Science in Year 4

Working Scientifically

Year 3/4

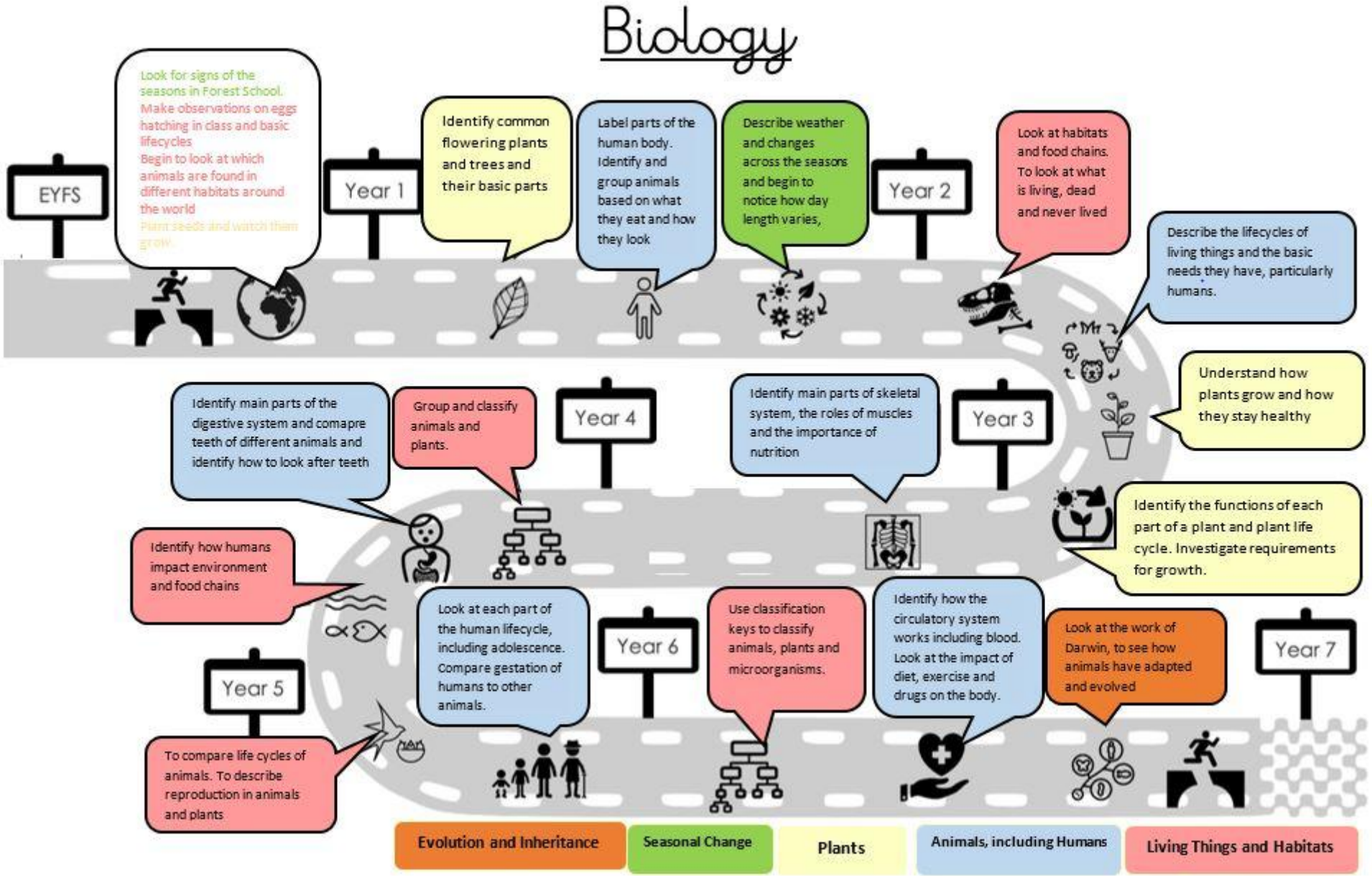
Working Scientifically Skills

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.
Identify how humans impact environment and food chains
Year 5
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 4	Area of NC: Living Things and their Habitats (Biology)

Living things and their habitats

Statutory requirements

Pupils should be taught to:

- 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.

