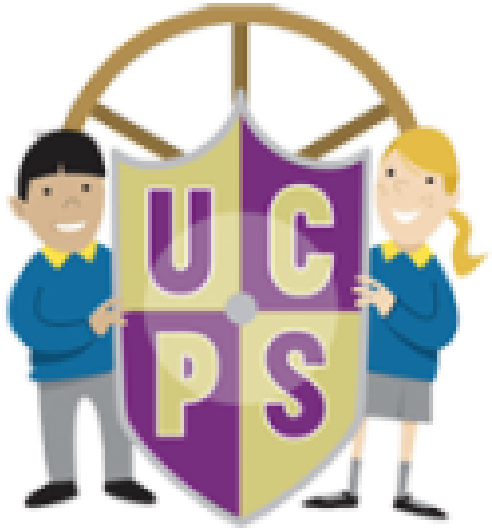


Science in Year 5

Working Scientifically

Year 5/6

Working Scientifically Skills

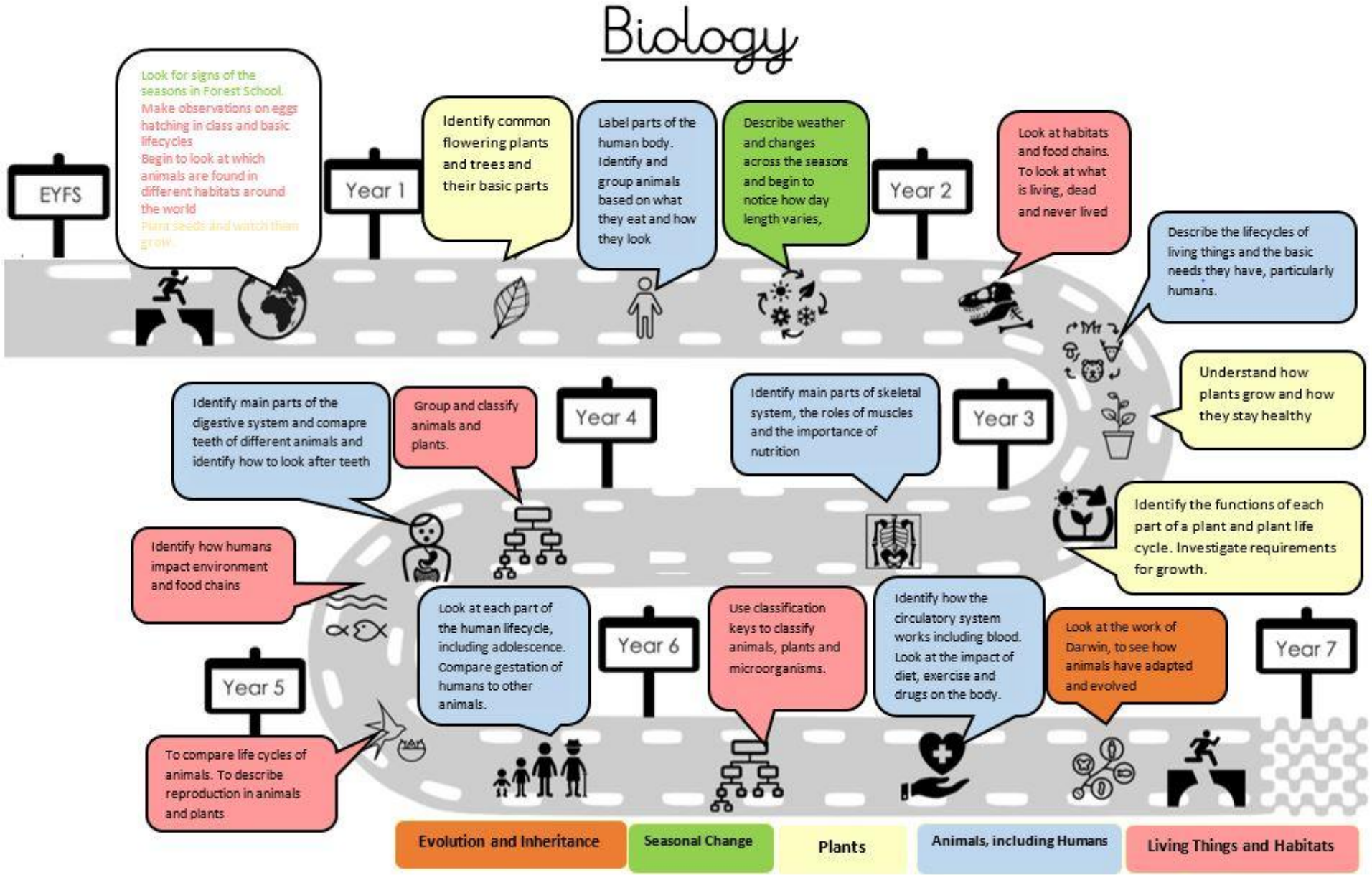
Working scientifically

Statutory requirements

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments.

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.
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 main parts of skeletal system, the roles of muscles and the importance of nutrition
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 5	Area of NC: Animals, including Humans- Human Development (Biology)

Animals, including humans

Statutory requirements

Pupils should be taught to:

- describe the changes as humans develop to old age.

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

In Y6, children have the option to have basic Sex Education (however, parents have the right to remove their child from this lesson).

In KS3 children will learn in more detail about the reproduction of humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta.



- How can we stay fit and healthy as we get older?
- PMI – What if the average life span was 200 for humans?
- Odd one out – elderly woman, baby, teenager
- PMI – What If we didn't visibly age?
- PMI – What if we aged backwards?
- Why are baby clothes sizes for only a few months (e.g. size 2-3months) but once they turn 2 the sizes are for a year interval?

SEE ALSO: RETRIEVAL IDEAS



- Order the basic lifecycle of a caterpillar, tadpole....etc.
- Discuss why animals and plants need to reproduce.
- What path does a piece of food take through our bodies after we swallow it?
- If you look in a mirror, why are your front teeth shaped differently than your back teeth?
- What do you think would happen to our bodies if we didn't have a skeleton inside us?

TIER 3 VOCABULARY:

Life cycle, life span, embryo, foetus, womb, gestation, adolescence, puberty, hormone, development, weaned.

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

Learning Objective	Objective Broken Down into Differentiation		
	Below	***Expected***	***Above***
