

Year 4 – Astronomy

National Curriculum Objectives		Core Knowledge		Vocabulary	
<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. Describe the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. 		<p>The universe: an extent almost beyond imagining The 'Big Bang' as one theory; Galaxies: Milky Way and Andromeda</p> <p>Our solar system Sun: source of energy (heat and light) The eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto [Note that, in 2006, Pluto was classified as a dwarf planet]; Planetary motion: orbit and rotation</p> <ul style="list-style-type: none"> How day and night on Earth are caused by the Earth's rotation How the seasons are caused by the Earth's orbit around the sun, tilt of the Earth's axis Gravity, gravitational pull: Gravitational pull of the moon (and to a lesser degree, the sun) causes ocean tides on Earth Asteroids, meteors ('shooting stars'), comets, Halley's Comet How an eclipse happens Stars and constellations Exploration of space: Observation through telescopes, Rockets and satellites: from unmanned flights to Apollo 11, first landing on the moon, Space shuttle 		<p>Day, night Earth, Sun, axis, rotation, light source Moon, phases of the Moon, waxing, waning, crescent, gibbous Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, dwarf planet, astronomy planets, solar system, rotate, orbit, axis, spherical, energy, eclipse, geocentric, heliocentric. star, constellation,</p>	
				Key Scientists	Linked Texts
				Claudius Ptolemy and Nicolaus Copernicus (Heliocentric vs Geocentric Universe) Tim Peake (First British ESA astronaut) Katherine Johnson (Worked with NASA)	<i>The Skies Above My Eyes (Charlotte Guillain & Yuval Zommer)</i> <i>George's Secret Key to the Universe</i> <i>(Lucy and Stephen Hawking with Christophe Galfard)</i> <i>Hidden Figures (Simon Bartram)</i> <i>Curiosity: the Story of a Mars Rover (Markus Motum)</i> <i>Cosmic (Frank Cottrell Boyce)</i> <i>A Galaxy of her Own (Libby Jackson)</i>
Prior Learning		Key Questions		Future Learning	
<ul style="list-style-type: none"> Sun: source of energy, light, heat Moon: phases of the moon (full, half, crescent, new) (Y2) The eight planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune) o Note that, in 2006, Pluto was classified as a dwarf planet. (Y2) Stars - Constellations: the Plough, the sun is a star. (Y2) Earth and its place in the solar system o The Earth moves around the Sun; the sun does not move (Y2) o The Earth revolves; one revolution takes one day (24 hours) o Sunrise and sunset o When it is day where you are, it is night for people on the opposite side of the Earth(Y2) 		<ul style="list-style-type: none"> How does temperature/day length/year length change as you get closer/further to the sun? How does distance from a light source affect how much light hits an object? How does speed/size of a meteorite affect the size of the moon crater formed? If the moon became heavier as a result of meteorite collisions what would happen to its position relative to Earth? Why do we have day/night/months/years/seasons? Why does day length change? Why does shadow size change over the course of a day? 		<ul style="list-style-type: none"> Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (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) 	
 Comparative & Fair tests	 Identify & Classify	 Observation over time	 Pattern Seeking	 Research	BIG Question: Assessment Opportunity
How does the length of daylight hours change in each season?	How could you organise all the objects in the solar system into groups?	Can you observe and identify all the phases in the cycle of the Moon?	Is there a pattern between the size of a planet and the time it takes to travel around the Sun?	What unusual objects did Jocelyn Bell Burnell discover? How do astronomers know what stars are made of? How have our ideas about the solar system changed over time?	Sun, Earth & Moon: What is moving and how do we know?

