MARTON MANOR
PRIMARY SCHOOL

YEAR 6

SCIENCE CURRICULUM

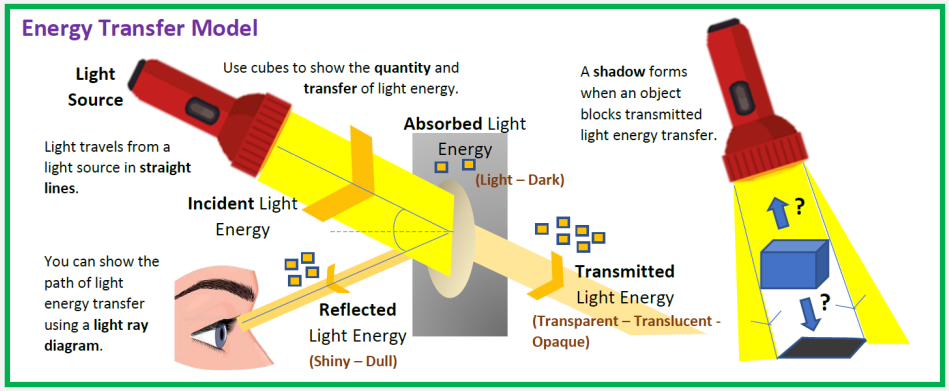
KNOW IT: YEAR 6

TOPICS OF STUDY FOR YEAR 6

ANIMALS INCLUDING HUMANS: KINGDOM **LIVING THINGS AND THEIR HABITATS:** KINGDOMS **EVOLUTION AND INHERITENCE**: KINGDOMS **LIGHT & ELCTRECITY :** ENERGY TRANSFER

CONCEPTUAL MODELS FOR YEAR 6

Energy Transfer Model

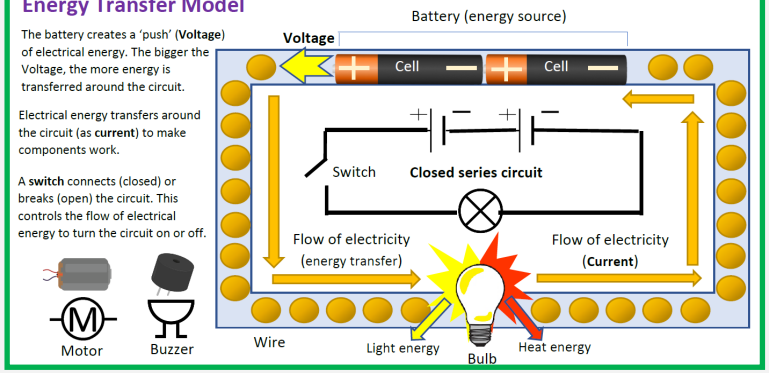


Energy Transfer Model

The battery creates a 'push' (**Voltage**) of electrical energy. The bigger the Voltage, the more energy is transferred around the circuit.

Electrical energy transfers around the circuit (as **current**) to make components work.

A **switch** connects (closed) or breaks (open) the circuit. This controls the flow of electrical energy to turn the circuit on or off.



Big Picture Model

Each living thing is made up of billions of tiny cells that contain **DNA**.

DNA contains all the instructions, as **genes**, to make us who we are.

Each species has the same genes.

However, we are all slightly different as we have **variations** in our DNA. This variation can be passed on (**inherited**) into our children (**offspring**).

Fertilisation

The parents DNA 'mix' in the new embryo.

Growth

The offspring grows up to show a combination of parental features.

Some genes may be **dominant** over others (**recessive** genes) and so always show through in the offspring.

Individuals will show slight variation.

