

Science in Year 3

Working Scientifically

Year 3/4

Working Scientifically Skills

Statutory requirements

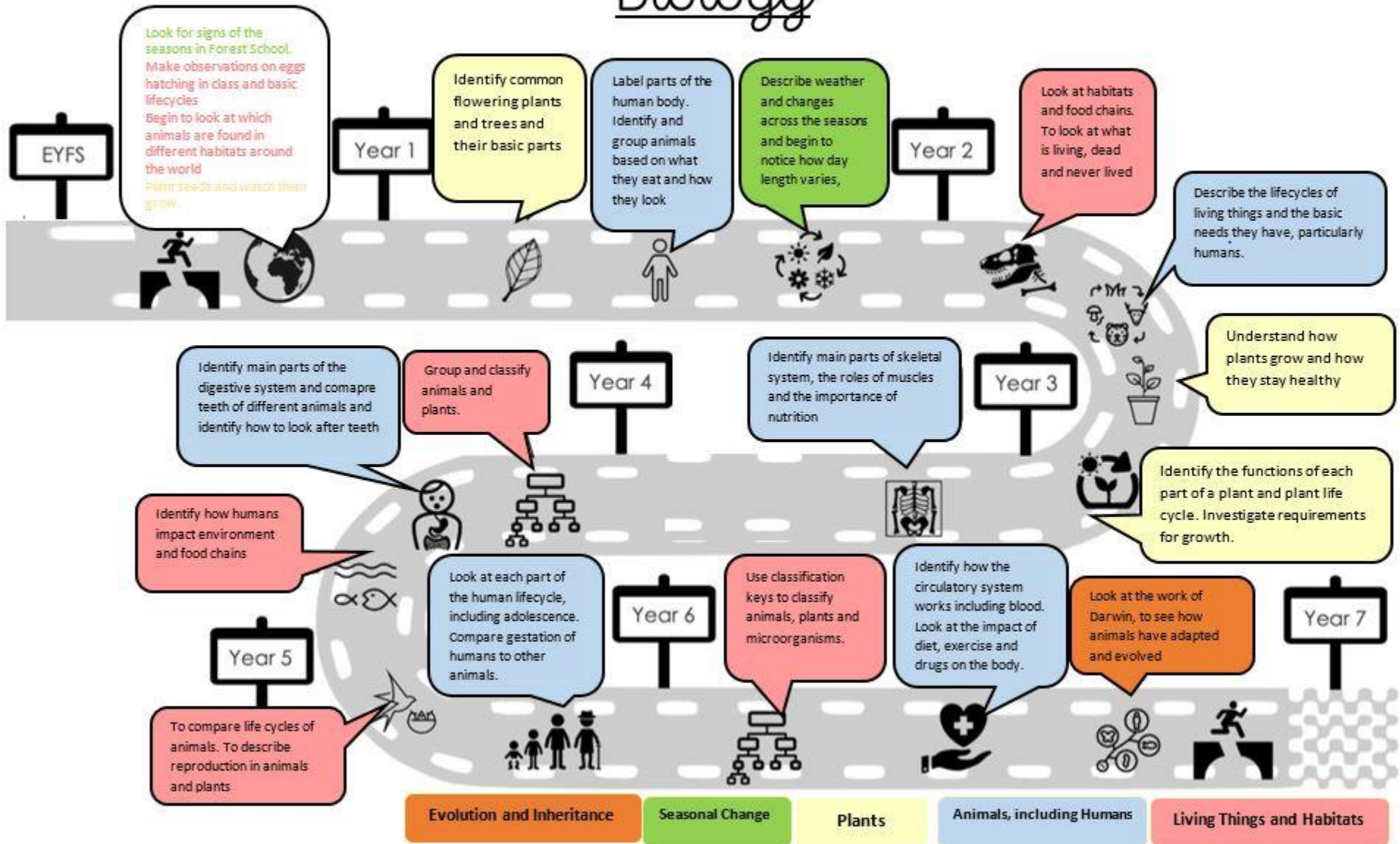
During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- 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.

