

SCAMBLESBY CE PRIMARY SCHOOL: MEDIUM TERM-PLANNING Y5/6 SCIENCE



Milestone 3 Working Scientifically

- Plan enquiries, including recognising and controlling variables where necessary.
- Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work.
- Take measurements, using a range of scientific equipment, with increasing accuracy and precision.
- Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models.
- Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions.
- Present findings in written form, displays and other presentations.
- Use test results to make predictions to set up further comparative and fair tests.
- Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments.

Light (Autumn Term)

Investigate light and seeing:

This concept involves understanding how light and reflection affect sight.

Milestone 3:

- Understand 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 eyes.
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them, and to predict the size of shadows when the position of the light source changes.
- Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.

Vocabulary

Straight, direction, rainbow, spectrum, refraction, reflection, diffusion, opaque, translucent, transparent, shadow, prism

Session	Learning objective	Learning Question / Success Criteria	Lesson outline
1	To know that light travels in straight lines; To explain how light can be reflected and be refracted.	Can light change direction? SC: I know that light travels in straight lines. (Basic) SC: I know that light can change direction when it hits a mirrored surface or water. (Advancing) SC: I can demonstrate / explain the process of refraction. (Deep)	• Share Knowledge Organiser; • Demonstration and diagrams to illustrate how we see things; • Investigations using mirrors and water to explore reflection and refraction.
2	To know that white light is made up of the seven colours of the rainbow and can be split into these colours using a prism.	Can you make a rainbow from a light source? SC: I know that light is made of the 7 colours of the rainbow. (B) SC: I can split white light using a prism. (A) SC: I can explain the processes involved in splitting white light and combining the 7 colours of the rainbow (D)	• Make a spectrum and spin to demonstrate mixture of colours; • Use prisms, including home-made water prisms, to explore how to split light.
3	To know that some materials will not allow light to pass through, and this causes shadows.	Can you create a range of shadows using a light source and a range of materials? SC: I know how shadows are formed. (B) SC: I know how some materials allow light to pass through them. (A) SC: I know how to vary the shape and definition of a shadow. (D)	• Investigations exploring different size and density of shadows.
Assessment	Rising Stars: Year 6, Tests 1 – 4 (choice of...), Y5/6 Milestone 3 Light Unit Analysis and Powerpoints		

Earth and Space (Autumn Term)

Investigate Earth and Space:

This concept involves understanding what causes seasonal changes, day and night.

Milestone 3

- 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.

Vocabulary

Orbit, planet, Earth, Sun, moon, gravitational pull, day and night, seasons, hemispheres, 365 $\frac{1}{4}$ days, 28 days, leap year, lunar month, 24 hours

Session	Learning Objective	Learning Question / Success Criteria	Lesson Outline
1	To know that the Earth and moon and other planets orbit the Sun, with each orbit taking a different length of time;	What is moving in our solar system? SC: I know that objects in the sky orbit the sun and that one orbit equals a year. (B) SC: I know that orbits vary depending on distance from the sun (A) SC: I know the length of orbits of Earth and other plants are different depending on distance from the sun. (D)	• Share Knowledge Organiser; • Demonstration of how planets orbit the Sun, and how the moon orbits the Earth. • Application of key times to orbit diagrams and demonstrations, including making own adapted orreries.
2	To know why the Sun, Earth and moon are roughly spherical, but not completely superficial	Why are planets spherical? SC: I know that all planets are roughly spherical. (B) SC: I know that gravity affects the shape of planets. (D & A)	• Research into shapes of Sun, Earth and moon and other planets, investigating sizes and topographical features; • Explore the effects of gravity and why this affects the shapes of the moon and Earth.
3	To know how the Earth's movement gives us day and night and the apparent movement of the Sun across the sky. To know how different seasons occur and how the Northern and Southern hemisphere experience different seasons 'at the same time'.	How do we experience day and night? How can it be winter in England but Summer in Australia? SC: I know that when it is day on one side of the world it is night on the other. (B) SC: I can demonstrate how day and night can occur at the same time. (A) SC: I can explain how the different hemispheres experience different seasons at the same time. (A)	• Draw labels and describe how the earth's rotation gives us day and night. • Explain and demonstrate how and why a sundial works. • Demonstration and explanations, using globes and light sources, of how day and night and seasons occur.
Assessment	Rising Stars: Year 5, Tests 1 – 5 (choice of...), Y5/6 Milestone 3 Earth and Space Unit Analysis and Powerpoints		

States of Matter and Materials (Spring Term)

Investigate materials

This concept involves becoming familiar with a range of materials, their properties, uses and how they may be altered or changed.

Milestone 3

- 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 the temperature at which this happens in degrees Celsius (°C), building on their teaching in mathematics.
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
- Understand how 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, oxidation and the action of acid on bicarbonate of soda.

Vocabulary

Solids, liquids, gases, soluble, insoluble, evaporation, condensation, particles, molecules, water cycle, melting, freezing, states of matter, reversible and irreversible changes, physical changes, chemical changes, solute, filtration, sieving

Session	Learning Objectives	Learning Question / Success Criteria	Lesson Outline
1	to know that materials can be grouped together based on a range of comparative and fair tests, including their hardness, solubility, conductivity (electrical and thermal) and response to magnets	How can we demonstrate the different properties of materials? SC: I know how to group materials based on given criteria. (B) SC: I can modify a test to compare given materials. (A) SC: I can devise an experiment that proves / disproves a hypothesis I have created about materials. (D)	• Share Knowledge Organiser; • Children sort a range of materials, using a range of criteria, using
2	To know that some solids are soluble and others are insoluble, and to suggest and test methods to separate them	How can we separate salt and sand from a solution? SC: I know that dissolving salt in water is a reversible change and I can separate them using heat and evaporation. (B) SC: I can explain that a dissolved solution has not disappeared when it has dissolved, providing evidence accordingly. (A)	• Investigation, using different scientific techniques, to separate soluble and insoluble materials from a water solution.

		<i>SC: I can relate my understanding to my knowledge of the water cycle. (D)</i>	
3	To know that some changes are reversible and that some are not, and that these result in a chemical change that might create a new material.	Can toast be unmade? Can cooking be reversed? <i>SC: I can explain and show that cooking in a physical change and is irreversible. (B)</i> <i>SC: I can explain and name new materials that are made from mixing different materials / processes. (D)</i>	Investigations about adding ascertic or citric acid to bicarbonate of soda and observing the results
4	To know that different materials will either conduct or insulate heat.	Can you design an appropriate jacket potato cover to keep it warm / a hot water cover for teddy? <i>SC: I know that some materials are conductors of heat and some are insulators of heat. (B)</i> <i>SC: I can measure temperatures accurately and graph and interpret the results. (A)</i> <i>SC: I can compare cooling rates of different thermal insulators and produce conclusions in response to my hypotheses. (D)</i>	- Demonstrations of temperature loss in china, glass and metal containers; - Investigation to design an investigation to compare thermal insulators and conductors
Assessment	Rising Stars: Year 5, Tests 1 – 5 (choice of...), Y5/6 Milestone 3 States of Matter and Materials Unit Analysis and Powerpoint.		