<u>Pupils do not need to be taught the following content, which they will learn in later year groups:</u>
Children do not need to look at plant or animal lifecycles which will be looked at in Y5.
Also, they do not need to look at all the specific plant groups when classifying or complex classification systems, as this will be done in Y6 along with specific reasoning for classifying.



- Odd one out – Rabbit, giraffe, frog…etc.
- Odd one out – animals in the correct/incorrect habitat.
- PMI – What if we ate insects?
- PMI – What if humans were banned from all rainforests?

SEE ALSO: RETRIEVAL IDEAS



- Look at some animals and say what they eat.
- Identify the habitats of common animals.
- Discuss how different animals are suited to different habitats.
- Create a simple food chain.

TIER 3 VOCABULARY:

Kingdom, classification key, species, fungi, bacteria, ecosystem, vertebrate, invertebrate, producer, consumer, predator, prey. food chain, conservation, deforestation.

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

Learning Objective	Objective Broken Down into Differentiation		
	Below	***Expected***	***Above***
Identify that animals can be grouped in a variety of different ways (including by their actual groups mammals, fish, amphibians, birds and reptiles, vertebrates and invertebrate, their habitats and what they eat)	Pupil can sort animals based on the animal groups, explaining differences with support	Pupil can name the main animal groups independently, and sort animals based on them using correct scientific vocabulary	Pupil can independently group and sort animals based on a wide variety of criteria
Explore and use classification keys to identify and group animals (primarily in the local environment) Forest school	Pupil can use a simple key to identify animals	Pupil can use and create simple keys to identify animals in their local environment	Pupil can use and keys for a range of audiences to identify animals in their local and wider environment

Identify that plants can be grouped in different ways (e.g. flowering and non-flowering, in the local environment or wider environment, by colour, can it be eaten etc) **Forest school**	Pupils can sort plants based on basic differences with support	Pupil can sort plants in the local environment based on similarities and differences	Pupil can independently group and sort plants based on a wide variety of criteria
Explore and use classification keys to identify and group plants (primarily in the local environment) **Forest school**	Pupil can use a simple key to identify plants	Pupil can use and create simple keys to identify plants in their local environment	Pupil can use and keys for a range of audiences to identify plants in their local and wider environment
Identify how human action can change environments and impact living things (positive and negative)	With support, a pupil can identify some ways environments change over time and the effects on living things	Pupil is aware that man's actions can have an impact upon the lives of other living creatures at a local and global scale Pupil can suggest some ways to address and/or reverse environmental change	Pupil can research long-term effects on living things and environments due to human impact. Pupils can link this knowledge with work on food chains and how ecosystems may possibly be impacted.

Year 4	**Area of NC: Animals, including Humans (Biology)**

Animals, including humans

Statutory requirements

Pupils should be taught to:

- 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.

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 the functions of all internal organs.



- Why do all animals not have the same teeth?
- PMI – What if toothbrushes didn't exist?
- PMI – What if humans had teeth like a snake?
- Odd one out – tooth, intestines, heart

SEE ALSO: RETRIEVAL IDEAS

- Retrieval vocab: absorption, component, dissolving, energy, nutrients, consumption, hygiene, herbivore, carnivore, organ



- Explain what a herbivore, carnivore, omnivore is.
- Explain what hygiene is and why it is important for animals and humans.
- Name some ways to stay hygienic (incl teeth).
- Explain why is a balanced diet so important?
- Explain what makes a diet balanced?
- Name a variety of foods.
- Explain how humans and animals get their nutrition.

TIER 3 VOCABULARY:

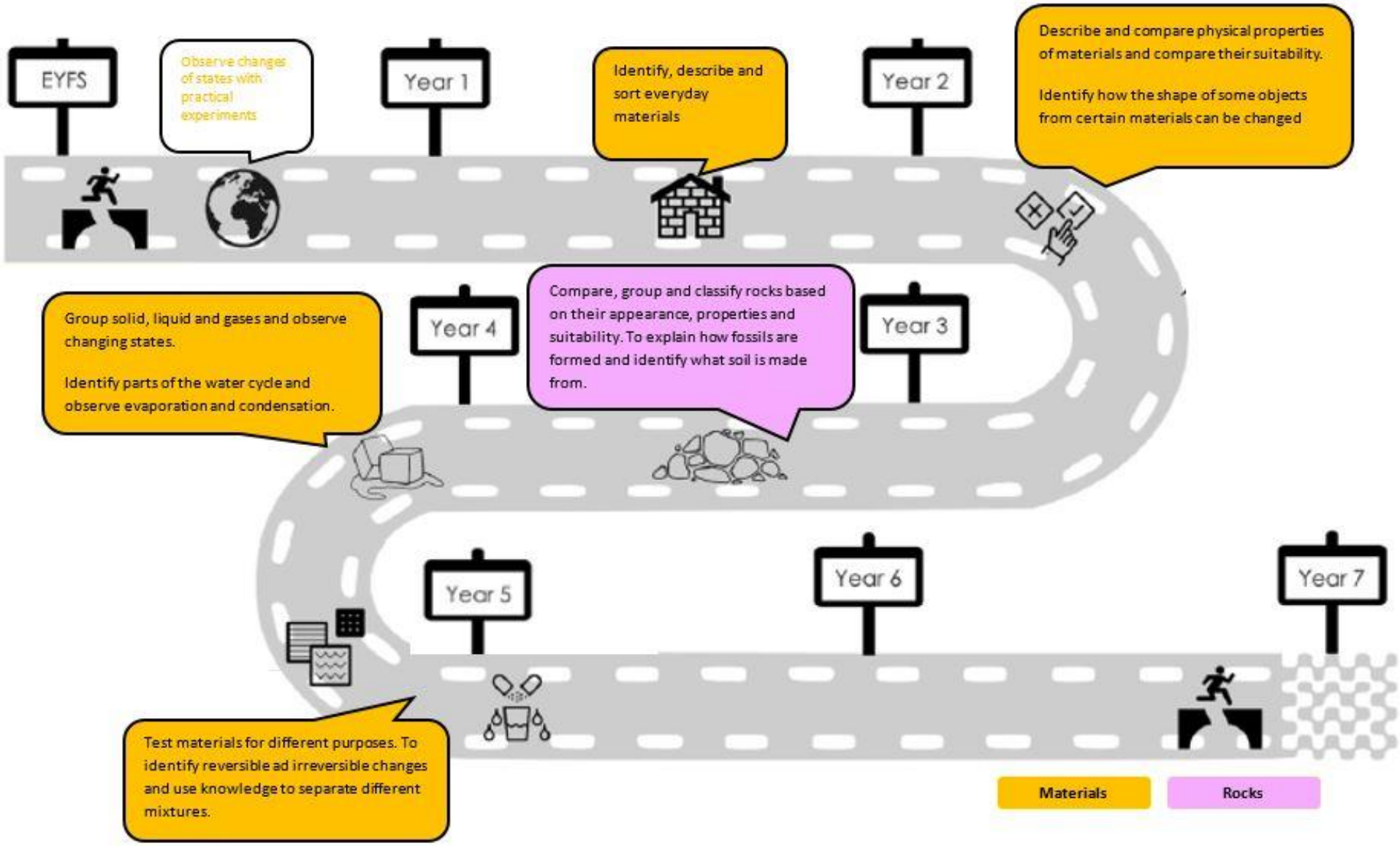
Digestion, digestive system, oesophagus, stomach, small intestine, large intestine, rectum, anus, peristalsis, saliva, bile, enzymes, incisors, canines, molars, tooth decay, plaque, enamel, nutrients.

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

Learning Objective	**Objective Broken Down into Differentiation**		
	Below	***Expected***	***Above***
Identify the main parts of the digestive system in humans and their functions	Pupil can name some parts of the digestive system	Pupil can label the main parts of the digestive system and describe the function of each part	Can use accurate scientific vocabulary when labelling and explaining each part and function
Describe and explain the simple process of digestion (mouth, tongue, teeth,	Can describe what happens in each part of the digestive system.	Can use diagrams, creative writing or a model to describe the journey of food through the body explaining what happens in each part.	Pupil can suggest some problems which may occur if one part of the digestive system is not working as it should

oesophagus, stomach, small and large intestine)			
Identify the different types of teeth in humans and their functions	Pupil understands that there are different types of teeth and recognises some of their functions	Can point to the three different types of teeth in their mouth and talk about their shape and what they are used for.	Can record the teeth in their mouth (make a dental record) and explain the role of different teeth.
Identify what damages teeth and how to look after them	Pupil recognises the importance of good oral hygiene to prevent tooth decay	Pupil can explain how tooth decay occurs and ways to prevent decay	Pupil can design an investigation to replicate the conditions leading to tooth decay and use this to suggest prevention strategies
Construct and interpret food chains for different habitats (producer, consumer, predator, prey)	Pupil can identify the producer, predator and prey using simple pictures.	Pupils can construct a simple food chain and be able to name a wider variety of producers, predators and prey.	Pupils can give reasons for why certain animals are more likely to be predator or prey (linking to previous knowledge on teeth/change in environments and human impact) and be clear on energy transfer.