Year 4 – Ecology

National Curriculum Objectives		Core Knowledge		Vocabulary	
<ul style="list-style-type: none"> Recognise that living things can be grouped in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments can change and that this can sometimes pose danger to living things. 		<p>Habitats, interdependence of organisms and their environment</p> <p>The concept of a 'balance of nature' (constantly changing, not a static condition)</p> <p>The food chain: producers, consumers, decomposers</p> <p>Ecosystems: how they can be affected by changes in environment (for example, rainfall, food supply, etc.) and by man-made changes</p> <p>Fossils and how they can tell us about the environment long ago</p> <p>Man-made threats to the environment: Air pollution: emissions, smog; Water pollution: industrial waste, run-off from farming</p> <p>Measures we can take to protect the environment (for example, conservation, recycling)</p>		<p>producer, predator, prey, consumer, decomposer, ecosystem, rainfall, food supply, fossil.</p> <p>human impact, greenhouse effect, climate change, nature reserves, deforestation, pollution, emissions, smog, water pollution, industrial waste, run off, greenhouse gases (carbon dioxide, methane, ozone)</p>	
				Key Scientists	Linked Texts
				<p>Cindy Looy (Environmental Change and Extinction)</p> <p>Jaques Cousteau (Marine Biologist)</p>	<p><i>The Vanishing Rainforest (Richard Platt)</i></p> <p><i>The Morning I Met a Whale (Michael Morpurgo)</i></p> <p><i>Journey to the River Sea (Eva Ibbotson)</i></p> <p><i>The Great Kapok Tree</i></p>
Prior Learning		Key Questions		Future Learning	
<ul style="list-style-type: none"> Living Things in their Environments – Plants. Habitats: rainforest, desert, meadow and underground habitats. Plants: Environmental change (Y2) Living Things in their Environments – Animals. Food chains, oceans and undersea habitats, deep ocean habitats and habitat destruction and damage; classification of animals (Y2) Cycles in Nature: Seasonal cycles and plants, animal migration. Life cycles of a plant and a frog. (Y3) Insects: Characteristics of insects, habitats, classifying insects, helpful and harmful insects, life cycles, social insects. (Y3) 		<ul style="list-style-type: none"> What food chains and webs are there in our local habitat? How does energy move through the food chain? How does removal of one species from an environment, affect others? (keystone species) How does environmental change affect different organisms? What are the most important things we could do to improve our outside area? (big hotels, pond, compost, wildflowers) How does human activity affect our environment? (ferries on the Solent? Sandown Airport? KFC?) 		<ul style="list-style-type: none"> Evolution; Fossils, adaptation, characteristics passing through generations, Mary Anning, Alfred Wallace, Charles Darwin, Darwin's sketches of finches.(Y5) Classification of Living Things; Classifying organisms, plant and animal cells, fungi, protists, monera, taxonomy, Latin names, vertebrates. (Y6) 	
 Comparative & Fair tests	 Identify & Classify	 Observation over time	 Pattern Seeking	 Research	BIG Question: Assessment Opportunity
Does the amount of light affect how many woodlice move around?	Can we use the classification keys to identify all the animals that we caught pond dipping?	How does the variety of invertebrates on the school field change over the year?	How has the use of insecticides affected bee population?	Why are people cutting down the rainforests and what effect does that have?	Are living things in danger?
How does the average temperature of the pond water change in each season?					

Year 4 – Light

National Curriculum Objectives		Core Knowledge		Vocabulary			
<ul style="list-style-type: none"> recognise that light appears to travel in straight lines use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. 		<ul style="list-style-type: none"> The speed of light: light travels at an amazingly high speed. Light travels in straight lines (as can be demonstrated by forming shadows). Transparent and opaque objects Reflection: Mirrors: plane, concave, convex; use of mirrors in telescopes and some microscopes The spectrum: use a prism to demonstrate that white light is made up of a spectrum of colours. Lenses can be used for magnifying and bending light (as in magnifying glass, microscope, camera, telescope, binoculars). <p>Vision: how the eye works</p> <ul style="list-style-type: none"> Parts of the eye: cornea, iris and pupil, lens, retina Optic nerve Farsighted and nearsighted 		Light source, dark , reflect, ray, mirror , bounce , visible, beam, sun , glare, travel , straight, opaque, shadow, block, transparent, translucent, reflect, absorb, emitted, scattered, refraction, light waves , transmit , absorb			
				Key Scientists		Linked Texts	
				Thomas Young (Wave Theory of Light) Ibn al-Haytham (Alhazen) (Light and our Eyes) Percy Shaw (The Cats Eye) Patricia Bath (pioneered laser cataract eye surgery)		<i>The Dark (Lemony Snicket)</i> <i>The King Who Banned the Dark (Emily Haworth-Booth)</i>	
Prior Learning		Key Questions		Future Learning			
<ul style="list-style-type: none"> The Human Body – naming the parts of the body; the five senses & associated body parts; understanding sensory impairment (Y1) 		<ul style="list-style-type: none"> How does the size of an object affect the size of a shadow? How does the distance between the light and the object change the size of a shadow? How does the distance between the object and the size of the screen affect the size of a shadow? How good are mirrors? Can we improve them? What happens to light when it is shone through water? How is this affected by putting glitter, salt or talc in the water? How does a periscope/microscope/telescope work? 		<ul style="list-style-type: none"> Light waves: the similarities and differences between light waves and waves in matter; light waves travelling through a vacuum; speed of light; the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface; use of ray model to explain imaging in mirrors (KS3) The human eye (KS3) 			
 Comparative & Fair tests	 Identify & Classify	 Observation over time	 Pattern Seeking	 Research	BIG Question: Assessment Opportunity		
How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface? Which material is most reflective?	Can you identify all the colours of light that make white light when mixed together? What colours do you get if you mix different colours of light together?	Does the temperature of a light bulb go up the longer it is on? How does my shadow change over the day?	Is there a pattern to how bright it is in school over the day? And, if there is a pattern, is it the same in every classroom?	Why do some people need to wear glasses to see clearly? How do our eyes adapt to different conditions?	Why does my shadow change length over the course of a day?		

