

Year 5 Unit Overview

Properties and Changes of Materials

Living Things and their Habitats

Earth and Space

Animals, Including Humans - The Human Life Cycle

Forces

Scientists



[Becky Schroeder](#)
(Inventor of the glow sheet)
[Dr Nira Chamberlain](#)
(polymath/mathematician who studies applied mathematics in science)



[Malaika Vaz](#)
(National Geographic explorer)
[Carl Linneus](#)
(botanist and zoologist)



[Mai Jemison](#)
(Astronaut)
[Dr Helen Mason](#)
(Solar scientist)



[Sigmund Freud](#)
(Created psychoanalysis)
[Olive Guthrie Smith](#)
(physiotherapist)



[Isaac Newton](#)
(Discovered gravity)
[Rafsan Chowdhury](#)
(Mechanical Engineer)

Careers

Chemical engineer (solves problems involving chemicals)
Biochemist (investigates chemical processes that take place inside living things)

Farmer (grows crops and raises animals for food)
Oceanographer (studies the physical and biological aspects of the ocean)

Astronaut (travels to space to carry out research)
Aeronautical engineer (develops spacecraft)
Astrophysicist (studies the physics of space and objects in space)

Physiotherapist (helps people affected by illness, injury or disability thorough movement and exercise)
Psychiatrist (a doctor who specialises in mental health)

Aeronautical engineer (designs, develops, manufactures and maintains aircraft)
Builder (builds structures)
Mechanical engineer (designs, analysis and manufactures mechanical systems)

Working Scientifically

I'm setting up comparative and fair tests like a biochemist.
I'm planning different types of scientific enquiries like a chemical engineer.

I'm recognising and controlling variables like a farmer.
I'm recording data like an oceanographer

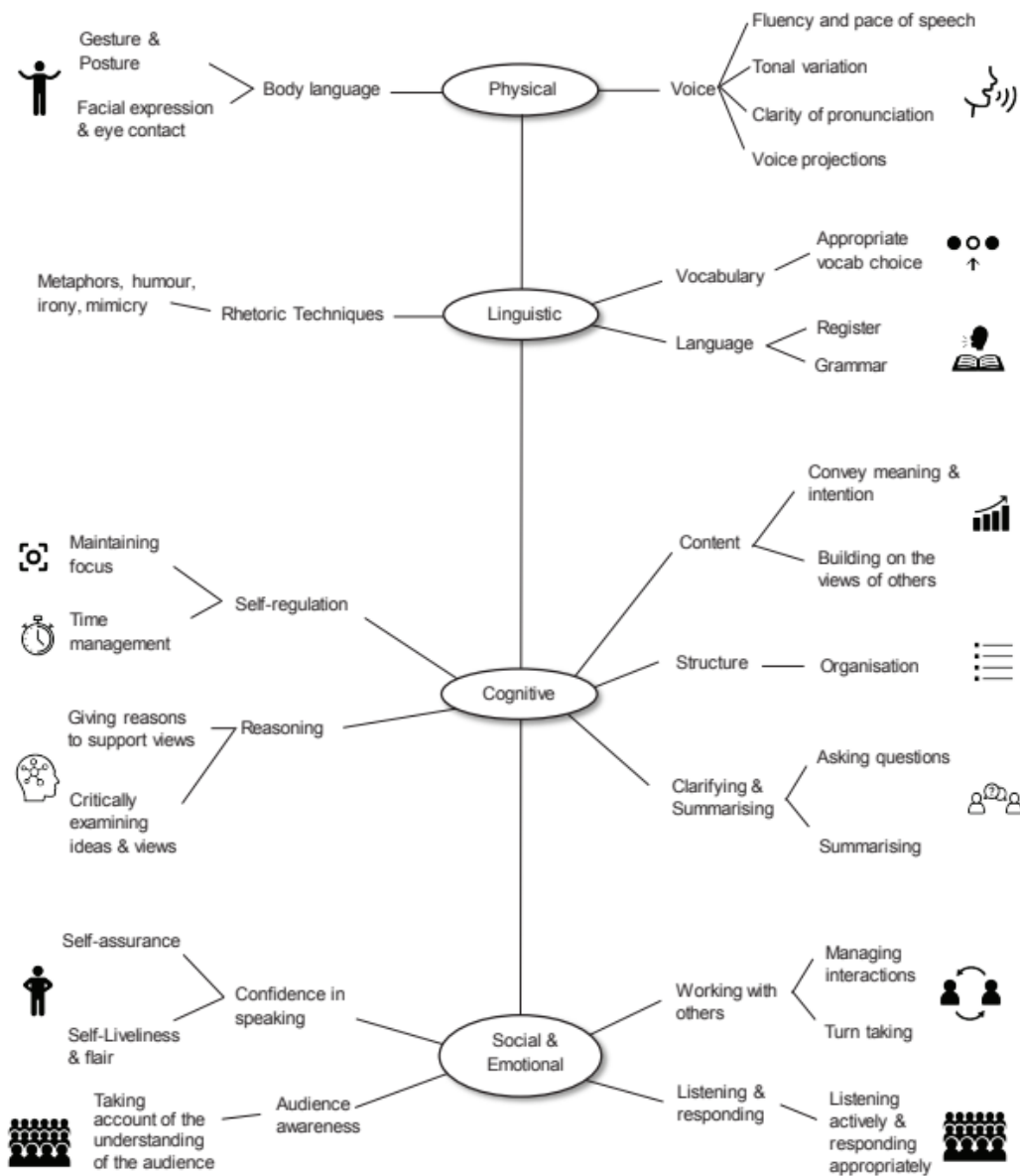
I'm presenting findings and conclusions like an astrophysicist.
I'm using scientific diagrams and labels like an aeronautical engineer.