Rocks and Soils (Spring Term)

Investigate Rocks and Soils:

This concept includes being able to compare and group rocks and describe the formation of fossils.

Milestone 3	- Compare and group together different kinds of rocks on the basis of their simple, physical properties. - Relate the simple physical properties of some rocks to their formation (igneous or sedimentary). - Describe in simple terms how fossils are formed when things that have lived are trapped within sedimentary rock. - Recognise that soils are made from rocks and organic matter.
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Vocabulary	Igneous, metamorphic, sedimentary, layers, soil, topsoil, subsoil, base rock, pressure, fossilisation, erosion, heat, pressure, lava, compression
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Session	Learning Objectives	Learning Question / Success Criteria	Lesson Outline
1	To know how rocks can be grouped on the basis of their simple, physical properties	Are all rocks the same? <i>SC: I can name and describe different rocks. (B)</i> <i>SC: I can compare and contrast different types of rocks. (A)</i>	- Share Knowledge Organiser; - Compare and contrast rock samples; - Use and develop branching diagrams to identify different types of rock;

		SC: I can infer the type of rock based on observable properties or descriptions. (D)	
2	To know the different properties of igneous, sedimentary and metamorphic rocks	Will all rocks respond similarly to pressure? SC: I can relate characteristics of rocks to effectiveness / suitability in different contexts (B) SC: I can devise a fair test investigation to compare properties of different rocks. (A) SC: I can relate the hardness of a rock to its origins. (D)	Investigation, using Mohs Scale of Hardness, to compare properties of rock and their responses to different amounts of pressure
3	To know how, why and where fossils are formed; To know that soils are made from rocks and organic matter.	How are fossils formed and where can they be found? Is all soil the same? SC: I know the origin of fossils. (B) SC: I can identify the types of fossils (identifying patterns) that are most likely to be found in different types of sedimentary rocks (e.g. in shale, limestone, sandstone etc). (D)	- Describe and illustrate the formation of fossils; - To observe and describe the properties of soil; - To explore how soil differs in different locations and has an implication for building and wildlife.
Assessment	Y5/6 Milestone 3: Rocks & Soils Unit Analysis and Powerpoints		
Forces and Magnets (Spring Term)			
Understand movement, forces and magnets. This concept involves understanding what causes motion			
Milestone 3	- Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. - Identify the effect of drag forces, such as air resistance, water resistance and friction that act between moving surfaces. - Describe, in terms of drag forces, why moving objects that are not driven tend to slow down. - Understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs. - Understand that some mechanisms including levers, pulleys and gears, allow a smaller force to have a greater effect.		
Vocabulary	Gravity, friction, air resistance, streamlining, aerodynamics, upthrust, weight, mass, water resistance, Newtons, particles, surface area, push, pull, balance, magnetism		
Session	Learning Objective	Learning Question / Success Criteria	Lesson Outline
1	To know that forces are pushes and pulls and can change the direction and shape of objects	Can gravity be ‘beaten’? SC: I know that gravity affects all objects but air resistance can slow down the effects of gravity. (B)	- Share Knowledge Organiser; - Demonstrations of gravity and air resistance in action;

	To know that gravity acts upon objects equally, but air resistance can affect a falling object; To know that streamlined objects can travel with less resistance than non-streamlined objects	SC: <i>I know how vehicles can be more / less streamlined and therefore more / less efficient. (A)</i> SC: <i>I can interpret data about the rate that different materials fall towards Earth and can summarise my findings. (D)</i>	Open ended investigation – ‘Make this piece of A4 paper travel the furthest?’
2	to know that forces are measure in Newtons, and that different forces are needed to move a range of stationery items	How can we measure and compare forces? SC: <i>I know that forces are measured in Newtons. (B)</i> SC: <i>I can devise an investigation to compare the force needed to move stationary items. (A)</i> SC: <i>I can identify ways to reduce force needed to move items (eg: using a lever or pulley) and devise an investigation to compare forces accordingly. (D)</i>	- Demonstration of how to use Newton meters and their effectiveness. - Investigations, using either items of a different mass or on a range of surfaces of different friction, to compare and contrast force needed.
3	To know the factors that can increase and decrease friction, air resistance and water resistance	Make this car travel more slowly down the ramp. Make this parachute the most effective. Make this paper boat the most effective. SC: <i>I can change variables to prove / disprove a hypothesis. (B)</i> SC: <i>I can conduct a fair test and compare results in detail. (A)</i> SC: <i>I can provide scientific reasons for observations and offer possible outcomes / ways to refine an investigation. (D)</i>	Group investigations – designing, conducting and evaluating a scientific investigation
4	To know the effects of magnetism and that magnets have two poles.	How do magnets work? Why do magnets have different poles? SC: <i>I can observe and describe the effect of placing like and different poles of a magnet next to each other. (B)</i> SC: <i>I can apply my knowledge of magnetic poles to create a game that uses the idea that magnets attract or repel each other. (A)</i> SC: <i>I know how to make a magnet. (D)</i>	- Demonstration and exploration of magnets - Research about North and South poles, compasses and why magnets have poles.
Assessment	Rising Stars: Year 5, Tests 1 – 4 (choice of), Y5/6 Milestone 3: Forces and Magnets Unit Analysis and Powerpoint reference		

Plants (Summer Term)

Understand plants

This concept involves becoming familiar with different types of plants, their structure and reproduction.

Milestone 3	Relate knowledge of plants to studies of evolution and inheritance. Relate knowledge of plants to studies of all living things Describe the life process of reproduction in some plants and animals. Describe how living things are classified into broad groups according to common observable characteristics. Give reasons for classifying plants and animals based on specific characteristics.
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Vocabulary	Root, stem, sepal, ovule, ovary, style, stigma, flower, anther, filament, stamen, 7 life processes (movement, nutrition, sensitivity to heat / light, respiration, reproduction, excretion, growth),
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Session	Learning Objective	Learning Question / Success Criteria	Lesson Outline
1 and 2	To know the function of parts of flowering plants, requirements of growth, water transportation in plants, life cycles and seed dispersal.	How do plants demonstrate the 7 life processes (movement, nutrition, sensitivity to heat / light, respiration, reproduction, excretion, growth) <i>SC: I know the 7 life processes. (B)</i> <i>SC: I can make comparisons between the 7 life processes and how they relate to different plants, animals and humans. (A)</i> <i>SC: I can explain and elaborate the 7 life processes to a specific audience. (D)</i>	• Share knowledge organiser; • 'Email an Alien' explanation • Demonstration and research, and interactive posters / leaflets / extended writing about the parts and function of plants, inc. seed dispersal
3	To know the processes of plant reproduction	How are new plants created? <i>SC: I can draw and describe plant reproduction. (B)</i> <i>SC: I can demonstrate and explain sexual and asexual reproduction in plants. (A)</i> <i>SC: I can relate the reproduction of plants to the reproduction of insects. (D)</i>	• Discussion and research about seed dispersal, and the process of pollination and germination; • Children produce comic strip / presentation (YouTube tutorial-style) about how plants reproduce and 3D flowers with annotations
4	To know how to classify plants based on specific characteristics.	How can well-chosen criteria help us name plants? <i>SC: I can use a branching diagram to identify and name a plant. (B)</i>	• Branching database diagrams to classify and sort plants