New vocabulary children must learn...

- prediction,
- measurement,
- enquiry,
- dependent variable,
- independent variable,
- fair test,
- similar,
- theory,
- hypothesis

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.

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

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 if 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: [Staff Shared > Subject Info and Resources > Science > Concept Cartoons](#)

Can you still?



- **Retrieval vocab:**, energy, growth, habitat, reproduction, decay, offspring, adult, survival, temperature, nutrients, consumption, vertebrate, skeleton.
- 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.

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VOCABULARY:

New vocab: extinction, vitamin, balanced diet, cartilage, invertebrate, contract, loosen, rib cage.

Skeleton, bones, joints, vertebrates, invertebrates, muscles, pull, contract, relax, support; protection; movement; organs; structure; Skeletal system, attached, sockets tendons , ligaments , Cartilage skull , Lower jaw , Collar bone / clavicle Breast Bone , ribs , spine , knee cap/patella femur; tibia; fibula, radius; ulna; humerus;

Food groups; balanced diet; protein (food for growth); fats & carbohydrates (foods for activity); vitamins, minerals and fibre (foods for health); whole grain; energy; carnivore; omnivore; herbivore; vegetarian; Nutrients, nutrition, water, fibre, sugars.

Learning Objective	Objective Broken Down into Differentiation		
	<i>Below</i>	<i>Expected</i>	<i>Above</i>
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

<p>Identify the different food groups and explain that animals, including humans, get nutrients from food.</p>	<p>Pupil understands that animals cannot make their own food and get nutrition from the food they eat</p> <p>Pupil can name some foods and the food groups they belong to</p>	<p>Pupil can explain that animals get nutrition from the food they eat and different foods give different nutrients and amounts of energy</p> <p>Pupil can name the nutrients found in food and the function of each food group</p>	<p>Can classify food into those that are high or low in particular nutrients.</p> <p>Can answer their questions about nutrients in food based on their gathered evidence.</p>
<p>Explain the importance of a nutritionally balanced diet</p>	<p>Pupil can describe some consequences of a poor or limited diet</p>	<p>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.</p>	<p>Pupil understands the effect of nutrition on the development of bones and muscles</p> <p>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</p>

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.

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

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: [Staff Shared > Subject Info and Resources > Science > Concept Cartoons](#)

Can you still?



- **Retrieval vocab:** bulb, seed, survival, temperature, nutrients, consumption, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower, vertebrate, skeleton.
- 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.

VOCABULARY:

New vocab: extinction, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization.