I'm identifying scientific evidence to support ideas like a physiotherapist.
I'm reporting causal relationships like a psychiatrist.

I'm taking measurements like an aeronautical engineer.
I'm using test results to make predictions like a mechanical engineer.

Supporting Oracy Resources

Oracy Graphic Organiser



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Sentence Stems for giving feedback

Praise: What have they done well?

Be Specific

Give an example

Why was it good?

- Because you have...
- Your work has had the effect of...
- You have improved how...
- I notice that you...
- This means that...

- When you... it made me...
- Your use of... in order to...
- I enjoyed the part where...
- The part where you... has had the effect of...

Enhance: What do they need to do to improve?

Be specific

Give an example

Why will it enhance their learning?

Checking for Understanding	Reshaping and Extending Learning
<ul style="list-style-type: none"> • Why did you choose to...? • Can you explain how...? • Prove to me how you came to this conclusion by using... • What effect did ... have on ... 	<ul style="list-style-type: none"> • I've noticed that you haven't... • Can you prove...? • Could you have included...? • Where else could you use... in your learning? • In order to improve your learning, you need to...

Respond: Show that you understand

Read what you could have done better

Correct the mistake

Show how you now understand

- Thank you, I agree that...because...
- I can see why you've said that...
- I actually disagree with you because...
- I have now... the effect this has had is...

- Now that I've had time to reflect...
- I agree with your comment that... because...
- Now that you've pointed it out...
- You've helped me to understand...

Supporting Oracy Resources

Tiered Vocabulary Wall- A way to organise our words.

Tiered Vocabulary Walls are a way of organising words. The aim of using Tiered Vocabulary Walls is to increase the amount of Tier 2 and Tier 3 words which children hear and use themselves. Tier 2 and Tier 3 words make the most impact on our vocabulary and on our learning. These words need direct teaching in order for them to be understood and used.

Tier 3	<p><u>Subject specific words:</u></p> <p>These will be rare and will be heard within particular contexts or subject areas. These will need direct teaching, such as:</p> <p><i>estuary, alliteration, igneous...</i></p>
Tier 2	<p><u>Focus words:</u></p> <p>These will be common words that are found across subjects. These will need direct teaching, such as:</p> <p><i>contradict, circumstance, precede, retrospect...</i></p>
Tier 1	<p><u>Everyday words:</u></p> <p>These will be basic, everyday words which will be used from an early age. These will be used freely in speech, such as:</p> <p><i>warm, dog, tired, run, table, flower....</i></p>

For example, Tiered Vocabulary for weather could look like:

Tier 3: barometer, isobar, celsius, tsunami

Tier 2: predict, forecast, breeze, shower, pressure

Tier 1: sun, cloud, rain, cold, warm, wind



Talking like a Scientist Sentence Stems



- It is...because...
 - It will...because...
 - *How do you know (e.g. 'The porridge is hot')?*
- I think this...because...
 - I know this, so I think...
 - This will happen because...
 - *What do you think?*
 - *What will happen if...?*
- I know that... Therefore, I know that...
 - Due to the fact that..., I know that...will happen.
 - Maybe it's because...
 - It is true that...
 - Having analysed..., I believe that...
 - I can prove how I know this because...
- Can we prove that...?
 - In conclusion, I have found that...
 - I would like to prove / disprove...
 - Perhaps the reason is ...
 - Based on the evidence I have been presented with, I conclude...
 - Taking everything into account...
 - Having pondered...
 - Given this, it is likely that...
 - *If we accept this hypothesis, what else will be true?*

Oracy in action video library:

- *Talk Tactics
- *Discussion in EYFS
- *Concept Cartoon
- *Whole class talk detectives
- *Talk Tokens
- *New Vocabulary
- *Silent Summariser
- *Harkness Discussion
- *Odd One Out

Properties and Changes of Materials

Knowledge Organiser
Unit: Properties and Changes
of Materials

Key Vocabulary

Key Word	Meaning
separate	To split or divide a substance into its distinct elements
solution	A mixture of two substances, the solute and the solvent
solute	A substance that is dissolved in liquid.
solvent	A substance that dissolves a solute, such as water.
irreversible	Impossible to change back to a previous condition or state.
compound	A substance formed when two or more chemical elements are bonded together.
physical change	A change in material in which no new substances are formed
chemical change	A change that results in the creation of few chemical substances.

5 ways to compare a **physical** and **chemical** change.

Property	Physical Change	Chemical Change
Explanation	Molecules are rearranged but the actual type of molecules stay the same.	The type and make-up of the molecules is changed and a new substance is formed.
Change	A temporary change that is easily reversed, and no new substance is formed.	A permanent change that is irreversible, with a new substance always being formed.
Energy	No energy is produced, and very little or no energy is absorbed.	Energy is produced, in the form of light or heat (for example) and energy is also absorbed.
Effects	Only has an effect on physical properties of a substance or object i.e. shape, size.	Changes both physical and chemical properties of a substance or object.
Examples	Freezing or boiling water, melting wax	Burning wood, eating food, rusting of metal.