		<i>SC: I know how to use a branching diagram in reverse to describe a plant's characteristics. (A)</i> <i>SC: I can create a branching diagram to classify a range of plants. (D)</i>	
5	To know that plants need sunlight, water and suitable conditions to grow effectively	Does it matter where I place my indoor plants? <i>SC: I know how the 7 life processes relate to successful plant growth. (B)</i> <i>SC: I can suggest which variables to change to identify conditions needed for successful plant growth. (A)</i> <i>SC: I can change variables to affect plant growth, and use measurements to compare results and produce detailed conclusions. (D)</i>	Investigation which compares location and watering of plants – compare and contrast and assess variables in action.
Assessment	Rising Stars: Year 5, Tests 1 – 4 (choice of), Y5/6 Milestone 3 Plants Unit Analysis and Powerpoints		
Animals including humans Evolution (Summer Term)			
Understand animals and humans This concept involves becoming familiar with different types of animals, humans and the life processes they share.			
Milestone 3	Describe the changes as humans develop to old age. Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Recognise the importance of diet, exercise, drugs and lifestyle on the way the human body functions. Describe the ways in which nutrients and water are transported within animals, including humans. 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. Describe how living things are classified into broad groups according to common observable characteristics. Give reasons for classifying animals based on specific characteristics. 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 adaptation may lead to evolution.		
Vocabulary	Animals, vertebrates, invertebrates, chordata, molluscs, arthropods, mammals, reptiles, fish, amphibians, birds, insects, crustaceans, arachnids, habitat, life cycle, metamorphosis, sexual / asexual reproduction, adaptation, environment, breeding, evolution, fossil, inherit, reproductive, selective breeding, trace fossil		
Session	Learning Objective	Learning Question / Success Criteria	Lesson Outline
1	To know and be able to describe the changes as humans develop to old age	How do we change as we get older? <i>SC: I know and can describe the main changes in the human body from childhood to adulthood to old age. (B)</i>	Discuss the '7 ages of man' – sequencing and describing ages, physical implications, social implications etc – link to creative writing / information writing to an alien about humankind.

		<i>SC: I can compare and contrast the physical appearance of children and adults, and can graph changes in average heights of males and females at different ages, summarising my findings. (A)</i> <i>SC: I can interpret data about normal blood pressure in children and adults and draw some conclusions. (D)</i>	
2	To know, identify and name the main parts of the human circulatory system, and describe the function of the heart, blood vessels and blood.	How does the human body actually work? <i>SC: I can draw and label diagrams of the human circulatory system and describe the functions of the heart, blood vessels and blood. (B)</i> <i>SC: I can contrast the different roles of veins and arteries in the human circulatory system. (A)</i> <i>SC: I can discover information about human blood pressure and can relate information about blood pressure to diet and lifestyle. (D)</i>	Either extended non-chronological writing about the circulation system, or YouTube-style presentation about the circulation system. Using oximeters, compare heart rate before and after exercise – investigations.
3	To know the importance of diet, exercise, drugs and lifestyle choices on the way the human body functions	How can we look after ourselves properly? <i>SC: I can observe and record the effect of exercise on the heartbeat and can describe a healthy, balanced diet. (B)</i> <i>SC: I know and can explain the possible effects of too much sugar in the diet on how the human body functions. (A)</i> <i>SC: I know how coronary arteries may become blocked and cause heart attacks. (D)</i>	Posters and leaflets persuading people to adopt a healthy lifestyle.
4	To know that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.	What is evolution and what evidence is there? <i>SC: I can describe how plants and animals may evolve through adaptation to their environment. (B)</i> <i>SC: I know that animals have changed over millions of years and can suggest reasons / evidence to prove it. (A)</i> <i>SC: I can analyse the work of Darwin and his theories of natural selection. (D)</i>	Exploration of the work of Charles Darwin – link to creative writing and map work.
5	To recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.	Why do I look like my brother? Why don't I look like my sister? <i>SC: I can observe and describe differences between living</i>	Discussion of genes – dominant and recessive, and family traits – discuss Royal Family. Baby photos exploration – can we match babies to classmates / their parents?

		<i>things and their offspring and can name offspring that are not identical to their parents and describe how they vary. (B)</i> <i>SC: I can explain, with examples, offspring which are not identical to their parents. (A)</i> <i>SC: I know how genetics can cause similarities and differences between parents and their offspring and siblings. (D)</i>	
6	To know how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution	How do animals and plants adapt to fit into their surroundings? <i>SC: I know that different plants and animals live in different habitats. (B)</i> <i>SC: I can list the ways an animal / plant has adapted to its environment. (A)</i> <i>SC: I can explain how adaptation can lead to evolution of appearance and characteristics. (D)</i>	Research and poster creation about how a chosen animal/ plant has adapted to its environment habitat.
Assessment	Rising Stars: Year 6 , Tests 1 – 4) choice of), Y5/6 Milestone 3:Animals including Humans Unit Analysis and Powerpoints		

How light travels

- Light travels in waves.
- Light waves don't always need particles to travel through. They can also travel through outer space or a vacuum.
- Light waves travel in straight lines.
- Light waves travel faster than sound waves.

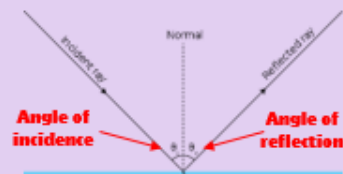
Reflection

Reflection is when light bounces off a surface, changing the direction of a ray of light.

All objects reflect light. However, smooth and shiny surface reflect all the rays of light at the same angle but rough and dull surfaces scatter the light rays.



When rays of light reflect, they obey the law of reflection: The angle of incidence always equals the angle of reflection.



Otters Class: Autumn 2022



Light

How we see things

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. This reflection of light allows us to see the object.

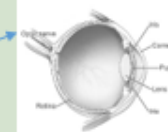
Light rays travel from the light source in a straight line



The ray of light is reflected off the cat and travels in a straight line to the eye, enabling the person to see the cat.



Light from object travels into the eye



How shadows are formed

Shadows are formed when an opaque object blocks a ray of light.

A shadow is always the same shape as the object that casts it.

A shadow can change size depending on the distance the object casting it is from the light source. Shadows can also be elongated or shortened depending on the angle of the light source.