Describe the changes as humans develop to old age.	Pupils can describe some of the physical changes that happen to humans from baby to when they get older.	Pupils can describe the changes to the human body and limitations this brings as a human gets older e.g. skin, walking, hair.	Pupils compare the life expectancy of humans to other animals
Describe the period of adolescence, describing changes that happen to both	Pupil can describe some changes which happen to the body during adolescence	Pupil can explain the changes which happen to the human body during adolescence	Pupil can explain the changes that happen during puberty, relating to hormones – describing a hormone and giving examples.

girls and boys in puberty			
Research the gestation periods of other animals and compare them with humans	Pupil recognises that human gestation period is different to other animals.	Pupils compare the gestation periods of various mammals and compare the similarities and differences	Pupil can present data about various gestation periods and explain the relationship and pattern they have identified.
Draw a timeline to indicate the stages of growth and development in the human life cycle	Pupil can describe the life cycle of a human in simple periods	Pupil can explain the life cycle of a human from conception to old age	Pupil can compare the stages of the human life cycle with those of other animal life cycles, evaluating differences.

Year 5	**Area of NC: Living things and their Habitats – Lifecycles (Biology)**

Living things and their habitats

Statutory requirements

Pupils should be taught to:

- describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
- describe the life process of reproduction in some plants and animals.

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

In Y6 children will group animals and plants based on observable characteristics, giving their reasons and similarities and differences.

In KS3 children will look at more complex and detailed information on the reproduction of humans and plants.



- PMI – What if there were no sting insects like bees or wasps in the world?
- Odd one out – frog, butterfly, hedgehog.

SEE ALSO: RETRIEVAL IDEAS



- Order the basic lifecycle of a caterpillar, tadpole....etc.
- Order the lifecycle of plants and flowers (sunflower).
- Discuss why animals and plants need to reproduce.
- Vertebrates and invertebrates.