- 1 • Can I describe and compare the properties of uses of different materials?
- 2 • Can I understand that some changes to materials are not reversible?
- 3 • Can I understand how physical and chemical changes occur?
- 4 • Can I understand how to dissolve a substance?
- 5 • Do I know and understand separation methods - filtering, sieving and evaporating?
- 6 • Can I understand how a chemical reaction happens?
- 7 • Can I understand the differences between elements, compounds and mixtures and explain how they are formed?

Separation Techniques

Filtering

- Brewing coffee
- Cleaning a swimming pool
- Vacuum Cleaning



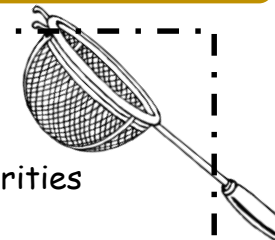
Evaporating

- Body sweat
- The water cycle
- Salt / crystal extraction



Sieving

- Removing impurities during cooking
- Sieving sand during building
- Mining for minerals



Unit		Year 5: Properties and Changes of Materials	
National Curriculum	Pupils should be taught to: <ul style="list-style-type: none"> • 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. 		
Prior Learning		Future Learning	
Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials) Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 - Forces and magnets) Compare and group materials together, according to whether they are solids, liquids or gases. (Y4 - States of matter) · Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). (Y4 - States of matter) Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. (Y4 - States of matter)		Chemical reactions as the rearrangement of atoms. (KS3) Representing chemical reactions using formulae and using equations. (KS3) Combustion, thermal decomposition, oxidation and displacement reactions. (KS3) Defining acids and alkalis in terms of neutralisation reactions. (KS3) The pH scale for measuring acidity/alkalinity; and indicators. (KS3)	
Key Learning		Key Vocabulary	
Materials have different uses depending on their properties and state (liquid, solid, gas). Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment. Mixtures can be separated by filtering, sieving and evaporation. Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible.		Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material	
Common Misconceptions		Lots of misconceptions exist around reversible and irreversible changes, including around the permanence or impermanence of the change. There is confusion between physical/chemical changes and reversible and irreversible changes. They do not correlate simply. Chemical changes result in a new material being formed. These are mostly irreversible. Physical changes are often reversible but may be permanent. These do not result in new materials e.g. cutting a loaf of bread. It is still bread, but it is no longer a loaf. The shape, but not the material, has been changed. Some children may think: <ul style="list-style-type: none"> • thermal insulators keep cold in or out • thermal insulators warm things up • solids dissolved in liquids have vanished and so you cannot get them back • lit candles only melt, which is a reversible change. 	

Year 5 Properties and Changes of Materials

Lesson Question	Skills	Knowledge	Lesson Overview	Summative Assessment Questions	Key Vocabulary
Can I describe and compare the properties of uses of different materials?	Testing properties of materials Use test results to make predictions to set up further comparative and fair tests	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	Compare the properties of different materials. Absorbency Investigation.		hardness, transparency, conductive, magnetic, solubility elastic, durable, absorbency, waterproof, flexibility
Can I understand that some changes to materials are not reversible?	Report and present findings from enquiries, share your conclusions	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	Have a go at today's fun experiment to see if a chemical reaction occurs.		bicarbonate of soda, irreversible, permanent, burning, activate
Can I understand how physical and chemical changes occur?	Use existing knowledge to identify physical and chemical processes	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	Identify chemical and physical changes		physical change, chemical change, rust, iron oxide, properties
Can I understand how to dissolve a substance?	Take measurements using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings	Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution Demonstrate that dissolving, mixing and changes of state are reversible changes	The Dissolving Sugar Challenge!		solution, dissolve, solute, saturated, solvent
Do I know and understand separation methods - filtering, sieving and evaporating?	Describing laboratory processes	Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating	Explain how to separate mixtures		separate, method, filter, sieve, evaporate
Can I understand how a chemical reaction happens?	Identifying chemical 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	Identifying the chemical change.		bond, molecule, product, reaction, atom
Can I understand the differences between elements, compounds and mixtures and explain how they are formed?	Identify scientific evidence that has been used to support or refute ideas or arguments	Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic	Identifying atoms, elements and compounds by making models to represent them.		compound, element, mixture, helium, methane

Earth and Space

Oracy Outcome:

Year Group	Oracy Skills – Learning to talk	Oracy Skills – Learning through talk	Oracy Outcome			
	Physical, Linguistic, Cognitive, Social & Emotional	Subject specific skills	Purpose	Audience	Outcome (link to topic)	Resources
5 – Space	<p>Linguistic - To use an increasingly sophisticated range of sentence stems with accuracy.</p> <p>Social and Emotional - To speak with flair and passion.</p> <p>Cognitive - To identify when a discussion is going off topic and to be able to bring it back on track.</p>	<p>Cognitive - To be able to draw upon knowledge of the world to support their scientific explanation.</p>	To share information	Younger year groups	<p>Audio presentation – on an aspect of Space</p> <p>Google Slides Groups of 4</p>	Always, Sometimes, Never, Talking Point, Listening ladder, Talk Detectives, Fed in facts.

Talking points

The moon is a light source.

The Sun goes round the Earth once a year.

The Sun is a planet.

Space is very close to the Earth's surface – only 60 miles up.

A light year is a measure of distance.

The Moon changes shape because it is in the shadow of the Earth.

Concept Cartoon



Erika

The moon blocks the sun at night.

The sun sets and it is night. It rises when it's day.