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
Year 3
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 4
Group solid, liquid and gases and observe changing states.
Identify parts of the water cycle and observe evaporation and condensation.
Year 5
Test materials for different purposes. To identify reversible ad irreversible changes and use knowledge to separate different mixtures.
Year 6
Year 7
Materials
Rocks

Year 4	Area of NC: States of Matter (Chemistry)

States of matter

Statutory requirements

Pupils should be taught to:

- 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.

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

In Y4 children will learn about irreversible changes/chemical changes, in Y4 it should only be reversible.

In Y5 children will also look at separating mixtures.



- PMI – What if the sea was like ketchup?
- What would life be like without solids?
- What if chairs were made of chocolate?
- Can you have a chocolate teapot?
- What if water couldn't freeze?
- Odd one out - Chocolate, a stone and water
- PMI - The freezing point of water becomes 10°C
- Where does a puddle go?
- PMI – What if chairs were made from chocolate?
- What do you notice



SEE ALSO: RETRIEVAL IDEAS



- Identify the basic properties of rubber, glass, brick, fabric…etc.
- Explain how to change the shape of an object (twist, squeeze…etc).
- Explain how magnets work.
- Identify magnetic materials and how these might be useful/ not useful.

TIER 3 VOCABULARY:

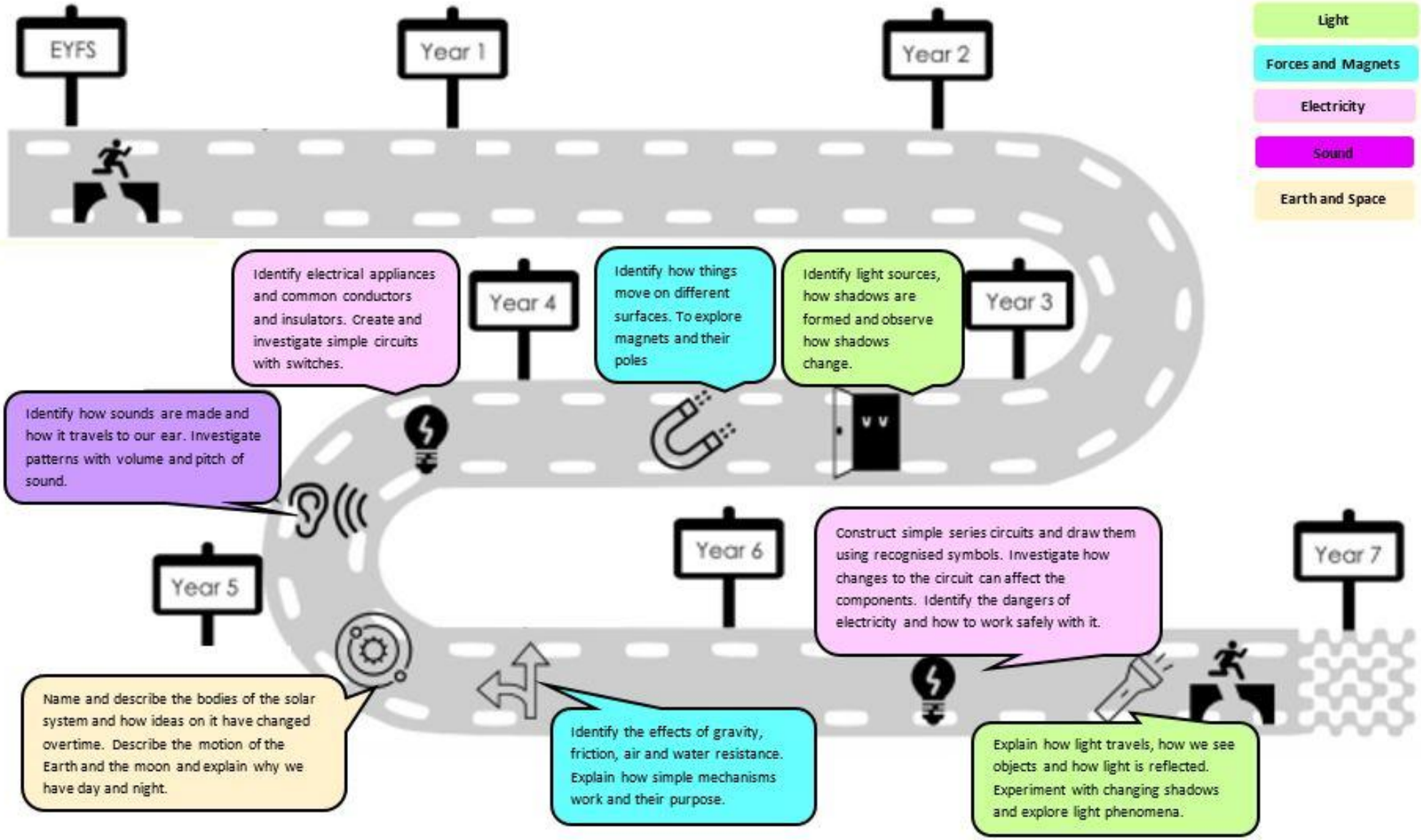
Condensation, evaporation, reversible, melting point, boiling point, solid, liquid, gas, thermometer, water cycle, precipitation, transpiration, water vapour, state change, particles.