TIER 3 VOCABULARY:

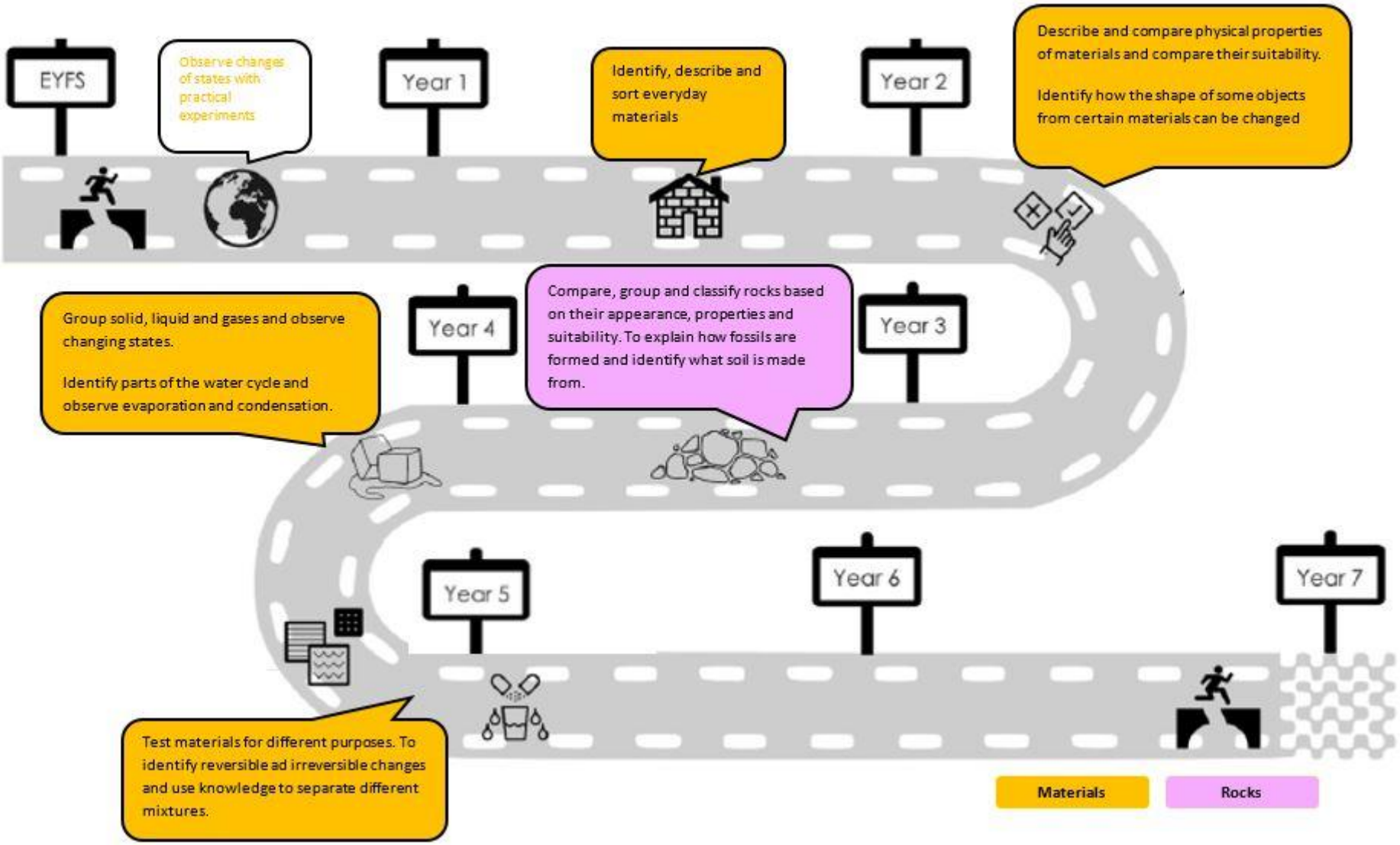
Metamorphosis, larva, pupa, chrysalis, tadpole, hatchling, fledgling, sexual reproduction, asexual reproduction, fertilisation, sperm, egg, plantlets, runners, bulbs, cuttings.