Inheritance

Sperm & Egg (Gametes)

These carry copies of the parents DNA

Natural Selection

Individuals in a population show variation. Some offer an advantage to survival

Those 'best suited' are favoured and selected (e.g. the best camouflaged are not eaten by predators)

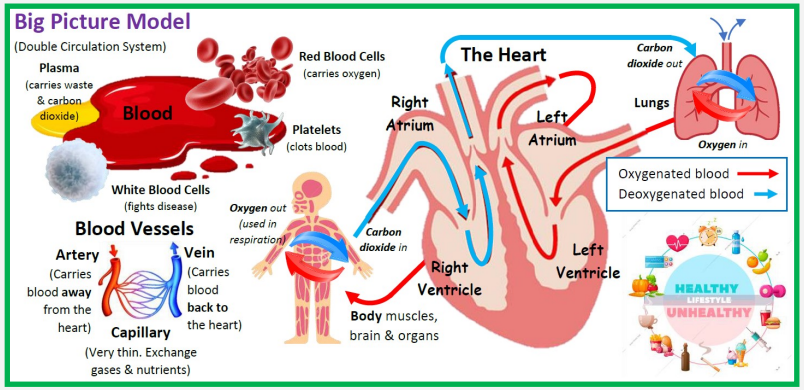
The population changes to show more with this selective advantage

Parents

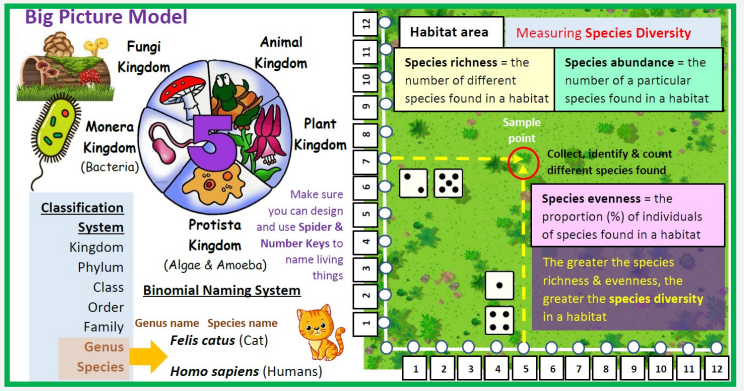
Over a long time this can lead to the **Evolution** of new species.

Big Picture Model

(Double Circulation System)



Big Picture Model



DISCIPLINARY KNOWLEDGE AND SCIENTIFIC ENQUIRY:

How we 'work' and 'think' like a Scientist.

YEAR 6

EXPLAINING SCIENCE

- I show a secure K&U across all KS2 topics (facts and concepts).
- I use complex science words correctly and fluently.
- I use science models to describe and explain (why, how, logical).
- I draw and annotate my own diagrams to describe and explain.
- I present a clear and logical argument/answer.

CLASSIFICATION

- I construct both spider and number keys.
- I group and sub-group by fine observation (create criteria).
- I explain the science behind a range of properties.

DESIGNING EXPERIMENTS

- I reason K&U to make a hypothesis (relationship).
- I select and use equipment with the right scale for the task.
- I plan to minimise risk and describe safe use of equipment.
- I plan a reliable fair test (use of variable terminology).
- I plan to collect repeat readings and calculate mean.
- I design and write an ordered and reliable method.

DATA, TABLES AND GRAPHS

- I scale up/down a number line (axis) and decide on limits.
- I measure/calculate with standard units (inc. area and volume).
- I construct a complex table to show repeated data.
- I construct graphs and can scale at least one axis independently.
- I plot mean values and draw a trend line for linear data.

MAKING CONCLUSIONS

- I describe changing patterns, trends and relationships.
- I spot anomalous data and explain from the method.
- I use primary and secondary data and science ideas in my conclusions.
- I suggest limitations (date) and practical improvements.

New Learning | Prior Learning

TEACH IT: Animals, including Humans

YEAR 6

KEY OBJECTIVES (STATUTORY)

- Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.
- Recognise the impact of diet, exercise and drugs on the way their bodies function.
- Describe the ways in which nutrients and water are transported within animals, including humans.

KEY SKILLS OBJECTIVES

EXPLAINING SCIENCE

⇒ Begin to use complex science words.
⇒ Use complex science words correctly.

⇒ Use knowledge of animals and humans to describe and begin to explain.
⇒ Use knowledge of animals and humans to describe and explain.

⇒ Begin to draw and annotate own diagrams.
⇒ Draw and annotate own diagrams to describe and explain.

DESIGNING EXPERIMENTS

⇒ Use knowledge and understanding to explain predictions.
⇒ Reason knowledge and understanding to make a hypothesis.

⇒ Suggest data range, interval and sufficient readings.
⇒ Plan for repeated readings (>3).

⇒ Design and write a method (controlled variables).
⇒ Write a reliable ordered method (repeats).