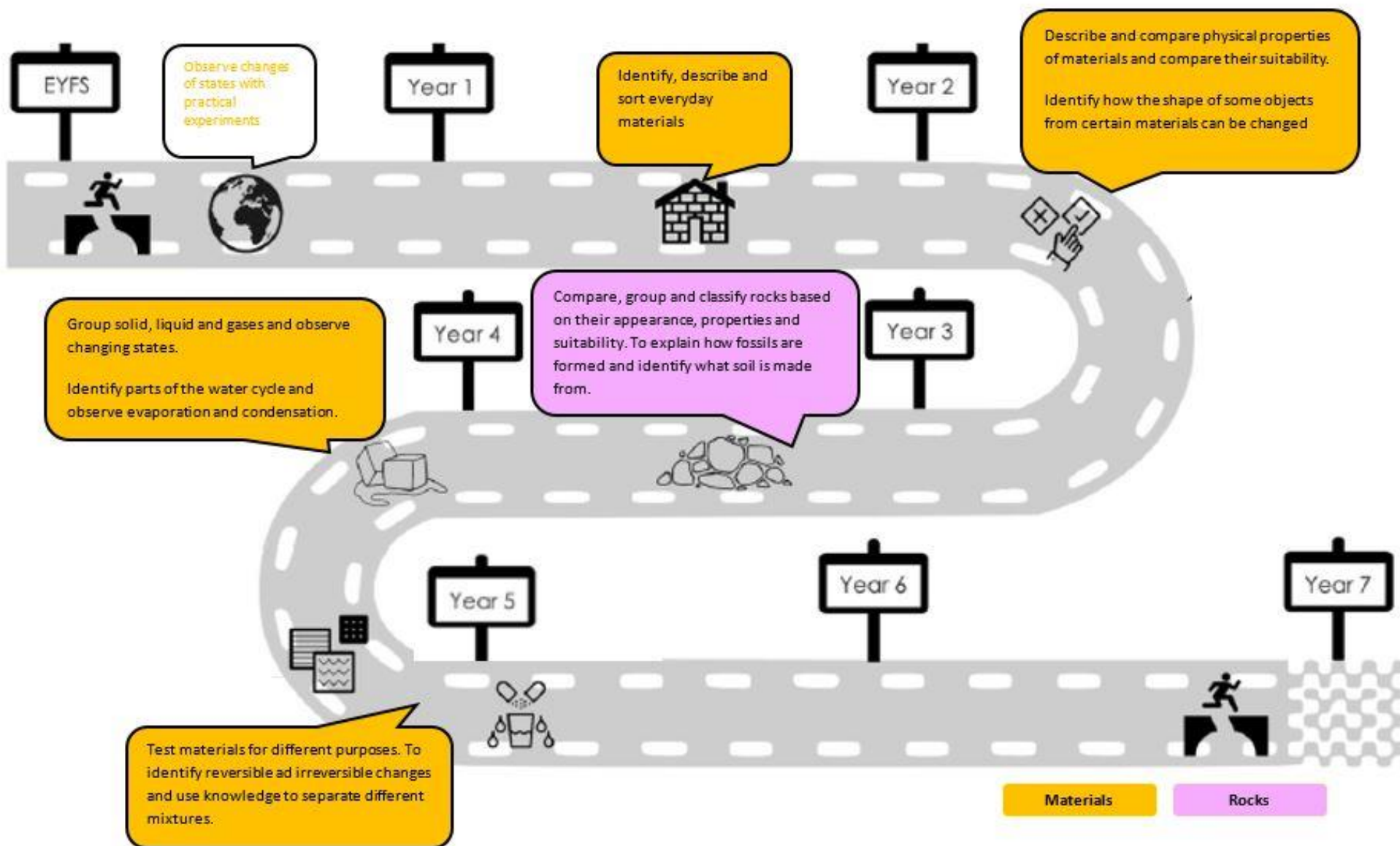
Hotter, warmer, cooler, colder, brighter, damper, wetter, drier.

Healthy, structure of plant , Functions of parts of the plant, air , nutrients , fertiliser , Transported , Botanist, pollination Life cycle, Germination.

Learning Objective	Objective Broken Down into Differentiation		
	<i>Below</i>	<i>Expected</i>	<i>Above</i>
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

<p>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</p>	<p>Pupil can name and describe some of the requirements of a plant for life and growth</p>	<p>Pupil can name and describe all the requirements of a plant for life and growth, understanding that it can vary from plant to plant</p>	<p>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.</p>
<p>Explain the way in which water is transported within plants.</p>	<p>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</p>	<p>Pupil can explain how water is transported around the plant</p>	<p>Pupil uses correct vocabulary and reference a practical enquiry to explain the transportation of water around a plant to keep it healthy</p>
<p>Explain the life cycle of a flowering plant, (including seed formation/germination, pollination and seed dispersal).</p>	<p>Pupil knows that flowers are important in pollination and seed dispersal</p>	<p>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.</p>	<p>Pupil can suggest external factors which can limit the processes of pollination, fertilisation and seed dispersal, and how this could affect plants</p>

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: [Staff Shared > Subject Info and Resources > Science > Concept Cartoons](#)

Can you still?



- **Retrieval vocab:** decay, matter, melting, material,
- What objects do they know that are made out of rock?