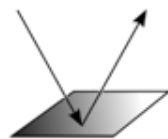
Refraction

Light rays usually travel in straight lines, but when they pass from one material to another they can be forced to bend (change direction and continue on a new straight path).

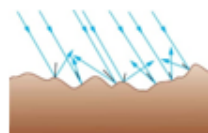
The bending is called refraction. It happens because light travels at different speeds in different materials.

For example, light moves more slowly through water than it moves through air. As the beam of light enters the water, it slows down and bends. As it re-enters the air the light beam speeds up and bends back again.

Smooth, shiny surface



Rough, dull surface



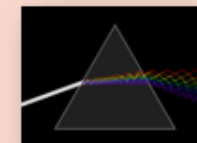
How we see colour

Natural light is actually made up of all the colours of the rainbow which mixed together appear white. These colours are known as 'The Visible Spectrum' and as we have done, they can be separated with a prism.

When a ray of white light shines on an object, the object absorbs some colours and reflects others. Every object reflects light in its own way, giving us the millions of different colours & shades.

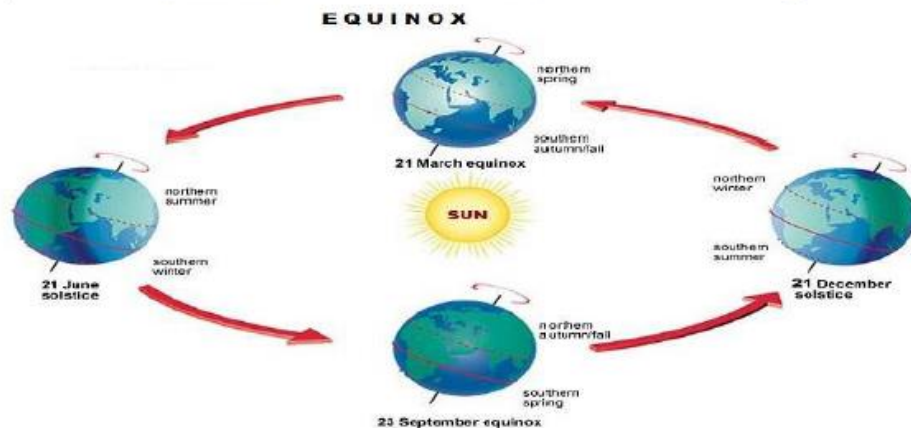
A filter works by only allowing certain colours through it.

Coloured filters absorb light and transmit the light they don't absorb.



Earth and Space

Key Vocabulary



Asteroid - A small rocky body orbiting the sun

Axis - An imaginary line about which a body rotates

Celestial - Positioned in or relating to the sky, or outer space as observed in the astronomy

Day - A twenty-four hour period, from one midnight to the next, corresponding to a rotation of the earth on its axis

Dwarf planet - A celestial body resembling a small planet but lacking certain technical criteria to be classed as a planet e.g. Pluto

Geocentric - Where people believed the earth was at the centre of the solar system

Heliocentric - Representing the sun as the centre of the solar system, the modern view of the solar system

Moon - A natural satellite of any planet

Night - The period from sunset to sunrise in each twenty-four hours

Orbit - The regularly repeated oval course of a celestial object around a star or planet

Planet - A celestial body moving in orbit round a star

Rotation - The action of rotating about an axis or centre

Solar system - The collection of eight planets and their moons in orbit round the sun

Star - A fixed luminous point in the night sky which is a large, remote body like the sun

Sun - The star round which planets orbit



STATES OF MATTER KNOWLEDGE ORGANISER

Scamblesby CE Primary School:

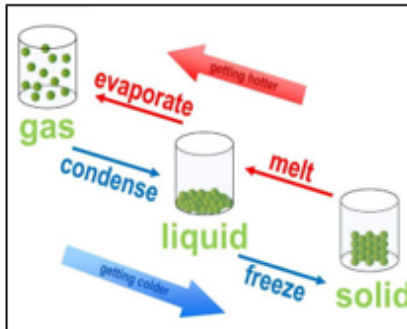


Overview



- Matter makes up our planet and the whole Universe.
- There are three main states of matter – solids, liquids and gases.
- Matter can change state, depending on its temperature.
- Several processes describe the processes of changing states, e.g. melting, evaporation, freezing and condensation.
- The water cycle depends upon some of these processes.

Changing States of Matter



States of matter can change, depending upon the temperature of the matter.

-**Melting** is the process of changing a solid into a liquid.

-**Evaporation** is the process of changing a liquid into a gas.

-**Condensation** is the process of changing a gas into a liquid.

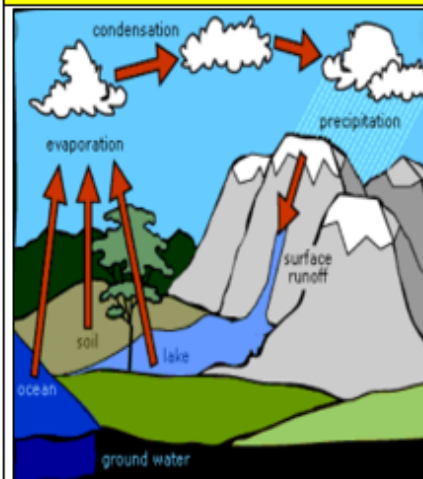
-**Freezing** is the process of turning a liquid into a solid.

Solids, Liquids and Gases

All matter exists in three states: solids, liquids and gases.

SOLIDS -Solids hold their shape -Solids are rigid -Solids have a fixed volume Examples include ice cubes, rock, glass and most metals.	 SOLID
LIQUIDS -Liquids do not hold their shape -They are not rigid -However, they have a fixed volume. Examples include water, oil, blood and milk.	 LIQUID
GASES -Gases do not hold their shape -They are not rigid -They do not have a fixed volume. Examples include oxygen, carbon dioxide and helium.	 GAS

Role in the Water Cycle



Changing states of matter play an important part in the water cycle:

EVAPORATION

Energy from the sun heats up the surface of the Earth. This causes the temperature in rivers, lakes and oceans to rise, and evaporate into the air.

CONDENSATION

As the water vapour rises, it cools in the higher air and turns back into liquid – condensation. This creates clouds.

PRECIPITATION

When too much water has condensed, the clouds become too big for air to hold them. Precipitation occurs.