VOCABULARY

Circulation (circulatory), heart, atrium (atria), ventricle (ventricles), valve, vessel, artery, vein, capillary, blood, red blood cell, white blood cell, platelets, plasma, lungs, oxygen, oxygenated, deoxygenated, carbon dioxide, nutrients, obesity, exchange, exercise, pulse, recovery time, drugs (various), variable, cause, effect, independent variable, dependent variable, controlled variable, data range, data interval, repetition, reliability, risk, relationship prediction, hypothesis, method, precision, error.

PRIOR LEARNING

Y3 Animals, including Humans: Effect of different nutrients on the body. The main food groups and what constitutes a balanced diet (food pyramid). Skeletal systems including the bones and their functions. Animal skeleton types. The position of the muscles, their functions, different types of muscles and how they enable movement.

Y4 Animals including Humans: Different types of teeth and their functions. The role of the mouth and teeth in the digestion process. Other parts of the digestive system and how the process works. Food chains and their different components. Understand how to interpret and construct food chains.

KEY CONCEPTUAL KNOWLEDGE AND UNDERSTANDING

⇒ Food is a balance of nutrients that the body needs.
⇒ There are a number of essential nutrients that have different functions: water-vital for life; vitamins, minerals and fibre-keep us healthy; carbohydrates-give us energy; proteins-help us to grow; fats-gives us energy, absorbs vitamins and helps nerves and brains. A small amount of fat is an essential part of a healthy diet.
⇒ The human body has different systems to survive.
⇒ The skeleton is a system, which acts as a frame to support and protect the body and allow movement.
⇒ Bones are alive and blood runs through them.
⇒ Muscles are a system. There are three main muscle types in the body: skeletal muscle, cardiac muscle and smooth muscle.
⇒ There is a digestive system , which has different parts to it that help the body to digest food and liquids.
⇒ There is a circulatory system that is responsible for transporting nutrients, water and oxygen to body cells. It also carries waste such as carbon dioxide, which body cells produce.
⇒ The circulatory system has three main parts: the heart, blood vessels and blood.
⇒ The heart is a muscle that pumps blood around the circulatory system. The blood delivers oxygen to all the body's cells as well as nutrients and water. The blood moves through tubes attached to the heart called arteries and veins which together are called blood vessels. Vessels that carry oxygenated blood away from the heart are called arteries and the ones that carry deoxygenated blood back to the heart are called veins.
⇒ Pulse is the measure of how fast your heart is beating or pumping blood.
⇒ A healthy diet involves eating the right types of nutrients in the right amounts.
⇒ A healthy lifestyle involves a healthy diet as well as regular exercise. Exercise is physical activity that requires effort, raises your heart rate and works your muscles.

PRIOR LEARNING LINKS

Y4 Animals including Humans: Different types of teeth and their functions. The role of the mouth and teeth in the digestion process. Other parts of the digestive system and how the process works. Food chains and their different components. Understand how to interpret and construct food chains.

Y5 Animals, including Humans: Changes in humans, as they develop into old age. Gestation periods of humans and different mammals.

Year 6 Science

Unit of Learning:

Animals, including Humans

FUTURE LEARNING LINKS

KS3 Science: The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases. The effects of recreational drugs (including substance misuse) on behaviour, health and life processes. The impact of exercise, asthma and smoking on the human gas exchange system.

Teaching and Learning Sequence for this Unit.

What is blood?

Why do we have blood?

Key Skill:
Use complex science words

How does blood travel around our body?

Key Skill:
Use knowledge of science to describe and explain.

What nutrients do the different systems in our body need and why?

Key Skill:
Use complex science words

How do the digestive and circulatory systems fit together to absorb and transport nutrients and water through the body?

Key Skill:
Use knowledge of science to describe and explain.

What makes a healthy diet and what is the impact of this on the body?

Key Skill:
Use knowledge of science to describe and explain.

What counts as exercise and what is the impact of regular exercise?

Which physical activities increase heart rate the most?

Key Skill:
Write an ordered method.

What makes an unhealthy lifestyle?

What are the effects of poor diet and drugs on the body?

Key Skill:
Use knowledge of science to describe and explain.

