught to:

- 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.

<u>Pupils do not need to be taught the following content, which they will learn in later year groups:</u>

In Y6 children will learn more about light travelling in straight lines and how we can see things.

More complex areas of light like refraction and the visible spectrum will also be looked at in Y6 as well as more investigation on shadows and how they can be altered.



- PMI – What if we didn't have mirrors?
- Odd one out – sources of light (sun, lantern, candle)
- Odd one out – diamond, coin, disco ball (reflecting light)
- PMI – What if all animals could see in the fark?
- What can you see when there is absolutely no light?
- Would you prefer a world in darkness or a world always in light? Explain your answer.

SEE ALSO: RETRIEVAL IDEAS



This is the first time children will be learning about light although daylight and darkness at night time will have been discussed in Y1 when looking at the length of day during seasonal change.

- Explain the meaning of/give examples of materials that are: transparent, translucent and opaque.

TIER 3 VOCABULARY:

Luminous, non-luminous, reflection, opaque, translucent, transparent, UV light, incident ray, photons, beam, shadow, visible.

SEE ALSO: https://www.stem.org.uk/primary/resources

Learning Objective	Objective Broken Down into Differentiation		
	Below	***Expected***	***Above***
Recognise what light and dark is and how it impacts what we see	Can define darkness and knows we cannot see without light.	Can describe how we see objects in light and can describe dark as the absence of light. Therefore, can clearly explain that objects are not visible in complete darkness.	Can describe patterns in visibility of different objects in different lighting conditions and predict which will b more or less visible as conditions change.
Identify light sources	Can identify a range of light sources.	Can identify whether a light source is natural or man-made	Can understand that difference between luminous an non-luminous light sources
Identify and observe reflective surfaces	With support, can explain what reflection is	Can identify reflective surfaces	Can explain the properties of materials that reflect light well Can select the most reflective material for a purpose.
Explain how the Sun can be dangerous and ways we can protect our eyes.	Can state that it is dangerous to view the sun directly	Can state that it is dangerous to view the sun directly and state precautions we can take day to day.	Can explain about UV light and its dangers and describe broader ways to protect our eyes from the sun for example in eclipses.
Explain how shadows are formed **Carry out an investigation to find patterns in the way the size of shadows change** **Forest school**	Can explain the difference in translucent, opaque and transparent. Can describe how shadows are formed by opaque objects blocking light. With support, can carry out an investigation into the size of shadows	Can describe and demonstrate how shadows are formed by blocking light. Can plan and set up an investigation about the way shadows change size.	Can describe patterns in how shadows vary in size, explaining with accurate scientific vocabulary.