Karl

Explain why we have day and night.



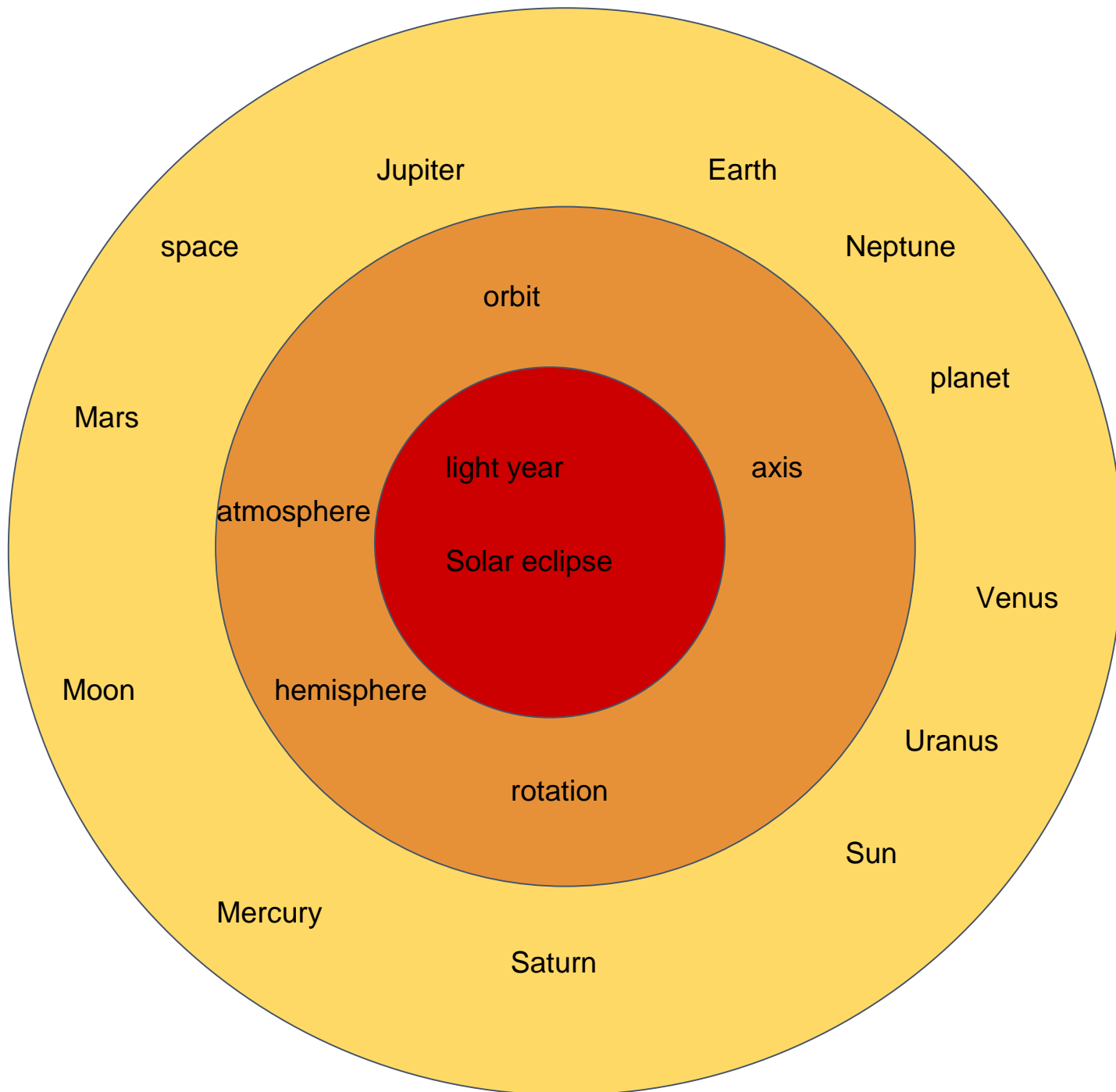
Tamana

It's because the Earth spins on its axis.

We need night time because we need to sleep.



Tom



	Tally	Total
1 point words		
3 point words		
5 point words		
	Overall total =	

Knowledge Organiser

Unit: Earth and Space

Key Question 1

• Can I Describe the contribution Nicholas Copernicus made to science?

Key Question 2

• Can I define 'orbit' and 'axis' and explain what phenomena they cause?

Key Question 3

• How does gravity act as a force?

Key Question 4

• Can I name the different planets in the solar system?

Key Question 5

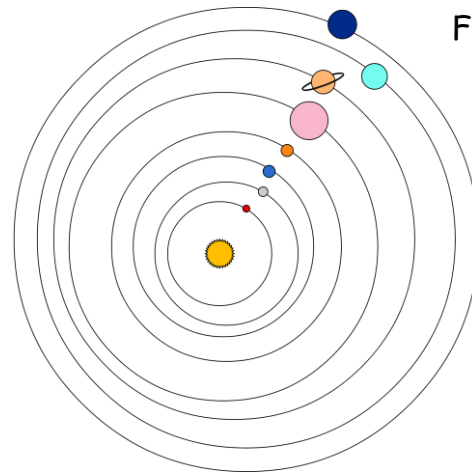
• Can I understand and explain theories about The Big Bang and the Universe?

Key Question 6

• Can I explain the cause of the changes of the Moon phase?

It takes the Earth 365.25 days to orbit the sun, which is why every four years we have a leap year of 366 days, to catch up with the orbit!