VOCABULARY:

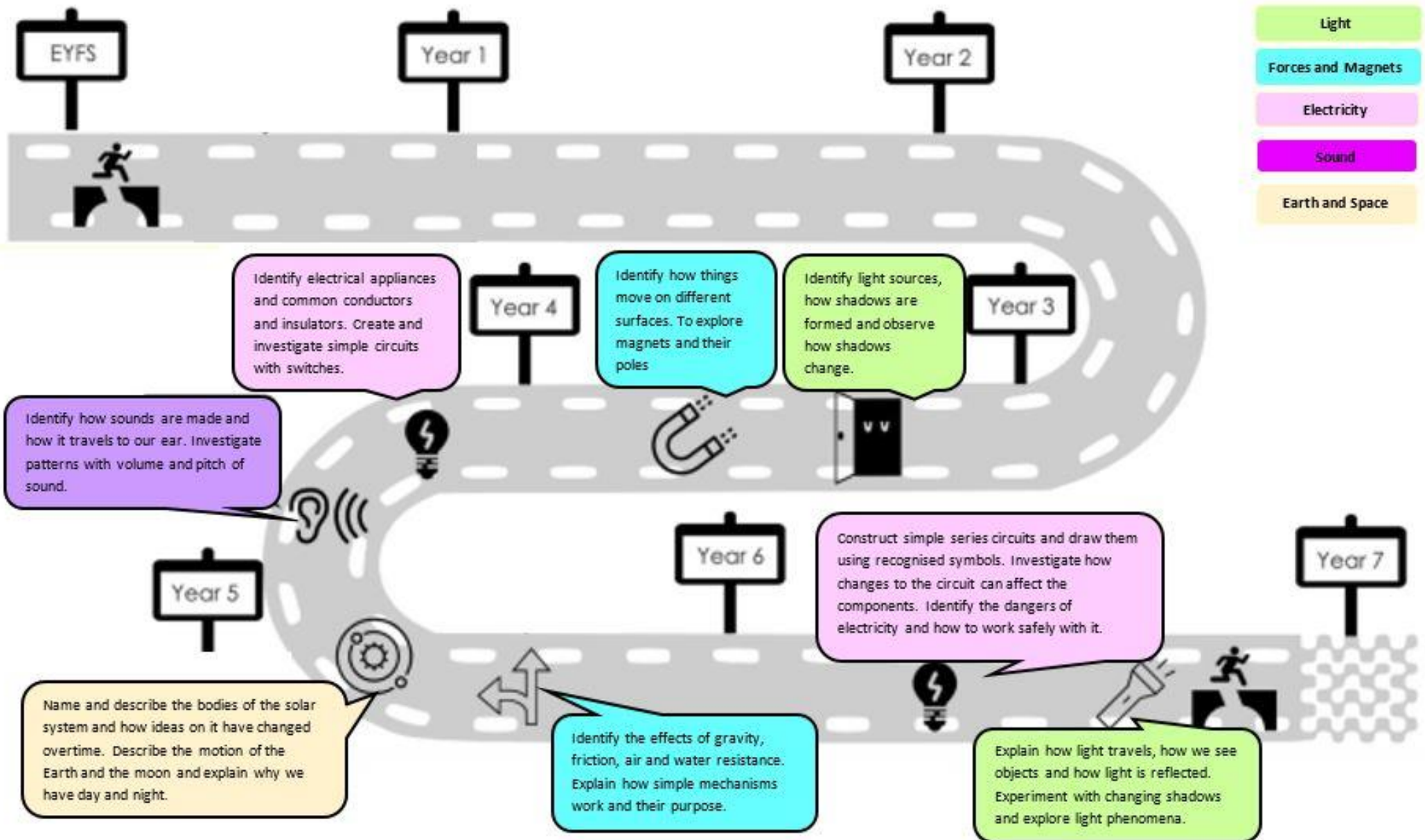
New vocab: extinction, particle, igneous, metamorphic, sedimentary, palaeontologist, weathering, molten rock, crust, tectonic plates, scavengers, fossil.