Key Learning Objectives:

- Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.
- Recognise the impact of diet, exercise and drugs on the way their bodies function.
- Describe the ways in which nutrients and water are transported within animals, including humans.

Key Conceptual Knowledge and Understanding

⇒ There is a digestive system, which has different parts to it that help the body to digest food and liquids.
⇒ There is a circulatory system that is responsible for transporting nutrients, water and oxygen to body cells. It also carries waste such as carbon dioxide, which body cells produce.
⇒ Food/nutrients are broken down through the digestive system and are then transported via blood through the circulatory system.
⇒ The circulatory system has three main parts: the heart, blood vessels and blood.
⇒ The heart is a muscle that pumps blood around the circulatory system. The blood delivers oxygen to all the body's cells as well as nutrients and water. The blood moves through tubes attached to the heart called arteries and veins which together are called blood vessels. Vessels that carry oxygenated blood away from the heart are called arteries and the ones that carry deoxygenated blood back to the heart are called veins.
⇒ Pulse is the measure of how fast your heart is beating or pumping blood.
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New Learning | Prior Learning

TEACH IT: Living Things & Their Habitats

YEAR 6

KEY OBJECTIVES (STATUTORY)

- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences including microorganisms, plants and animals.
- Give reasons for classifying plants and animals based on specific characteristics.

KEY SKILLS OBJECTIVES

EXPLAINING SCIENCE

⇒ Use clear knowledge and understanding of science ideas and concepts.

⇒ Show secure knowledge and understanding of science (facts and concepts).

⇒ Use complex science words correctly.

⇒ Use complex science words correctly and fluently.

⇒ Begin to draw and annotate own diagrams.

Draw and annotate own diagrams to describe and explain.

CLASSIFICATION

⇒ Construct spider and use number keys

⇒ Construct both spider and number keys.

⇒ Group and sub-group by easy observation (create criteria).

⇒ Group and sub-group by fine observations.

VOCABULARY

Classification, taxonomy, characteristic, diversity, variation, Kingdom, phylum, class, order, family, genus, species, binomial, animal, plant, fungi, Protista (single-celled), Monera (bacteria), virus, vertebrate, invertebrate, agar, sort, group, re-group, classify, criteria, spider key, number key.

PRIOR LEARNING

Y2 Living things and their Habitats: Compare living, dead and things that have never been alive. Habitats provide for the basic needs of animals.

Y4 Living things and their Habitats: Living things can be grouped in a variety of ways. Environments can change and pose dangers to living things.

Y5 Living things and their Habitats: Lifecycles of mammals, amphibian, insects and a birds. Process of reproduction in some plants and animals.

KEY CONCEPTUAL KNOWLEDGE AND UNDERSTANDING

⇒ Living things can be divided or sorted into different groups using a classification key.

⇒ A classification key is a series of questions used to identify a living thing and can unlock the identity of it.

⇒ There are 5 major kingdoms-animal, plant, fungi, algae, slime and mould and bacteria.

⇒ The animal kingdom can be divided into vertebrates and invertebrates and the plant kingdom can be divided into flowering or non-flowering, in order to classify them.

⇒ The taxonomy system was created by Carl Linnaeus in 1737 to organise living things.

⇒ Linnaeus' classification looked at natural things to decide if they were related. It includes 7 levels from largest to smallest: kingdom, phylum, class, order, family, genus and species.

⇒ Vertebrates all have a backbone and can be grouped into 5 classes: amphibians, birds, fish, mammals and reptiles.

⇒ Invertebrates have no backbone and occupy around 95% of the animal species and can be grouped into 4 classes: Annelida, Mollusc, Arachnida and Insects.

⇒ Bacteria, algae, slime and mould are all micro-organisms (incredibly small living things).

⇒ There are helpful and harmful bacteria. Helpful bacteria live in your gut and help break down food and fight the harmful bacteria. Harmful bacteria is transmitted in food and can cause illness.

⇒ Mould is a fungus that can grow on food and can make it unsafe to eat but when planned and prepared properly, mould can safely add to the flavour of food (blue cheese).

⇒ Viruses are types of micro-organism but are not a true living thing: they can only live and grow in the cells of animals, plants and bacteria. Viruses only cause harm.

PRIOR LEARNING LINKS

Y2 Living things and their Habitats: Compare living, dead and things that have never been alive. Habitats provide for the basic needs of animals.