Solids

Wood

Ice Cube

Glass

Coffee

Liquids

Water

Shower Gel

Gases

Carbon Dioxide

Air

Oxygen

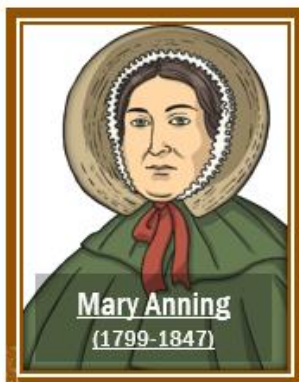


Rocks and Soil

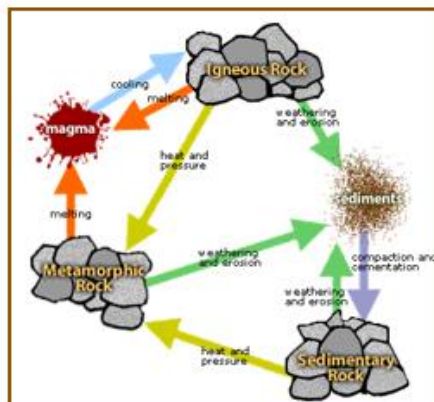
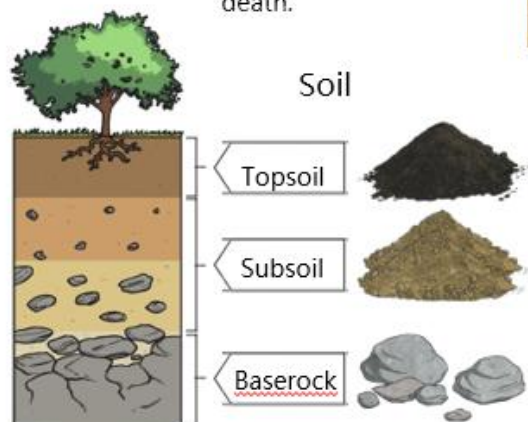
Scamblesby CE Primary School:



Mary's family lived at the beach and would spend lots of time trying to find shells and fossils that they could sell. Later, when Mary was 12 years old, she discovered a gigantic fossil hiding in the rocks. Unfortunately, her discovery was stolen by a male palaeontologist and she wasn't well-known until well after her death.



Types of Rocks and the Rock cycle

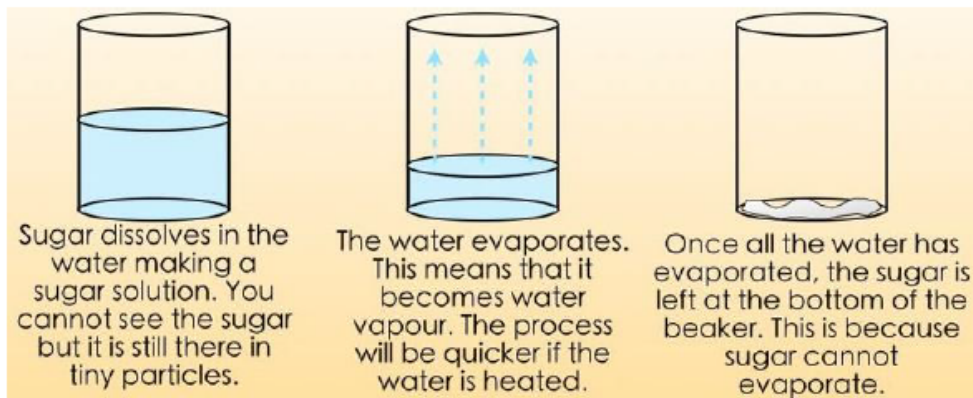
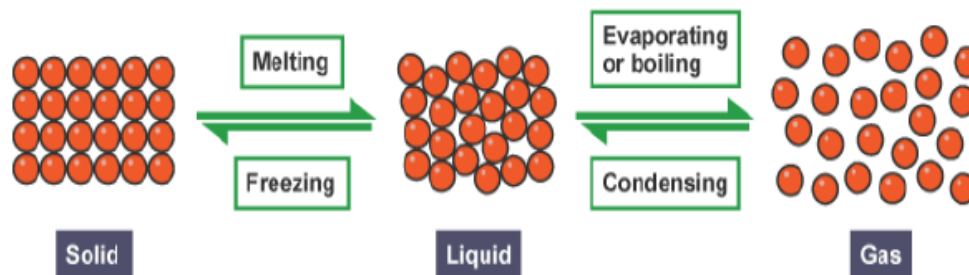
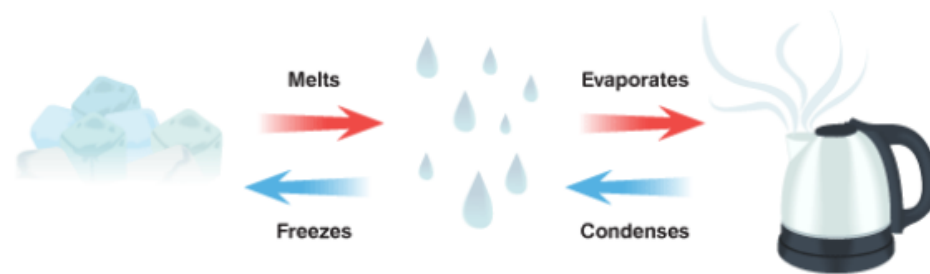


Basalt	Granite	Igneous
Igneous rock is formed by molten lava cooling.		
Marble	Slate	Metamorphic
Metamorphic rock is formed through heat and pressure.		
Sandstone	Chalk	Sedimentary
Sedimentary rock is formed by compressing sediments.		

The Fossilisation Process

An animal dies. It gets covered with sediments which eventually become rock.	More layers of rock cover it. Only bones, shells and teeth remain.	Over thousands of years, sediment might become a cast fossil. Bones become minerals.	Changes in sea level take place over a long period.	After erosion takes place, eventually the fossil is exposed.

MATERIALS



Key Vocabulary

Conductor - A material or device which allows heat or electricity to carry through

Dissolve - When something solid mixes with a liquid and becomes part of the liquid

Evaporation - The process of turning from liquid to vapour

Flexible - Capable of bending easily without breaking

Gas - An air-like fluid substance which expands freely to fill any space available

Insulator - A substance which does not readily allow the passage of heat or sound

Irreversible - Cannot be reversed back to its original state

Liquid - A substance that flows freely but can be measured by volume e.g. water or oil

Magnetic - Capable of being magnetised or attracted by a magnet

Material - The matter from which a thing is or can be made from

Opaque - Not able to be seen through, not transparent

Reversible - Able to be reversed back to its original state

Solid - Firm and stable in shape, not a liquid or fluid

Soluble - Able to be dissolved, especially in water

Thermal - Relating to heat

Transparent - Allows light to pass through so that objects behind can be seen



OTTERS CLASS: FORCES

Science Knowledge Organiser

Knowledge

Skills

Vocabulary

Knowledge

Progression

Can I explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object?

Can I identify the effects of air resistance, water resistance and friction that act between moving surfaces?

Can I recognise that some mechanisms, including pulleys, levers and gears allow a smaller force to have a greater effect?

Curriculum Coverage

- 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.