Rocks, stone, pebble, boulder, grain, crystals, layers, marble, chalk, granite, sandstone, clay, limestone, slate, igneous, metamorphic, sedimentary, hard, soft, texture, absorb water, permeable, impermeable, porous, weathering, erosion, rough, smooth, Purpose/uses of rock: buildings, gravestones fossil, Mary Anning, extinct, organic matter, non-organic matter, soil, top soil, sub soil, base rock, peat, sandy/chalk/clay soil.

Learning Objective	Objective Broken Down into Differentiation		
	<i>Below</i>	<i>Expected</i>	<i>Above</i>
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

<p>Describe how different rocks are useful and suitable for different purposes Forest school</p>	<p>Pupil, with support, can explain why they think one rock may be more suitable than another for a given purpose</p>	<p>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.</p>	<p>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.</p> <p>Pupil should be able to devise their own tests to see if the rock would be suitable.</p>
<p>Explain how fossils are formed</p>	<p>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</p>	<p>Can explain how a fossil is formed step by step</p>	<p>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.</p>
<p>Identify that soils are made from rocks and other organic matter Forest school</p>	<p>Can identify plant/animal matter and rocks in samples of soil</p>	<p>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.</p>	<p>Can devise tests to explore different soils</p>

Physics



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.

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

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: [Staff Shared > Subject Info and Resources > Science > Concept Cartoons](#)

Can you still?



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.

- **Retrieval vocab:** energy, matter, property, wave, metal, material, surface, friction, force, stretch, squash, rough, smooth

VOCABULARY:

New vocab: magnetic, non-magnetic, pole, north, south, sliding friction, static friction, elastic, resist, attraction, repulsion

force/ forces Friction Push/pushing / pull/pulling Surfaces- texture Magnetic force distance magnet/magnets Strength bar magnet ring magnet Button Magnet Horseshoe Strength Attract repel Magnetic Non-magnetic Magnetic poles: north and south Like Unlike Resistance Contact force Non-contact force Magnetism

See STEM Learning for Word Mats <https://www.stem.org.uk/elibrary/resource/34637>

Learning Objective	Objective Broken Down into Differentiation		
	<i>Below</i>	<i>Expected</i>	<i>Above</i>
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

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.

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

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 dark?
- 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: [Staff Shared > Subject Info and Resources > Science > Concept Cartoons](#)

Can you still?



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.

- **Retrieval vocab:** absorption, energy, property, reflection.
- Explain the meaning of/give examples of materials that are: transparent, translucent and opaque.

VOCABULARY:

New vocab: wave, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, data logger

dark, absence of light, natural light source, artificial light source, luminous, non-luminous Reflect/reflective/reflection, shiny, matt, mirror, bounce, visible, beam, sun, glare, travel, surface opaque, shadow, block, transparent, translucent, solid, distance, size sunlight, dangerous, UV light, sunglasses, protect/protection

See STEM Learning for Word Mats <https://www.stem.org.uk/elibrary/resource/34637>

Learning Objective	Objective Broken Down into Differentiation		
	<i>Below</i>	<i>Expected</i>	<i>Above</i>
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 be 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 and 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.

What skills have we used?

We can make some decisions on what information and data to collect

We can decide how long to make systematic and careful observations for, with support

With support we can collect data to look for patterns and relationships

We can take fair and accurate measurements using a range of equipment

We can use secondary sources and understand why they may be needed

With support we can analyse data for patterns, similarities and differences to draw conclusions

We can use relevant scientific vocabulary to discuss and communicate our findings

We can collect and record data in a variety of ways

We can set up comparative and fair tests

We can group, sort and classify including using simple keys

We ask relevant questions

We can make some decisions on what type of enquiry to use

We can make some decisions on what equipment to use

With support we can discuss how successful we have worked and ways to improve

We answer questions using different types of enquiry

We understand what a fair test is

We record predictions giving reasons and using scientific vocabulary



We are scientists!

Y3/4