Y4 Living things and their Habitats: Living things can be grouped in a variety of ways. Environments can change and pose dangers to living things.

Y5 Living things and their Habitats: Lifecycles of mammals, amphibian, insects and a birds. Process of reproduction in some plants and animals.

Year 6 Science

Unit of Learning:

Living Things & Their Habitats

FUTURE LEARNING LINKS

KS3 Science: Explore cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope. Recognise the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts

Teaching and Learning Sequence for this Unit.

How are animals and plants classified?

Who was the scientist Carl Linnaeus and what did he do?

Key Skill
Use complex words science correctly.

How do we classify vertebrates?

Can we categorise, describe, sort and classify vertebrates?

Key Skill
Construct spider and number keys?

How do we classify invertebrates?

Can we categorise, describe, sort and classify invertebrates?

Key Skill
Construct spider and number keys?

What are micro-organisms?

Where can we find microbes?

Can we group them?

Key Skill
Group and sub-group by fine observations.

What is mould?

Which conditions are best for mould to grow?

Key Skill
Draw diagrams to describe and explain.

Key Learning Objectives:

- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences including microorganisms, plants and animals.
- Give reasons for classifying plants and animals based on specific characteristics.

Key Conceptual Knowledge and Understanding-

⇒ There are 5 major kingdoms-animal, plant, fungi, algae, slime and mould, and bacteria.
⇒ The animal kingdom can be divided into vertebrates and invertebrates and the plant kingdom can be divided into flowering or non-flowering in order to classify them.
⇒ The taxonomy system was created by Carl Linnaeus in 1737 to organise living things.
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⇒ Viruses are types of micro-organism but are not a true living thing: they can only live and grow in the cells of animals, plants and bacteria. Viruses only cause harm.

New Learning | Prior Learning

TEACH IT: Evolution & Inheritance

YEAR 6

KEY OBJECTIVES (STATUTORY)

- Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.
- Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.
- Identify how animals and plants are adapted to suit their environment in different ways and that adaption may lead to evolution.

KEY SKILLS OBJECTIVES

EXPLAINING SCIENCE

⇒ Use science knowledge to describe and begin to explain (why and how).

⇒ Use science models to describe and explain (why, how logical).

⇒ Use complex science words correctly.

⇒ Use complex science words correctly and fluently.

⇒ Begin to draw and annotate own diagrams.

Draw and annotate own diagrams to describe and explain.

DATA, TABLES & GRAPHS

⇒ Use a frame to construct a complex table of results.

⇒ Construct a complex table to show repeated data.

⇒ Use a frame to construct a graph and scale axes (with support).

⇒ Construct graphs and scale at least one axis independently .

⇒ Join plotted coordinates with straight lines.

⇒ Plot mean values and draw a trend line for linear data.

VOCABULARY

Inherit (inheritance), variation, asexual, sexual, reproduction, sperm, egg, cell, nucleus, gene, characteristic, trait, environment, parent, offspring, selection (selected), adapt (adaptation), species, evolution, fossil, extinct (extinction), survival, table of results, cause, effect, repeats, bar chart, bar, coordinate, graph, data point, extrapolate, scale, plot, mean, trend line, linear, non-linear.

PRIOR LEARNING

Y3 Rocks: Living things trapped in rocks an form fossils.
Y5 Animals including Humans: Changes in humans as they develop into old age.

KEY CONCEPTUAL KNOWLEDGE AND UNDERSTANDING

⇒ Rocks are solid objects that are made up of one or more minerals.
⇒ Rocks can be broken up into smaller and smaller pieces.
⇒ Eventually they can be broken up into **particles** which are too small to see.
⇒ Soil is made of very fine rock particles that have mixed with water, air and particles from dead animals and plants.
⇒ Living things trapped in sedimentary rock can form fossils.
⇒ Fossil evidence shows how livings things have changed over time.
⇒ Animals, including humans have offspring that grow into adults.
⇒ Animals grow and change; some animals look like their parents and others do not.
⇒ Humans also grow and change; there are six stages of human maturation: baby, toddler, child, teenager, adult and older adult.
⇒ Living things can produce identical offspring (asexual) but sexual reproduction results in offspring that share inherited features but vary from their parents.
⇒ This variation means that some individuals will have features better suited to a changing environment. These better features will be selected for/by nature and so, individuals who have them are more likely to survive.
⇒ In order to survive, some species adapt over time.
⇒ Natural selection is the process whereby species adapt to their environment and it is an engine that drives evolution.