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

Learning Objective	**Objective Broken Down into Differentiation**		
	Below	***Expected***	***Above***

Compare and group materials together, according to whether they are solid, liquid or gas	Pupil can identify solids, liquids and gases	Pupil can define and group a range of materials as solids, liquids and gases based on their properties. .	Can give reasons to justify why something is a solid, liquid or gas and can discuss how some materials may show properties of more than one.
Observe materials changing state and describe the changes when they are heated or cooled	Pupils are beginning to understand that matter can change state Pupils recognise that water can exist in 3 states – ice (solid); liquid water and water vapour	Pupil can explain that materials can change their state and that this is affected by temperature	Can give everyday examples of melting and freezing. Pupil can explain the different temperatures at which water changes state and can suggest how this could be investigated/measured
Measure or research the temperature at which changes in state happen	Can measure temperatures using a thermometer.	Can give examples of things that melt/freeze and how their melting points vary.	Pupils explore the temperatures at which a range of materials change state and compare / group then
Explore and observe evaporation and condensation	Pupil can see that evaporation and condensation is happening around them and offer examples Pupil can describe that the rate of evaporation seen	Pupil can describe the process of evaporation and condensation giving examples from the environment around them Pupil can associate the rate of evaporation with temperature.	Pupil can explain factors, such as wind, temperature, surface of materials which may be perceived to affect the rate of evaporation and/or condensation
Identify the parts condensation and evaporation play in the water cycle	Can describe the water cycle, with support.	Pupil can describe how evaporation and condensation occur within the water cycle	Pupil can give detailed account of the Water Cycle noting clearly the changes of state which occur

Physics


Light
Forces and Magnets
Electricity
Sound
Earth and Space
EYFS
Year 1
Year 2
Year 3
Year 4
Year 5
Year 6
Year 7
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 4	Area of NC: Electricity (Physics)

Electricity

Statutory requirements

Pupils should be taught to:

- 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.

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

In Y6 children will use symbols to represent a circuit in a diagram, this does not need to occur in Y4.

In Y6, children will learn about how voltage can affect components and can discuss how to change volume, brightness speed of components in a circuit.



- Odd one out – torch, lamp, fridge
- PMI – What if all transport was electric?
- PMI - A world without electricity
- Odd one out - A battery, a light bulb and a motor

SEE ALSO: RETRIEVAL IDEAS



- This is the first time children will be learning about electricity in science.
- Identify some light sources in their everyday life.

TIER 3 VOCABULARY:

Circuit, component, appliance, charge, electron, battery, cell, bulb, buzzer, switch, current, static electricity, voltage, conductor, insulator, terminal.