Skills Progression

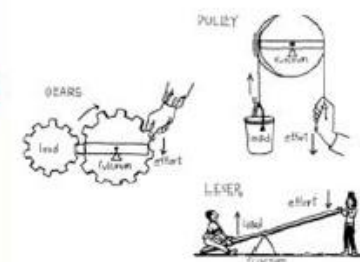
- To be able to identify scientific evidence that has been used to support or refute ideas or arguments.
- To be able to take repeated accurate measurements using a stopwatch.
- To be able to explain the degree of trust in results.
- To be able to use test results to make predictions to set up further fair tests.
- To be able to plan a fair test, identifying the control variables.

Scientific vocabulary

- Gravity, friction, air resistance, up thrust, weight.
- Measuring forces: Newton meter, Newtons (N)
- Particles, surface area, push, pull, balance.
- Mass – grams and kilograms.
- Mechanical devices – gears, levers, pulleys, springs.

Scientific enquiry

What is a force? What does a force do? What is the difference between weight and mass? What is gravity? How do gravitational forces differ? What is friction? What types of resistance are there? What is up thrust? How do we measure force? How can our knowledge of forces help us in everyday life?



pushes and pulls – forces and motion





SCIENCE

INVESTIGATING FORCES

Date: w.c. 27.2.23



OTTERS CLASS Science Knowledge Organiser

Knowledge Skills Vocabulary

Knowledge Progression

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

Curriculum Coverage

- 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

Skills Progression

- To be able to identify scientific evidence that has been used to support an idea or hypothesis
- To be able to take repeated accurate measurements using a stopwatch
- To be able to explain the degree of their results
- To be able to use test results to make predictions to set up further fair tests
- To be able to plan a fair test, identifying the control variables

Scientific vocabulary

- Gravity, friction, air resistance, up thrust, weight
- Measuring Forces: Newton meter, Newtons (N)
- Particles, surface area, push, pull, balance
- Mass - grams and kilograms
- Mechanical devices - gears, levers, pulleys, springs

Scientific enquiry

What is a force? What does a force do? What is the difference between weight and mass? What is gravity? How do gravity and forces affect? What is friction? What types of resistance are there? What is up thrust? How do we measure force? How can our knowledge of forces help us in everyday life?

push and pull - forces and motion



2. What are we learning today? [Our new knowledge].



- Today we will find out what we already know, prove that gravity exists and acts upon all objects with the same force.
- We will test hypotheses, we will throw things in the air, watch Mr Luff arm-wrestling one of the Otters and use language really specifically!

3. Important Vocabulary.

Key Vocabulary

Air resistance - A force that is caused by air with the force acting in the opposite direction to an object moving through the air

Force - A push or pull upon an object resulting from its interaction with another object

Friction - The resistance that one surface or object encounters when moving over another

Gears - A toothed wheel that works with others to alter the relation between the speed of a driving mechanism (e.g. engine) and the speed of the driven parts (e.g. the wheels)

Gravity - The force that attracts a body towards the centre of the earth

Lever - A rigid bar resting on a pivot that is used to move a heavy or firmly fixed load

Mass - The weight measured by an objects acceleration under a given force or by the force exerted on it by gravity

Pull force - To draw or haul towards oneself or itself, in a particular direction

Pulleys - A wheel with a grooved rim around that changes the direction of a force applied to the cord

Push force - To move something in a specific way by exerting force

Water resistance - A force that is caused by water with the force acting in the opposite direction to an object moving through the water



4. Today's learning / activity.



- First, we need to know what you know so that we know what you need to know moving forward.

1. If a ball is dropped, it falls because of the force of gravity between it and the Earth. Circle the correct answer.

true false

2. Gravity is only found on the Earth. Circle the correct answer.

true false

4. Today's learning / activity.



5.



A lever placed under a block can lift it.

A large movement of the lever moves the block with _____ effort.

Choose the correct word to complete the sentence above: less more

4. Today's learning / activity.



3. A box slides over a surface.

a) When two surfaces rub together, what is the name of the force that opposes the movement?

b) Explain what would happen to this force if the surfaces were made smoother.

c) How will this affect the force needed to move the box?

4. Today's learning / activity.



- In your science book, write this LO:
- LO: to describe forces around us
- Then write the following subheadings (Mr Luff will explain the layout...)
- Youtube presentation...
- Gravity Always Wins!
- Arm-Wrestling in the Otters Class!
- How to slow down gravity...

4. Today's learning / activity.



- Watch each of the demonstrations really carefully, then recount them, using the technical vocabulary under each subtitle. You will have 5 minutes for each task.
- Credit will be given for detail, a good memory, application of the correct terminology and annotated diagrams.
- <https://www.youtube.com/watch?v=Aoy3jgtbOko>
- Good luck!

SCIENCE

Date: w.c. 6th March 2023

LO: to know that forces are measure in Newtons,
and that different forces are needed to move a
range of stationery items

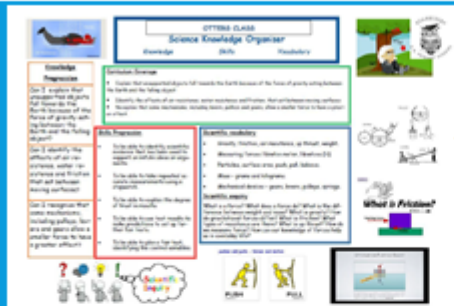
5. Review

Did we achieve our Learning Objective?
BALANCE Self-Assessment...



- 1) What are the colours that make light?
- 2) How can light be separated?
- 3) Describe evaporation / condensation / filtration;
- 4) Name a reversible change;
- 5) Name an irreversible change.

1. What did we learn in our last session? [Recap of knowledge].



*Gravity Always Wins!
Arm-Wrestling in the Otters
Class!
How to slow down gravity...*

3. Important Vocabulary.



Key Vocabulary

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Push force - To move something in a specific way by exerting force.

Water resistance - A force that is caused by water with the force acting in the opposite direction to an object moving through the water.

2. What are we learning today? [Our new knowledge].



- Isaac Newton was a remarkable scientist and mathematician.
- He is so important to science that forcemeters (devices which measure force) are also known as Newton meters, and force is measured in Newtons!
- Imagine that! In 400 years we might be measuring volume in Holmans! Or doing a dance called The Clowes! Wow!
- But how exactly does a Newton meter work?

What are 5 interesting facts about Isaac Newton?

- Isaac Newton has two birthdays. ...
- Isaac almost gave up on his education. ...
- An apple never actually fell on his head. ...
- Newton discovered a lot more than gravity. ...
- Isaac has his own special 50p. ...
- Newton never got married. ...
- He died at age 84. ...
- His dog once set his laboratory on fire.