PRIOR LEARNING LINKS

Y3 Rocks: Living things trapped in rocks can form fossils.

Y5 Animals including Humans: Changes in humans as they develop into old age.

Year 6 Science

Unit of Learning:

Evolution and Inheritance

FUTURE LEARNING LINKS

KS3 Science: Learn more about how evolution works. Learn about selective breeding of animals by humans. Learn about cloning of animals using DNA.

Teaching and Learning Sequence for this Unit.

Why are fossils so important?

What can they tell us about how living things have changed over time?

Key Skill
Use complex science words correctly.

How are we different/ the same?

Are all offspring identical to their parents?

Key Skill
Construct charts/ graphs.

How are living things adapted to their environment?

Which features are adaptive?

Key Skill
Use knowledge to explain how and why.

What is meant by evolution?

What are the different theories on evolution?

Key Skill
Use complex science words

How have animals adapted and evolved to suit their environment?

Why are the Galapagos finches a good example of this?

Key Skill
Construct charts/ graphs.

Key Learning Objectives:

- Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.
- Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.
- Identify how animals and plants are adapted to suit their environment in different ways and that adaption may lead to evolution.

Key Conceptual Knowledge and Understanding-

⇒ Living things trapped in sedimentary rock can form fossils.
⇒ Fossil evidence shows how livings things have changed over time.
⇒ Animals, including humans have offspring that grow into adults.
⇒ Animals grow and change; some animals look like their parents and others do not.
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⇒ Living things can produce identical offspring (asexual) but sexual reproduction results in offspring that share inherited features but vary from their parents.
⇒ This variation means that some individuals will have features better suited to a changing environment. These better features will be selected for/by nature and so, individuals who have them are more likely to survive.
⇒ In order to survive, some species adapt over time.
⇒ Natural selection is the process where species adapt to their environment and it is an engine that drives evolution.

New Learning | Prior Learning

TEACH IT: Light

Year 6

Key Objectives (Statutory)

- Recognise that light appears to travel in straight lines.
- Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light in to the eye.
- Explain that we see things because light travels from a light source to our eyes or from light sources to objects and then to our eyes.
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast **them**.

Key Skills Objectives

Explaining Science

⇒ Begin to use complex science words.
⇒ Use complex science words correctly.

⇒ Use knowledge of energy transfer to describe and begin to explain.
⇒ Use knowledge of energy transfer to describe and explain.

⇒ Begin to draw and annotate own diagrams.
⇒ Draw and annotate own diagrams.

Making Conclusions

⇒ Describe patterns, trends and relationships.
⇒ Describe changing patterns, trends and relationships.

⇒ Use data in conclusions and knowledge of energy transfer to explain.
⇒ Use primary and secondary data in conclusions.

⇒ Identify strengths, weaknesses and improvements.
⇒ Suggest limitations (data) and practical improvements.

Vocabulary

Light, source, energy, transfer, reflection (reflected), transmits (transmitted), absorbs (absorbed), shiny, dull, mirror, transparent, translucent, opaque, ray, eye, receptor, shadow, angle, incidence, perpendicular, pattern, data, primary data, secondary data, trend, relationship, conclusion, valid (validity), limitation.

Prior Learning

EYFS Foundations for Science: Learn that light comes from the sun, as part of their work on the Earth and Solar System. Have some awareness of shadows. Understand how sunlight alters during different seasons. Know that plants need light from the sun to grow.

Y3 Light: Learn about different types of artificial and natural light sources. Understand that different sources transfer different quantities of light energy. Explore materials that reflect light and use a sensor to measure reflected light. Know the terms opaque, translucent and transparent and how the transfer of light energy differs when it is transmitted through materials with these different properties. Learn and investigate shadows. Understand how to protect eyes and skin from light.