The Earth takes 24 hours to spin on its axis and complete one rotation, which is why our days are 24 hours long.



FROM THE SUN
OUTWARDS:

Mercury
Venus
Earth
Mars
Jupiter
Saturn
Uranus
Neptune

This diagram is a good, simple way to remember the order of the planets and also to understand **planetary motion** and the way the planets **orbit** the sun. **Copernicus** developed the **heliocentric** theory that the sun was at the centre of the **solar system**. However, the **ellipses-shaped orbit** was an idea that was discovered by Johannes Kepler in the 17th century.

gravitational force

We are constantly attracted to the Earth by its gravitational force. The reason the Moon doesn't fall to Earth because of gravity is because it constantly moves around us. Without the Earth's gravity, it would float away into space.

Key Vocabulary

Key Word	Meaning
heliocentric	The modern model of the solar system, which places the sun at the centre.
geocentric	The old solar system model, which thought the Earth was at the centre.
solar system	The name for the sun and all the planets, asteroids, meteors and comets that orbit it.
astronomy	The study of space, planets and the universe as a whole.
Big Bang Theory	The most widely accepted scientific theory of how the Universe was made.
gravitational force	The force that causes two particles to pull towards each other.
orbit	The path of one celestial object around another i.e. the Moon around the Earth.
hemisphere	On Earth, there are two of these - the North and South, separated by the equator.

Comets, asteroids, and meteors

Comets are chunks of ice and rock with tails that orbit a long way around the Sun.

Asteroids are chunks of rock and metal that orbit more closely to the Sun.

Meteors are fragments of Asteroids that fly into the Earth's atmosphere and catch fire, leaving a bright streak in the sky.

Unit	Year 5: Earth and Space	
National Curriculum	Pupils should be taught to: <ul style="list-style-type: none"> 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. 	
Prior Learning		Future Learning
Explore the natural world around them. (Reception - Earth and space) Describe what they see, hear and feel whilst outside. (Reception - Earth and space) Observe changes across the four seasons. (Y1 - Seasonal changes) Observe and describe weather associated with the seasons and how day length varies. (Y1 - Seasonal changes)		Gravity force, weight = mass x gravitational field strength (g), on Earth $g=10 \text{ N/kg}$, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only). (KS3) Our Sun as a star, other stars in our galaxy, other galaxies. (KS3) The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. (KS3) The light year as a unit of astronomical distance. (KS3)
Key Learning		Key Vocabulary
The Sun is a star. It is at the centre of our solar system. There are 8 planets (can choose to name them, but not essential). These travel around the Sun in fixed orbits. Earth takes $365\frac{1}{4}$ days to complete its orbit around the Sun. The Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (day) and half is facing away from the Sun (night). As the Earth rotates, the Sun appears to move across the sky. The Moon orbits the Earth. It takes about 28 days to complete its orbit. The Sun, Earth and Moon are approximately spherical.		Sun, Moon, Earth, planets (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, Solar System, rotate, star, orbit
Common Misconceptions	Some children may think: <ul style="list-style-type: none"> the Earth is flat the Sun is a planet the Sun rotates around the Earth the Sun moves across the sky during the day the Sun rises in the morning and sets in the evening the Moon appears only at night night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth. 	

Year 5 Earth and Space

Lesson Question	Skills	Knowledge	Lesson Overview	Summative Assessment Questions	Key Vocabulary
Can I Describe the contribution Nicholas Copernicus made to science?	Use existing knowledge to create a model of the solar system.	Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus.	Create your own Solar System.		heliocentric, geocentric, Nicolaus Copernicus, orbit, Ptolemy
Can I define 'orbit' and 'axis' and explain what phenomena they cause?	Record data using scientific diagrams and labels	Describe the movement of the moon relative to the Earth Describe the sun, Earth and moon as approximately spherical bodies	Create a diagram / drawing which shows the movement of Earth around the sun, indicating how day and night occur where you live.		axis, season, poles, eclipse, hemisphere
How does gravity act as a force?	Using test results to make predictions to set up further comparative and fair tests	Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky	Does weight affect how fast the balls will fall?		ocean tides, gravitational force, black hole, mass, celestial
Can I name the different planets in the solar system?	Apply knowledge and understanding	Pupils should be introduced to a model of the sun and Earth that enables them to explain day and night. Pupils should learn that the sun is a star at the centre of our solar system and that it has 8 planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). They should understand that a moon is a celestial body that orbits a planet (Earth has 1 moon; Jupiter has 4 large moons and numerous smaller ones).	Heather and Jon show how to play a game of Space using today's Handout.		rocky planets, gas planets, dwarf planet, moon, solar system
Can I understand and explain theories about The Big Bang and the Universe?	Reporting and presenting findings from enquiries, including conclusions, casual relationships of and degree of trust in results, in oral and written forms, such as displays and other presentations	Pupils should find out about the way that ideas about the solar system have developed	Making a model of the Universe.		astronomy, universe, Milky Way, expand, Big Bang theory
Can I explain the cause of the changes of the Moon phase?	To explain a natural process	Describe the sun, Earth and moon as approximately spherical bodies	Create a leaflet which shows the different phases of the Moon.		phase, orbit, illuminate, waxing, waning

Living Things and their Habitats

Knowledge Organiser
Unit: Living Things and their Habitats

Key Vocabulary

Key Word	Meaning
Sir David Attenborough	A natural scientist who has made many award-winning nature documentaries
Jane Goodall	A scientist who committed her life to studying the lives of chimpanzees and other primates.
naturalist	An expert in natural sciences and history.
metamorphosis	When insects and animals develop into adult forms through a cycle of changes.
endangered	A species of animal with very few alive.
documentary	A film or programme that researches, studies and provides a factual report on a subject.
asexual	Something that reproduces on its own.
reproduction	To make offspring.