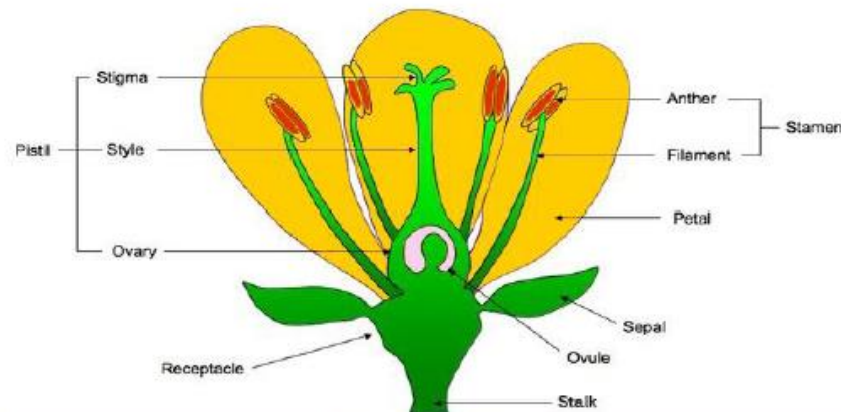
4. Today's learning / activity.



- Devise an investigation that uses a Newton meter.
- You might want to see how much force objects of different masses exert.
- You may choose to assess how much force is needed to move an object on a variety of surfaces.
- What exactly do you want to do? What do you hypothesise (great Greek word! Will happen? How will you record your results?

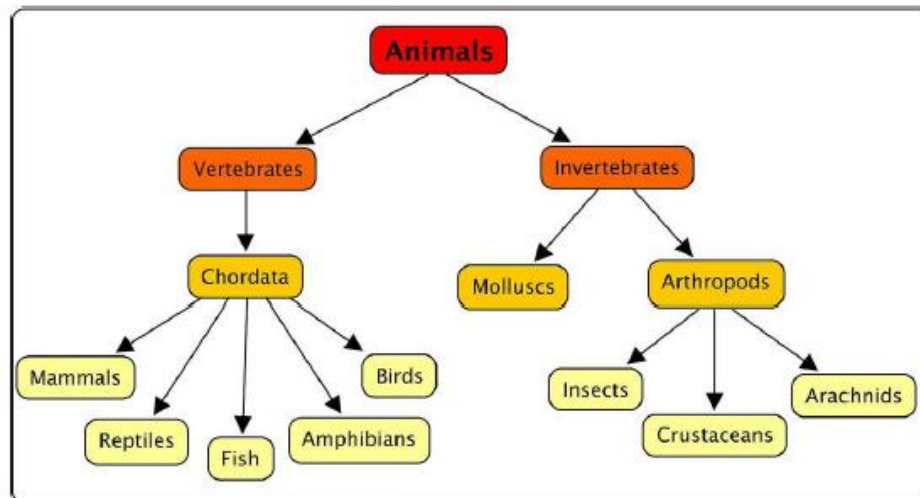
What you need to do to conduct your investigation?	What you need to record your results?
1. Plan your investigation. What are you going to investigate? What are you going to measure? What are you going to change? What are you going to keep the same?	
2. Carry out your investigation. Record your results in a table. What are you going to record? How are you going to record it?	
3. Analyse your results. What do you think is happening? What do you think is the reason for this? What do you think is the conclusion?	
4. Draw a conclusion. What do you think is the answer to your question? What do you think is the final result?	

Living Things



Parts of a flower

Classification



Key Vocabulary

Amphibian - A cold-blooded vertebrate animal that comprises frogs, toads, newts, salamanders and caecilians

Asexual reproduction - Offspring get genes from one parent so are clones of their parents

Bird - A warm-blooded egg-laying vertebrate animal distinguished by the possession of feathers, wings, a beak and typically able to fly

Habitat - The natural home or environment of an animal, plant or other organism

Insect - A small animal that has six legs and generally one or two pairs of wings

Invertebrate - An animal lacking a backbone

Life cycle - The series of changes in the life of an organism including reproduction

Mammal - A warm-blooded vertebrate animal, distinguishable by the possession of hair or fur, females secreting milk for young and typically giving birth to live young

Metamorphosis - The process of transformation from an immature form to an adult form in two or more distinct stages

Sexual reproduction - Offspring get genes from both mum and dad, inheriting a mix of features from both

Vertebrate - An animal with possession of a backbone/ spinal column

Living Things

Domain	Bacteria	Archaea	Eukarya			
Kingdom	Bacteria	Archaea	Protista	Fungi	Plantae	Animalia
Example						
Characteristics	Bacteria are simple unicellular organisms.	Archaea are simple unicellular organisms that often live in extreme environments.	Protists are unicellular and are more complex than bacteria or archaea.	Fungi are unicellular or multicellular and absorb food.	Plants are multicellular and make their own food.	Animals are multicellular and take in their food.

Key Vocabulary

Amphibian - A cold-blooded vertebrate animal that comprises frogs, toads, newts, salamanders and caecilians

Annelid - A segmented worm

Arachnid - An animal that has eight legs and a body formed of two parts

Bird - A warm-blooded egg-laying vertebrate animal distinguished by the possession of feathers, wings, a beak and typically able to fly

Crustaceans - Mostly live in water with a hard shell and segmented body

Habitat - The natural home or environment of an animal, plant or other organism

Insect - A small animal that has six legs and generally one or two pairs of wings

Invertebrate - An animal lacking a backbone

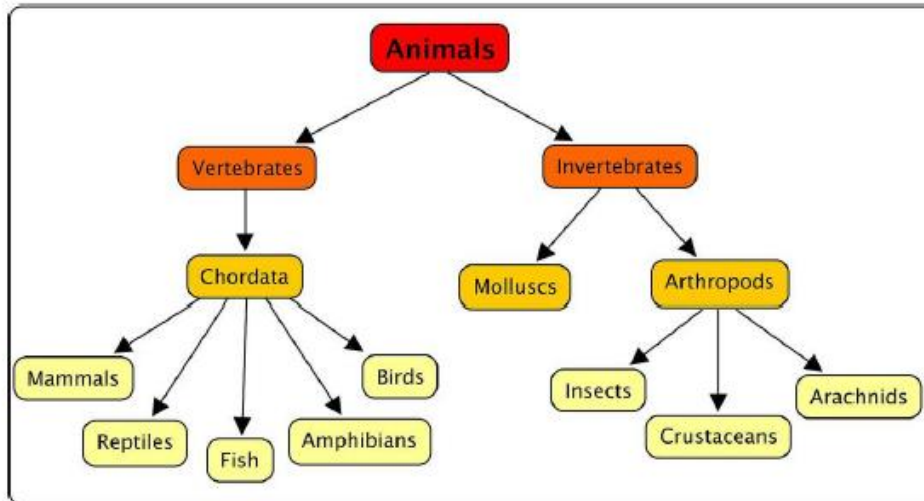
Mammal - A warm-blooded vertebrate animal, distinguishable by the possession of hair or fur, females secreting milk for young and typically giving birth to live young