Key Conceptual Knowledge And Understanding

Energy Transfer

⇒ Light is needed to see things. Dark is the absence of light.
⇒ Light from the sun can be dangerous. Eyes and skin need to be protected from sunlight.
⇒ Light is a form of energy that enable things to be seen.
⇒ There are natural and artificial sources of light energy.
⇒ Light can be reflected from surfaces (reflected light energy).
⇒ Shadows are formed when light energy is blocked by an object (shadow=absence of transmitted light energy).
⇒ The closer an object is to the source of the light, the larger the shadow it casts.
⇒ Light waves travel out from sources of light in straight lines. These lines are often called rays or beams of light. Rays of light travel from a light source and hit objects around us. The rays of light reflect, or bounce off an object, and then travel into our eyes.
⇒ The law of reflection states that the angle of incident ray is equal to the angle of the reflected ray.
⇒ A shadow forms when an object blocks transmitted light energy transfer.
⇒ A light ray diagram shows the path of light energy transfer.

PRIOR LEARNING LINKS

Y3 Light: Learn about different types of artificial and natural light sources. Understand that different sources transfer different quantities of light energy. Explore materials that reflect light and use a sensor to measure reflected light. Know the terms opaque, translucent and transparent and how the transfer of light energy differs when it is transmitted through materials with these different properties. Learn and investigate shadows-how distance from light source affects the size. Understand how to protect eyes and skin from light.

Year 6 Science

Unit of Learning

Light

FUTURE LEARNING LINKS

KS3 Science: Learn about refraction through exploration of light passing through different surfaces.

Teaching and Learning Sequence for this Unit.

How does light travel?
How can we use our knowledge of energy transfer to explain how light travels?

Key Skill:
Use knowledge of energy transfer to explain.

What happens when light hits an object?
How does the light intensity of transmitted light change by increasing sheets of tissue paper? How we use a data logger to measure?

Key Skill:
Describe patterns and make conclusions.

How can we see around corners?
Can we make a periscope?
Can we draw a diagram that helps us to explain how a ray of light travels through a periscope?

Key Skill:
Draw diagrams to describe and explain.

How do shadows form?
How does the angle of the light source affect the size and shape of the shadow? (Use of shadow puppets)

Key Skill:
Describe patterns and make conclusions.

Key Learning Objectives:

- Recognise that light appears to travel in straight lines.
- Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.
- Explain that we see things because light travels from sources to our eyes or from light sources to objects and then to our eyes.
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Key Conceptual Knowledge and Understanding – Energy Transfer

⇒ Light is needed to see things. Dark is the absence of light.
⇒ Light from the sun can be dangerous. Eyes and skin need to be protected from sunlight.
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⇒ The law of reflection states that the angle of incident ray is equal to the angle of the reflected ray.
⇒ A shadow forms when an object blocks transmitted light energy transfer.
⇒ A light ray diagram shows the path of light energy transfer.

New Learning | Prior Learning

TEACH IT: Electricity

Year 6

Key Objectives (Statutory)

- Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.
- Compare and give reasons for variations in how components function including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.
- Use recognised symbols when representing a simple circuit in a diagram.

Key Skills Objectives

Explaining Science

⇒ Begin to use complex science words.
⇒ Use complex science words correctly.

⇒ Use knowledge of energy transfer to describe and begin to explain.
⇒ Use knowledge of energy transfer to describe and explain.

⇒ Begin to draw and annotate own diagrams.
⇒ Draw and annotate own diagrams.

Designing Experiments

⇒ Use knowledge and understanding to explain prediction.
⇒ Reason knowledge and understanding to make a hypothesis.

⇒ Plan a fair test ensuring that controlled variables are kept the same.
⇒ Plan a reliable fair test.

⇒ Begin to plan to minimise risk and work safely.
⇒ Plan to minimise risk and describe safe use.

Vocabulary

Electric (electricity), source, energy, transfer, Voltage, flow, Current, resistance, insulator, conductor, closed / open circuits, series, cell, battery, positive, negative, wire, bulb, buzzer, motor, switch, clip, metal, light energy, sound energy, heat energy, kinetic energy, Voltmeter, variable, cause, effect, independent variable, dependent variable, controlled variable, data range, data interval, repetition, reliability, risk, relationship prediction, hypothesis, method, precision, error.

Prior Learning

Y4: Electricity: Learn about where electricity comes from and different power sources. Learn about simple series circuits, their components including switches and how to draw these. Learn about conductors and insulators and which metals are good conductors.