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

Learning Objective	**Objective Broken Down into Differentiation**		
	Below	***Expected***	***Above***
Research life cycles of a range of animals (including some in the local environment)	Can draw the life cycle of at least two animals. Pupil, with support, can describe the life cycles of some animals from their local environment.	Pupil can explain the life cycle of animals including mammals, insects, amphibian, fish, reptiles and birds. Pupil can independently describe the life cycles of some animals from their local environment.	Pupil can explain each part of a range of animal lifecycles, using correct scientific vocabulary .
Compare similarities and differences of the life cycles of animals	Can compare two lifecycles studied.	Pupil is beginning to identify some similarities and differences between the life cycles of studied animal groups. Eg. Compare mammal and bird or insect and amphibian	Pupil can identify similarities and differences between the life cycles of studied animal groups and spot patterns within them. Pupil can compare the lifecycles of animals from their local environment with other animals from around the world.

Describe the life process of reproduction in some animals	With support, I can describe the process of reproduction in mammals using the life cycles created	Pupil can describe the process of reproduction in some animals (eg frogs, dragonflies and hedgehogs). Lifecycles research can be used to discuss this.	Pupil can understand terms such as cells and fertilisation.
Research the work of well-known naturalists and animal behaviourists	With support, can research the work of well-known naturalists	Can independently research the work of well known naturalists and explain the contribution they have had.	Can identify the work that still needs to be done by naturalists.
Describe the life process of reproduction in some plants	Pupil can describe how some plants reproduce. Pupil recognises that plants may not all reproduce sexually.	Pupil can explain the difference between sexual and asexual reproduction and give examples of how plants reproduce in both ways Pupil can label and describe the parts of a flowering plant involved in sexual reproduction. Pupil can carry out a test to grow new plants from different parts of the parents plant so asexual reproduction can be observed.	Pupil can identify advantages and disadvantages to sexual and asexual reproduction in plants. Pupil can accurately describe the process of reproduction in a flowering plant and compare this to reproduction in at least 1 of the main non-human animal groups

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 5	Area of NC: Properties and Changes of Materials (Chemistry)

Properties and changes of materials

Statutory requirements

Pupils should be taught to:

- compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
- know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
- use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
- demonstrate that dissolving, mixing and changes of state are reversible changes
- explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

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

In KS3 children will look at atoms and formulas when discussing chemical reactions as well as look at defining acids and alkalines.



- Where does salt go when it is dissolved in water?
- PMI – What if the whole human body could display the properties of liquid rather than a solid?
- Burning candle and melting chocolate – how are these different?
- Odd one out – Ice cube melting, sugar in water, effervescent tablet in water.

SEE ALSO: RETRIEVAL IDEAS



- Talk about the different physical properties of different materials.
- Compare which materials are suitable for different purposes.
- Explain how to change the shape of some materials (squashing, bending, twisting and stretching).
- Group materials based on solids, liquids and gases - what happens when some materials are heated and cooled.
- Explain reversible and irreversible changes (and give an example).
- Explain the basic process of evaporation.

TIER 3 VOCABULARY:

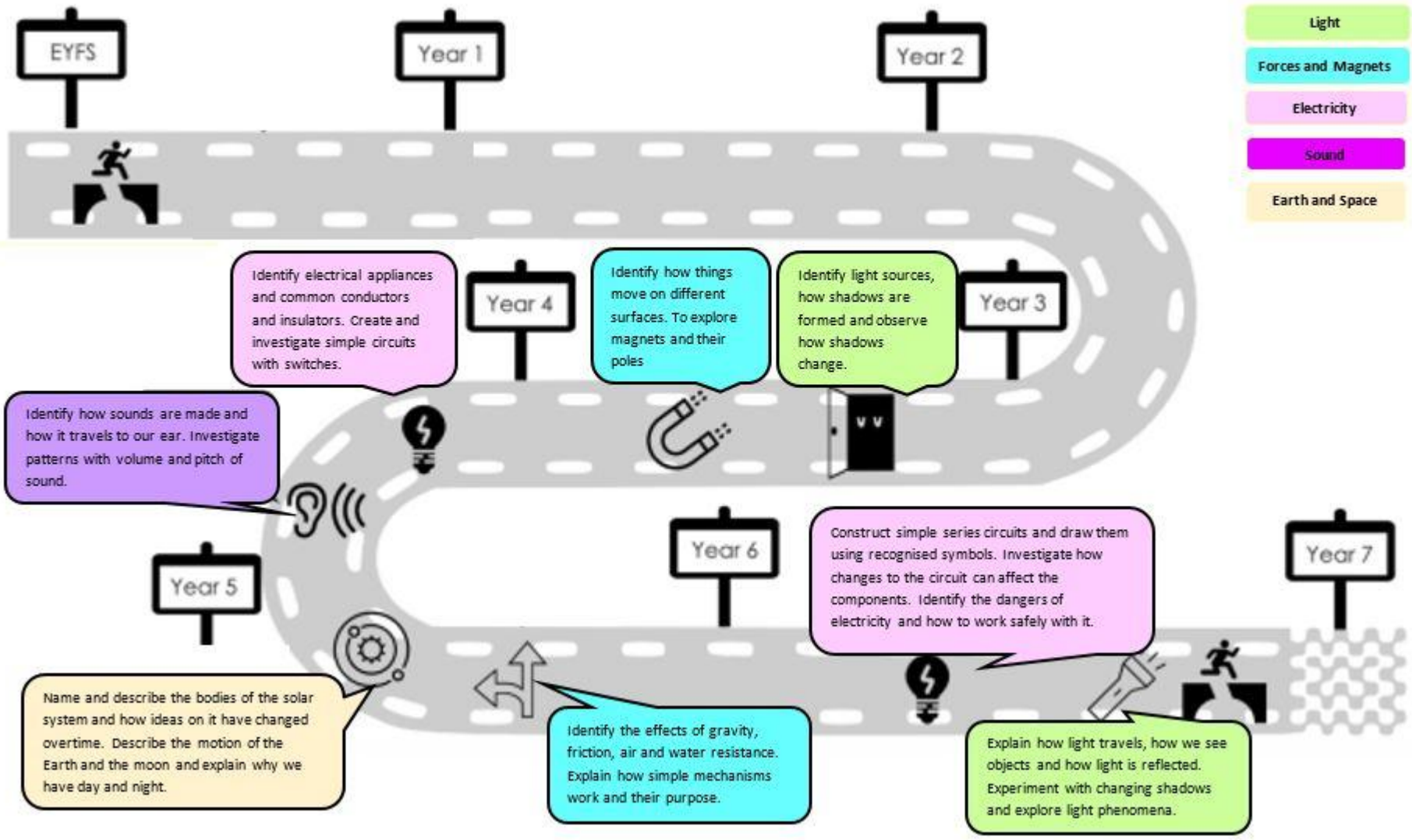
Dissolve, soluble, insoluble, solvent, solute, solution, saturation, crystallisation, filtration, sieving, thermal conductivity, electrical conductivity, irreversible change, chemical change.

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

Learning Objective	**Objective Broken Down into Differentiation**		
	Below	***Expected***	***Above***
Compare and classify everyday materials based on a range of properties	Pupil describe a materials properties Pupil can explain what thermal and electrical conductors and insulators are.	Can create a chart or table grouping/comparing everyday materials by different properties including their hardness, , transparency, conductivity (electrical and thermal), and response to magnets Pupil understand and can define the properties of materials accurately	Pupil can group most everyday materials on the basis of their properties explaining their similarities and differences.