Living things that reproduce asexually include bacteria, mould, algae and fungi. This means they reproduce by themselves!

Animals and birth



Most **mammals**, including humans, go through 'live birth.' This means that the mother gives birth to it as a live mammal, it is just a smaller version of an adult. These mammals will grow into adults over time.

Most **birds and reptiles** are born when the mother lays eggs and incubates them until they are ready to hatch. Once the egg is hatched, the baby is looked after by the mother for a period of time, and then leaves the nest to fend for itself.



Amphibians are a bit different. Many of these are born live or via eggs underwater, but complete a metamorphosis as adults and can live and breathe on land. An example of this is a frog. It starts as frogspawn, changes to a tadpole and then into a frog!



Sir David Attenborough and Dame Jane Goodall

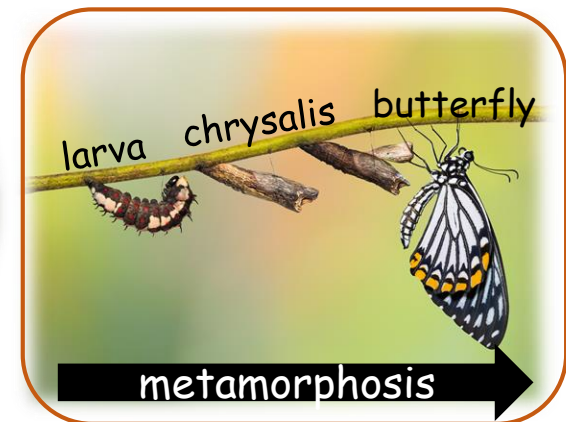
Both Sir David Attenborough and Dame Jane Goodall are leading **naturalists**, and study living things. They both present the life of animals on earth and have made **important documentaries** so we can learn about the world around us. Because of their impact on the world, they have both been awarded honours by the Queen!



Can you remember?

All living things can: move, respire, have senses, grow, reproduce, excrete and take in nutrition.

- 1 Can I learn about the work of Sir David Attenborough?
- 2 Can I understand the life of Jane Goodall and what she achieved?
- 3 Can I understand about sexual reproduction?
- 4 Can I compare the life cycles of different animals?
- 5 Can I understand and describe the differences in life cycles between insects and amphibians?
- 6 Can I describe what it means to reproduce asexually?



Unit	Year 5: Living Things and heir Habitats	
National Curriculum	Pupils should be taught to: <ul style="list-style-type: none"> • 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. 	
Prior Learning		Future Learning
Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans) Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)		Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. (KS3) Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)
Key Learning		Key Vocabulary
As part of their life cycle, plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis. Plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects.		life cycle, reproduce, sexual, fertilises, asexual, plantlets, runners, tubers, bulbs, cuttings
Common Misconceptions	Some children may think: <ul style="list-style-type: none"> • all plants start out as seeds • all plants have flowers • plants that grow from bulbs do not have seeds • only birds lay eggs. 	


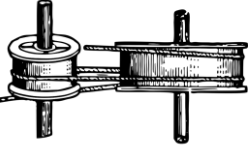

Year 5 Living Things and their Habitats

Lesson Question	Skills	Knowledge	Lesson Overview	Summative Assessment Questions	Key Vocabulary
Can I learn about the work of Sir David Attenborough?	Report and present findings from enquiries, in oral and written forms	They should find out about the work of naturalists and animal behaviourists, David Attenborough	Create a quiz about Sir David Attenborough!		David Attenborough, natural sciences, documentary, naturalist, lecture
Can I understand the life of Jane Goodall and what she achieved?	Report and present findings from enquiries, in oral and written forms	They should find out about the work of naturalists and animal behaviourists, Jane Goodall.	Research the life and work of Dame Jane Goodall.		Jane Goodall, chimpanzee, primatologist, primate, endangered
Can I understand about sexual reproduction?	Write a report and present your findings	Describe the life process of reproduction in some plants and animals	Produce a storyboard of reproduction in a flowering plant.		fertilisation, genes, sexual reproduction, pollination, pollen
Can I compare the life cycles of different animals?	Report and present findings from enquiries, in oral and written forms	Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird	Create a lifecycle poster and fact file on an animal of your choice.		unborn, egg, hatch, fledgling, mammary gland
Can I understand and describe the differences in life cycles between insects and amphibians?	Comparing the life cycle of a butterfly with two other egg-laying animals.	Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird They should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment.	Comparing the life cycle of a butterfly with two other egg-laying animals.		metamorphosis, larva, pupa, tadpole, butterfly
Can I describe what it means to reproduce asexually?	Plan different types of scientific enquiries to answer questions, including controlling variables where necessary	Describe the life process of reproduction in some plants and animals	Clone your own plant cutting and explore how the outcome can be varied.		asexual, plantlet, bulb, tuber, bacteria

Forces

- 1 • Can I recall information about the life and works of Sir Isaac Newton?
- 2 • Can I understand the forces of gravity and air resistance?
- 3 • Can I understand the effects water resistance and friction?
- 4 How and what are pulleys and levers used for?
- 5 • Can I explain how gears allow a smaller force to have greater effect?
- 6 • How can I calculate the density of an object?