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

Learning Objective	Objective Broken Down into Differentiation		
	Below	***Expected***	***Above***
Identify common appliances that run on electricity	Pupil understands that appliances need electricity to operate and name some common appliances.	Pupil can identify appliances which run on electricity – specifying if this is mains or battery and offering simple reasons for the difference	Pupil can identify common appliances that may use both mains and battery e.g. a mobile phone, laptop etc.
Construct a simple electrical circuit, identifying and naming its basic parts	Pupil can build a simple circuit using a battery, wire and one component.	Can make electrical circuits using multiple components – including cells, wires, bulbs, and buzzers. Can name the components in a circuit.	Pupil draws simple diagrams (pictorial representation/**not recognised symbols**) to show the sequence of components in the circuit. Can begin to compare and give reasons or variations in how components function, including the brightness of bulbs and the loudness of buzzers

Predict and identify whether or not a lamp will light in simple circuit	Pupil understands that a circuit must be complete for a lamp to light	Can identify why lamps will or will not light in a simple circuit	Can identify why lamps are not lighting in a simple circuit and can adapt them so that they work and also talks about them in terms of open and closed circuits.
Identify some common conductors and insulators	Pupil can define what an electrical conductor and insulator is	Can name some metals that are conductors and associate metals with being good conductors Can name some materials that are insulators.	Pupil can devise investigations to classify materials as electrical conductors or insulators.
Recognise that a switch opens and closes a circuit	Pupil understands that a circuit must be closed for components to work and can explain a switch stops this	Can incorporate a switch into a circuit to turn a lamp on and off explain how it works.	Can connect a range of different switches or make switches Can give reasons for choice of materials for making different parts of a switch Can describe how their switch works
Explain the importance of electrical safety	Pupil knows that electricity is dangerous and can give one way it can be dangerous	Pupil understands that electricity is dangerous and how to keep safe when using electricity.	Pupil can identify a number of ways electricity is dangerous and a variety of ways we can keep ourselves safe.

Year 4	Area of NC: Sound (Physics)

Sound

Statutory requirements

Pupils should be taught to:

- 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.

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

Children will look at sound in KS3 (they will then look at sound waves and frequencies of sound).



- PMI – What if humans had hearing like a bat
- Odd one out - A guitar, a piano and a drum
- PMI - What if all sounds were the same

SEE ALSO: RETRIEVAL IDEAS



This is the first time children are learning about sound in science. In music lessons, children may have become aware of vocabulary such as pitch prior to this.

- What is the quietest sound you can think of? What about the loudest?
- If you close your eyes right now, what are three different things you can hear? **How do you know what they are without looking?**
- How do you think our lives would be different if everything was completely silent?
- Can you make a sound using only an everyday object nearby (like a desk, a zipper, or a ruler)? **How did you make it happen**

TIER 3 VOCABULARY:

Vibration, frequency, volume, pitch, medium, vacuum, percussion instrument, string instrument, wind instrument, sound source, longitudinal wave, transverse wave.

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

Learning Objective	**Objective Broken Down into Differentiation**		
	Below	***Expected***	***Above***
Identify and compare sounds and how they are made	Can identify and describe sound sources around school	Can name sound sources and state that sounds are produced by the vibration of the object.	To compare different sounds associating the similarities and differences with the vibrations.

Explain what happens to sound as it travels to our ear.	Pupil can explain that sound travels by vibrations through a medium.	Can state that sounds travel through different mediums such as air, water and metal.	Pupil can describe how a sound comes from a vibration travelling through a medium e.g. air to the ear, which transmits it to the brain
Find patterns in the volume of a sound and the strength of vibrations that produced it	Pupil understands that sound can vary in volume Pupil understands that some materials can insulate sounds	Can give examples of how to change the volume of a sound e.g. increase the size of vibrations by hitting or blowing harder. Pupil can suggest simple ways to create sound insulators to protect the ear from loud sounds.	Pupil explains how they could investigate the types of sound made by different types of sources to demonstrate volume getting louder or quieter Pupil can describe how materials can be sound insulators and create models to demonstrate their effectiveness.
Recognise a relationship between volume and distance from the sound source	Can identify how sounds change over distance.	Can give examples to demonstrate that sounds get fainter as the distance from the sound source increases.	Pupil can suggest how sounds can be amplified when the distance from the source increases – eg string telephones
Find patterns in the pitch of a sound and the features of an object that produce it	Pupil understands that sound can vary in pitch - high and low sounds.	Can give examples to demonstrate how the pitch of a sound is linked to the features of the object that produced it.	Pupil explains how they could investigate the types of sound made by different types of sources to demonstrate pitch variance.