Give reasons, based on evidence from comparative and fair tests, for the particular use of everyday materials	Pupil can identify some materials used in everyday objects and suggest why they were suitable.	Pupil can use understanding of properties to explain everyday uses of materials Pupil can use test evidence gathered about different properties to suggest an appropriate material for a particular purpose e.g material to keep tea warm, materials to keep jacket warm etc (thermal insulation)	Pupil can record data from ta range of experiments accurately and explain the reliability of their results when stating if a material is suitable or unsuitable based on their properties.
Identify soluble and insoluble materials	Pupil can identify materials which are soluble in liquids and those that are not With support, pupils can explain what dissolving is.	Pupil can identify materials which are soluble in liquids and describe the process as dissolving. Pupil can explain the difference between melting and dissolving. Pupil can investigate factors which affect the speed of dissolving.	Pupil can investigate factors which affect the speed of dissolving, they can plan, carry out and record the investigation choosing the variables.
Identify, describe and compare mixtures and solutions	Pupil can explain the difference between a mixture and solution, with support	Pupil can compare and contrast mixtures and solutions, giving examples.	Pupils can use terms like solute and solvent accurately and independently.
Name and describe some reversible changes	Pupil is beginning to understand that some changes are reversible	Can describe some simple reversible changes to materials, giving examples	Pupils can carry out practical enquires showing reversible changes
Use my knowledge of solids, liquids and gases to decide how mixtures should be separated **Forest school – to create dirty water that can be separated and made clean**	Pupil can suggest some simple methods to separate materials in mixtures.	Can use knowledge of liquids, gases and solids to suggest how materials can be recovered from solutions or mixtures by evaporation, filtering or sieving	Can give reasons for choice of equipment and methods to separate a given solution and explain what the most efficient method is.
Explain some changes result in new materials	Pupil is beginning to understand that some changes are irreversible.	Pupil understands (and give examples) that some irreversible changes can result in the formation of new materials.	Pupil can describe the new materials created in irreversible chemical changes.
Conduct research about how chemists create new materials	Pupils with support can research chemists who created new materials (names of scientists given to pupil)	Pupil can independently research the work of chemists who created new materials (names of scientists given to pupil)	Pupil can research chemists who have recently created new materials and explain what the advantages and disadvantages of these new materials are.

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 5	Area of NC: Forces (Physics)

Forces

Statutory requirements

Pupils should be taught to:

- explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- identify the effects of air resistance, water resistance and friction, that act between moving surfaces
- recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

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

In KS3 they will use force arrows on diagrams as well as learn more complex science about the forces discussed in Y5.



- PMI- What if the Earth's gravity was reduced by half?
- PMI – What if there was no gravity?
- Big question – What if there was no friction?
- Odd one out – parachute, aeroplane and sycamore seeds (air resistance and gravity)

SEE ALSO: RETRIEVAL IDEAS



- Explain what a force is and what it does to objects on different surfaces.
- Use language such as 'push' and 'pull' to describe forces.
- Talk about how magnets can be used to move certain objects.

TIER 3 VOCABULARY:

Gravity, mass, weight, Newton, air resistance, water resistance, buoyancy, upthrust, acceleration, force meter, fulcrum, lever, pulley, gear. Pivot, streamlined , terminal velocity.

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

Learning Objective	**Objective Broken Down into Differentiation**		
	Below	***Expected***	***Above***
Explain the effect of gravity	Pupil knows that an unsupported object will fall to the Earth and this is caused by gravity working at a distance, they may require support with this.	Pupil can independently explain the effect of gravity on unsupported objects falling towards the Earth.	Pupils can explain what would happen if we had no gravity and how that would impact life on Earth.
Identify the effects of friction Identify the effects of air resistance Identify the effects of water resistance	Pupil can understand that air resistance, water resistance and friction are contact forces and can affect the rate of movement of an object	Pupil can give examples of friction, water resistance and air resistance acting upon moving surface and can explain that the movement of objects is being resisted by these mediums. Pupil can give ideas for how the effect of air & water resistance and friction can be minimised to enable objects to move more freely through the respective medium.	Pupil can give examples of when it is beneficial to have high or low friction, water resistance and air resistance in context. Pupil can explain how to alter the effect of all these forces on objects so the object moves slower or quicker.