Knowledge Organiser Unit: Forces and Magnets

Name	Picture	How it Works	Used For
Lever		Helps to reduce the amount of force needed to move or lift an object, by increasing the distance through which the force acts.	<ul style="list-style-type: none"> • stapler • door handle • claw of hammer • tweezers
Pulley		Helps to reverse the direction of the lifting force, therefore multiplying the force your body produces on the object.	<ul style="list-style-type: none"> • elevator • wells • theatre curtains • bulldozer
Gear		The 'teeth' on the gears turn one another, and in doing so, helps to increase the power of a turning force.	<ul style="list-style-type: none"> • cars • bikes • pendulum clock • vacuums

Key Vocabulary

Key Word	Meaning
Sir Isaac Newton	An English physicist and mathematician, one of the most influential scientists in history.
gravity	A force that attracts something with mass towards earth, measured in Newtons per kilogram.
resistance	A force exerted on something to slow it down or stop it.
lever	A simple machine used to move an object or operate a machine.
gear	Toothed wheel that engages with another to change speed or direction of a machine.
pulley	A wheel which a cord passes through; it helps to raise heavy weights.
mass	The measure of how much matter is in an object.

Sir Isaac Newton (1643-1726)

- Explained the three laws of motion
- Explained the theory of gravity, including gravitational pull of the Earth.
- Invented the reflecting telescope
- His physics book 'Principia' contained many theories of physics

Can you resist me?

Air resistance, otherwise known as **drag**, is the way air opposes the direction an object is travelling in and slows it down. A good example of this is a **parachute**, the large surface area **absorbs** the air resistance, and slows down the descent of the parachutist.



Water resistance is the way water slows down the speed of the item travelling through it. This is why high-speed boats have a narrow front end, so that they can easily glide through it.

Friction occurs when two surfaces rub against each other. The rougher the surface, the more friction is caused. For example, sand and carpet have lots of friction.



Unit	Year 5: Forces	
National Curriculum	Pupils should be taught to: <ul style="list-style-type: none"> • 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. 	
Prior Learning		Future Learning
<p>Compare how things move on different surfaces. (Y3 - Forces and magnets)</p> <p>Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets)</p> <p>Observe how magnets attract or repel each other and attract some materials and not others. (Y3 - Forces and magnets)</p> <p>Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 - Forces and magnets)</p> <p>Describe magnets as having two poles. (Y3 - Forces and magnets)</p> <p>Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 - Forces and magnets)</p>		<p>Forces as pushes or pulls, arising from the interaction between two objects. (KS3)</p> <p>Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces. (KS3)</p> <p>Moment as the turning effect of a force. (KS3)</p> <p>Forces: associated with deforming objects; stretching and squashing - springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water. (KS3)</p> <p>Forces measured in Newtons, measurements of stretch or compression as force is changed. (KS3)</p>
Key Learning		Key Vocabulary
<p>A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.</p> <p>Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object.</p> <p>A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.</p>		<p>Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gear</p>
Common Misconceptions	<p>Some children may think:</p> <ul style="list-style-type: none"> • the heavier the object the faster it falls, because it has more gravity acting on it • forces always act in pairs which are equal and opposite • smooth surfaces have no friction • objects always travel better on smooth surfaces • a moving object has a force which is pushing it forwards and it stops when the pushing force wears out • a non-moving object has no forces acting on it • heavy objects sink and light objects float. 	

Year 5 Forces

Lesson Question	Skills	Knowledge	Lesson Overview	Summative Assessment Questions	Key Vocabulary
Can I recall information about the life and works of Sir Isaac Newton?	Report and present findings using other presentations	Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object Pupils might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.	Newton Challenges.		Sir Isaac Newton, prism, gravity, theory, curved mirror
Can I understand the forces of gravity and air resistance?	Use test results to make predictions to set up further comparative and fair tests	Identify the effects of air resistance, water resistance and friction, that act between moving surfaces	Water drag investigation.		brake, water resistance, streamlined, paddle, friction
Can I understand the effects water resistance and friction?	Use test results to make predictions to set up further comparative and fair tests	Identify the effects of air resistance, water resistance and friction, that act between moving surfaces	Paper drop investigation		parachute, paragliding, sky diving, gravity, drag
How and what are pulleys and levers used for?	Take measurements, use a range of scientific equipment, take repeat accurate readings	They might explore resistance in water by making and testing boats of different shapes. identify the effects of air resistance, water resistance and friction, that act between moving surfaces	Sink or Swim?		mass, volume, buoyant, floating, sinking
Can I explain how gears allow a smaller force to have greater effect?	Report and present findings using other presentations	Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect	Create a set of 3 gears which interact with each other.		gear, worm gear, rack and pinion, bevel gear, mesh
How can I calculate the density of an object?	Record data using scientific diagrams and labels	Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect	Explore how to use a pulley - Why is it better to use a pulley? What are the advantages of using a pulley?		load, effort, lever, pivot, fulcrum

Animals, Including
Humans - The
Human Life Cycle

Knowledge Organiser

Unit: Animals, Including Humans

- 1 • Can I identify the key stages of a mammal's life cycle?
- 2 • Can I explore the gestation periods of mammals?
- 3 • Can I learn about foetal development?
- 4 • Can I investigate the hand span of differently aged children?
- 5 • Can I learn about the changes experienced in puberty?
- 6 • Can I describe the changes humans may experience during old age?