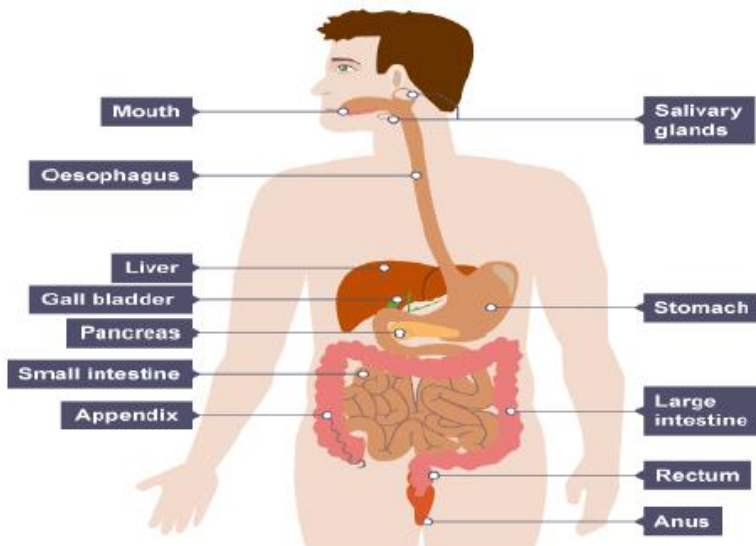
Microorganism - A microscopic organism, especially a bacteria, virus or fungus

Reptile - A vertebrate animal that has dry scaly skin and typically lay soft-shelled eggs on land

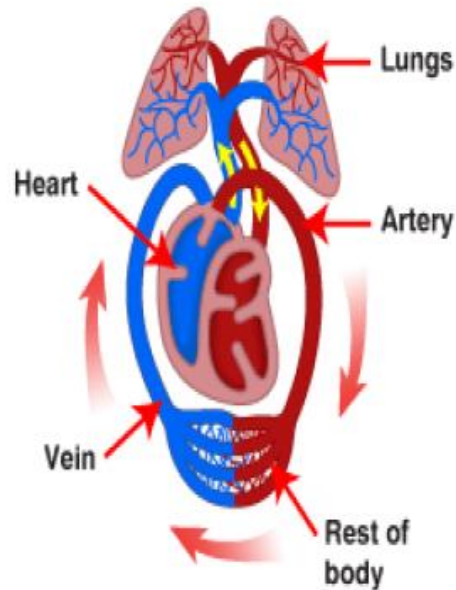
Vertebrate - An animal with possession of a backbone/ spinal column

Classification





Animals



Key Vocabulary

Arteries - Muscular-walled tubes that transport blood from the heart to other parts of the body

Blood - Red liquid that circulates in arteries and veins, carrying oxygen to and carbon dioxide from tissues of the body

Blood vessel - A tubular structure carrying blood through the tissues and organs

Bones - Hard whitish tissue making up the skeleton in humans and other vertebrates

Circulatory system - The system that circulates blood through the body, including the heart, blood vessels and blood

Heart - A hollow muscular organ that pumps the blood through the circulatory system

Lungs - Pair of organs situated within the ribcage where oxygen can pass into the blood and carbon dioxide be removed

Muscles - A band or bundle of fibrous tissues that have the ability to contract, producing movement in or maintaining positions of parts of the body

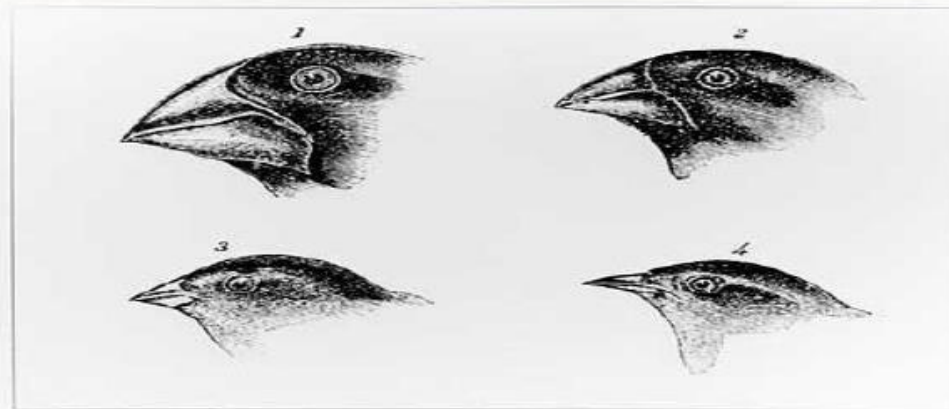
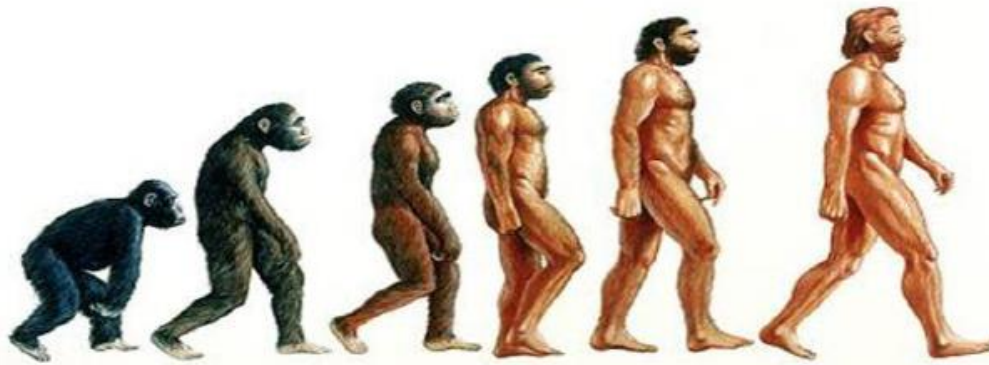
Nutrients - A substance that provides nourishment essential for the maintenance of life and for growth

Organs - Part of an organism that is typically self-contained and has a specific vital function (e.g. the heart and lungs)

Veins - Tubes forming part of the blood circulation system of the body, carrying mainly oxygen-depleted blood towards the heart

Vitamins - Organic compounds essential for normal growth and nutrition

Evolution



Key Vocabulary

Adaptation - The process of change so that an organism or species can become better suited to their environment

Body fossil - Preserved remains of the body of the actual animal or plant itself

Breeding - The mating and production of offspring by animals

Environment - The surroundings or conditions in which a person, animal, or plant lives

Evolution - The process by which different kinds of living organism are believed to have developed from earlier forms during the history of the earth

Fossil - The remains or impression of a prehistoric plant or animal embedded in rock and preserved

Inherit - To gain a quality, characteristic or predisposition genetically from a parent or ancestor

Offspring - A person's child or children/ an animal's young

Reproduction - The production of offspring by a sexual or asexual process

Selective breeding - The process by which humans use animal breeding and plant breeding to develop selective characteristics by choosing particular animals and plants

Trace fossil - Indirect evidence of life in the past such as the footprints, tracks, burrows, borings and waste left behind by animals