Key Conceptual Knowledge And Understanding

Electricity: Energy Transfer

⇒ Conductors allow electrical energy to pass through them.
⇒ Insulators do not allow electrical energy to pass through them.
⇒ Resistance measures how well a material or object conducts electricity.
⇒ Electrical energy transfers around a circuit (as a current) to make components work.
⇒ Electrical energy is transferred from the battery to the bulb along the wire.
⇒ Energy is lost at the bulb as light/heat energy.
⇒ The surplus electrical energy from the bulb flows back to the battery.
⇒ A switch connects (closed) or breaks (open) the circuit. This controls the electrical energy to turn the circuit on or off.
⇒ Voltage is a measure of the amount of energy transferred.
⇒ A battery creates a push (voltage) of electrical energy. The bigger the voltage, the more energy is transferred around the circuit.
⇒ Electrical resistance is a force that counteracts electrical flow (current).
⇒ Resistance to electrical flow (energy transfer out of the circuit as heat energy) can result in component failure.
⇒ The voltage of cells used in a battery will affect the brightness of a bulb or volume of a buzzer.

PRIOR LEARNING LINKS

Y4 Electricity: Learn about where electricity comes from and different power sources. Learn about simple series circuits, their components including switches and how to draw these. Learn about conductors and insulators and which metals are good conductors.

Year 6 Science

Unit of Learning:

Electricity

FUTURE LEARNING LINKS

KS3: Describing energy transformation from one type into another.

Teaching and Learning Sequence for this Unit.

Can we make a working series circuit?
Can we follow a diagram to set up a simple series circuit? Can we problem solve with incorrectly set up circuits?

Key Skill:
Use knowledge of energy transfer to explain.

How many cells are needed to provide different voltages?
Why do some components require more voltage than others?
Can we explore the different voltage outputs of batteries?
Types and amounts.

Key Skill:
Use knowledge of energy transfer to explain.

How can we change the amount of energy in a circuit?

How can we change the brightness/ loudness of a bulb/ buzzer?

Key Skill:
Reason with knowledge and understanding to make a hypothesis

What is electrical resistance?

What happens to the current/voltage as we increase the length of wire?

Key Skill:
Plan a reliable fair test.

What happens to the energy as it flows around a circuit?
What happens to the brightness when we increase the number of bulbs? Why?

Key Skill:
Use knowledge of energy transfer to describe.

Can we make a circuit to use as part of a wider curriculum project?

Key Skill:
Plan, build and test own circuits.

Key Learning Objectives:

- Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.
- Compare and give reasons for variation in how components function including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.
- Use recognised symbols when representing a simple circuit in a diagram.

Key Conceptual Knowledge and Understanding

⇒ A battery creates a push (voltage) of electrical energy. The bigger the voltage, the more energy is transferred around the circuit.

⇒ Electrical resistance is a force that counteracts electrical flow (current).

⇒ Resistance to electrical flow (energy transfer out of the circuit as heat energy) can result in component failure.

⇒ The voltage of cells used in a battery will affect the brightness of a bulb or volume of a buzzer.

New Learning | Prior Learning

APPLY IT: Working Scientifically

Year 6

Children should be supported to develop their understanding of scientific ideas by using different types of scientific enquiry throughout all teaching.

Working Scientifically

During Years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programmes 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.

Pupils might work scientifically by:

Animals, including humans:	Living things and habitats:	Evolution and Inheritance	Light	Electricity
• Do fruit juices have less sugar than a can of fizzy drink? • Does our heart rate only increase when we exercise?	• What are the similarities and differences between vertebrates? • What are the similarities and differences between invertebrates? • What are the best conditions for mould to grow?	• How has life on earth changed over time? • What is DNA and what does it do? • Are all offspring identical to their parents? • How have living things adapted to survive in extreme conditions? (cactuses, penguins and camels) • What are the advantages and disadvantages of specific adaptations? (two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers).	• What colour is light made of? • How does light help us to see objects? • How does reflection help us to see objects? • What surfaces make the best reflectors? • Why do we see objects as a particular colour? • What happens to the appearance of an object when placed in water?	• How does electricity work? • What are the effects and consequences of changing circuit components and batteries?