Human Gestation Period (9 months*)

The gestation period is when the **foetus** develops inside the **female**. It is different in all **mammals**.



Some animals give birth to 1 baby - the North American Opossum has between 16 and 20!

- Humans - 9 months
- Elephants - 23 months
- Basking shark - 42 months
- North American Opossum - 12 days

Human Young (0-3years*)

Young mammals (babies) are **dependent** - they:

- need milk
- have poor muscle control
- need lots of sleep
- cannot control toileting

Puppies are born with their eyes closed.
Human babies see light and dark.
Toddlers begin walking between 1-2 years.



Human Youngsters (4-11 years*)

Human and other mammal youngsters walk **independently**, eat independently and toilet independently. They begin to learn new skills.



Human Adults (21-100 years*)

- Adults are fully grown.
- A dog reaches adulthood at about 2 years.
- Adults reproduce so the whole cycle starts again.



A middle-aged adult



An elderly adult

Human Adolescents/Young Adults (12-21 years*)



- Shoulders broaden
- More muscly
- Hair on legs, chest and face
- Penis and scrotum develops
- Voice breaks

During puberty, hormones cause physical, mental and emotional changes. Some are the same for boys and girls:

- Hair on armpits and groin.
- Greasy skin/spots
- Mood swings



- Hips broaden
- Breasts develop
- Menstruation starts (periods)

Key Vocabulary

Key Word	Meaning
offspring	a child or young animal
foetus	the term for an unborn offspring still within the female mammal's body
dependent	an offspring needing others to look after it
adolescent	a mammal's young adult offspring
puberty	the period of life when a human's sexual organs mature
gestation	the period of time an animal is pregnant for
pregnant	when an animal contains a foetus within the body
toddler	the name of the stage given to a young child when they start to walk
prenatal	the stage before birth when the foetus is developing in the womb
breeding	mating and producing offspring
embryo	the name of the unborn offspring in the first few weeks of development
hormones	chemical messengers produced by the body

*These are approximate ages – every individual is different.

Unit	Year 5: Animals, Including Humans	
National Curriculum	Pupils should be taught to: <ul style="list-style-type: none"> Describe the changes as humans develop to old age. 	
Prior Learning		Future Learning
Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)		Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. (KS3)
Key Learning		Key Vocabulary
<p>When babies are young, they grow rapidly. They are very dependent on their parents. As they develop, they learn many skills. At puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce.</p> <p>This needs to be taught alongside PSHE. The new statutory requirements for relationships and health education can be found below:</p> <ul style="list-style-type: none"> statutory guidance on Physical health and mental wellbeing (primary and secondary). <p>Other useful guidance includes:</p> <ul style="list-style-type: none"> Joint briefing on teaching about puberty in KS2 from PHSE Association and Association for Science Education 		Puberty – the vocabulary to describe sexual characteristics
Common Misconceptions	Some children may think: <ul style="list-style-type: none"> a baby grows in a mother's tummy a baby is "made". 	

Year 5 Animals, Including Humans - Human Life Cycle

Lesson Question	Skills	Knowledge	Lesson Overview	Summative Assessment Questions	Key Vocabulary
Can I identify the key stages of a mammal's life cycle?	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs and bar and line graphs	Describe the changes as humans develop to old age	<ul style="list-style-type: none"> Name the key stages of a mammal's life cycle Identify developments during each stage of a life cycle Compare the human life cycle with another mammal 		adolescent reproduce dependent puberty foetus
Can I explore the gestation periods of mammals?	Reporting and presenting findings from enquiries - including conclusions, causal relationships and explanations of and a degree of trust in results - in oral and written forms such as displays and other presentations	Describe the changes as humans develop to old age	<ul style="list-style-type: none"> Understand what gestation is Learn some differences between the gestation periods of mammals Explore reasons behind extreme gestation periods 		gestation pregnant breeding extreme duration
Can I learn about foetal development?	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs and bar and line graphs	Describe the changes as humans develop to old age	<ul style="list-style-type: none"> Understand the stages during pregnancy Accurately create and plot points on a line graph Compare the mass and length lines 		embryo trimester midwife umbilical chord womb
Can I investigate the hand span of differently aged children?	Taking measurements using a range of scientific equipment and with increasing accuracy and precision; taking repeat readings when appropriate	Describe the changes as humans develop to old age	<ul style="list-style-type: none"> Understand all children grow Learn some ways that the growth of children is measured Begin to link data with scientific thinking on growth 		growth spurt childhood motor skills milk teeth constant
Can I learn about the changes experienced in puberty?	Reporting and presenting findings from enquiries - including conclusions, causal relationships and explanations of and a degree of trust in results - in oral and written forms such as displays and other presentations	Describe the changes as humans develop to old age	<ul style="list-style-type: none"> Understand all children go through puberty Identify changes that take place during puberty Compare the changes experienced by boys and girls 		adolescence bloodstream hormone growth appetite
Can I describe the changes humans may experience during old age?	Identifying scientific evidence that has been used to support or refute ideas or arguments	Describe the changes as humans develop to old age	<ul style="list-style-type: none"> Know some key signs of ageing in humans Recognise that humans age differently depending on their lifestyle Suggest ways to stay healthy in old age 		cataract memory neurodegenerative keratin lifestyle