Explain how simple mechanisms (gears, levers and pulleys) work. **Forest school – can create pulleys outside, seesaws etc**	Pupil can identify the differences between gears, levers and pulleys.	Pupil can describe how levers, pulleys and gears work.	Pupil can identify and give examples of how gears, levers and pulleys are used in a real-life context and explain why they are useful.
Identify that simple mechanisms allow a smaller force to have a greater effect.	Pupil recognises that gears, pulleys and levers may be utilised to transfer force.	Pupil can explain how some mechanisms can use a small force to create a big effect.	Pupil has opportunity to experiment with different types and sizes of levers, pulleys and gears to identify patterns in the size of force they can create.

Year 5	Area of NC: Earth and Space (Physics)

Earth and space

Statutory requirements

Pupils should be taught to:

- describe the movement of the Earth, and other planets, relative to the Sun in the solar system
- describe the movement of the Moon relative to the Earth
- describe the Sun, Earth and Moon as approximately spherical bodies
- use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

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

In KS3, children will learn formula for working out gravitational force on Earth and other planets and stars. They will learn about other galaxies and they will learn about the light year as a unit of measurement.



- Odd one out.- the earth, sun, moon
- PMI – What if the earth stops spinning?
- PMI – What if humans could all live in the moon ?
- Why do the Sun and the Moon look the same size in the sky?
- How do you know the Earth is a sphere?
- If the Earth is constantly rotating on its axis, why don't we feel dizzy?
- Who should own space?
- What would you investigate on the ISS?
- What if the sun rotated not the Earth?
- What if there were two suns?
- What if there was no moon?

SEE ALSO: RETRIEVAL IDEAS



- (NB: the Sun and the Earth are capitalized when being discussed in an astronomical context.)
- Discuss how to length of a day varies throughout seasonal changes (they have not been taught why).
- Explain how shadows are formed and how they change length.

TIER 3 VOCABULARY:

Planet, satellite, sphere, solar system, universe, constellation, axis, celestial body, rotation, orbit, eclipse, lunar, solar, telescope, geocentric, heliocentric, waxing, waning, crescent, gibbous, dwarf planet, astronomer.

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

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

Name and describe the range of celestial bodies in our Solar System , comparing their similarities and differences	Pupil can name some planets in the Solar system and explain simply how they are different to the Earth. They can also identify the sun and moon.	Pupil can name, place and describe some features of the planets in the Solar system. Children can also identify the sun and moon and some of their features.	Pupils can name other celestial bodies in the solar system as well as identify similarities and differences between planets.
Describe the Sun, Earth and Moon as approximately spherical bodies	Pupil understands that the Sun, Moon and Earth are spherical.	Pupil can explain that the Sun, Earth and Moon are spherical bodies.	Children can explain how we know that the sun, Earth and Moon are approximately spherical and understands why we now know the Earth is not flat.
Describe the motion of the Earth and other planets relative the Sun	Pupil understands that the Earth orbits the Sun.	Pupil can explain that the Earth and other planets orbit the Sun.	Pupil can describe the position of the Earth and Sun in relation to the wider Solar system.
Research how our ideas of the solar system have changed over time	Pupil, with support, can identify the different theories about the solar system over time.	Can use the terms heliocentric model and geocentric model accurately.	Can describe the arguments and evidence used by scientists in the past about the solar system.
Describe the movement of the moon relative to the Earth.	Pupil can explain that the Moon orbits the Earth not the Sun.	Pupil can explain how the Moon moves relative to the Earth. Pupil understands that the Moon appears to change shape over the period of 1 month.	Pupil can explain that the Moon orbits the Earth noting the number of days, apparent shape and the lunar cycle.
Explain why we have day and night	Pupil can describe that the length of day/night is determined by the position of the Earth and Sun. Pupil recognise that the apparent movement of the Sun during the day affects the size and position of shadows.	Pupil can describe how the rotation of the Earth in relation to the Sun causes day and night. Pupils can explain the apparent movement of the Sun during the day and its effect on shadow length.	Pupil can explain why night and day occur at different times in different places on Earth. Can explain how a sundial works