Year 4 – Sound

National Curriculum Objectives		Core Knowledge		Vocabulary	
<ul style="list-style-type: none"> identify how sounds are made, associating some of them with something vibrating recognise that vibrations from sounds travel through a medium to the ear find patterns between the pitch of a sound and features of the object that produced it find patterns between the volume of a sound and the strength of the vibrations that produced it recognise that sounds get fainter as the distance from the sound source increases. 		<ul style="list-style-type: none"> Sound is caused by an object vibrating rapidly. Sounds travel through solids, liquids and gases. Sound waves are much slower than light waves. Speed of sound: Concorde Qualities of sound: Pitch: high or low, faster vibrations = higher pitch, slower vibrations = lower pitch; Intensity: loudness and quietness Human voice: Larynx (voice box); vibrating vocal chords: longer, thicker vocal chords create lower, deeper voices <p>Hearing: how the ear works</p> <ul style="list-style-type: none"> Sound as vibration Outer ear, ear canal Eardrum Three tiny bones (hammer, anvil and stirrup) pass vibrations to the cochlea Auditory nerve 		Amplitude, volume, quiet , loud , ear , pitch, high, low, faster, slower, particles, instruments , sound wave, vibration, echo, intensity , reflection , absorption , ear drum, bones, hammer , anvil , stirrup , larynx, vocal chords	
				<table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 50%;">Key Scientists</th> <th style="width: 50%;">Linked Texts</th> </tr> </thead> <tbody> <tr> <td> Aristotle (Sound Waves) Galileo Galilei (Frequency and Pitch of Sound Waves) Alexander Graham Bell (Invented the Telephone) James West Co-invented the electret microphone used in telephones, hearing aids </td> <td> <i>Moonbird</i> (Joyce Dunbar) <i>The Pied Piper of Hamelin</i> (Natalia Vasquez) </td> </tr> </tbody> </table>	
Key Scientists	Linked Texts				
Aristotle (Sound Waves) Galileo Galilei (Frequency and Pitch of Sound Waves) Alexander Graham Bell (Invented the Telephone) James West Co-invented the electret microphone used in telephones, hearing aids	<i>Moonbird</i> (Joyce Dunbar) <i>The Pied Piper of Hamelin</i> (Natalia Vasquez)				
Prior Learning		Key Questions		Future Learning	
<ul style="list-style-type: none"> The Human Body – naming the parts of the body; the five senses & associated body parts; understanding sensory impairment (Y1) 		<ul style="list-style-type: none"> How can you change the volume of a sound? How does the type of material affect how well it blocks a sound? How does thickness of material affect how well it blocks a sound? Which materials vibrate better and produce louder sounds? Can we identify any patterns? Which materials make the best string telephone components? (tin cans, paper cups, plastic cups, wire, cable, string, plastic or elastic – predict and test) Can you predict the relative pitch of tuning forks from the patterns of ripples they make in the water? 		<ul style="list-style-type: none"> Sound waves: frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound; sound needs a medium to travel, the speed of sound in air, in water, in solids; sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal; auditory range of humans and animals. (KS3) 	
 Comparative & Fair tests	 Identify & Classify	 Observation over time	 Pattern Seeking	 Research	BIG Question: Assessment Opportunity
How does the volume of a drum change as you move further away from it? How does the length of a guitar string/tuning fork affect the pitch of the sound?	Which material is best to use for muffling sound in ear defenders?	When is our classroom the quietest?	Is there a link between how loud it is in school and the time of day? If there is a pattern, is it the same in every area of the school?	Do all animals have the same hearing range?	How can we make different sounds?

Year 4 – Human Body

National Curriculum Objectives		Core Knowledge		Vocabulary	
<ul style="list-style-type: none"> identify that humans and some other animals have skeletons and muscles for support, protection and movement. 		<p>The muscular system: Involuntary and voluntary muscles.</p> <p>The skeletal system :</p> <ul style="list-style-type: none"> Skeleton, bones, marrow Musculo-skeletal connection Skull, cranium Spinal column, vertebrae Joints Ribs, rib cage, sternum Scapula (shoulder blades), pelvis, tibia, fibula Broken bones, X-rays <p>The nervous system: brain, spinal cord, nerves, reflexes</p>		<p>Skeleton, bones, marrow, cranium, spinal columns, vertebrae, ball & socket, hinge, scapula, spinal cord, brain, nerves, reflexes, ligaments, tendons, achilles tendon, cartilage, support, protection, movement, antagonistic pairs</p>	
				<p>Key Scientists</p> <p>Ivan Pavlov (Digestive System Mechanisms) Joseph Lister (Discovered Antiseptics)</p>	<p>Linked Texts</p> <p><i>Human Body Odyssey (Werner Holzwarth)</i> <i>Bones (Steve Jenkins)</i> <i>Illuminatomy (Kate Davies)</i> <i>Anatomicum (Jennifer Paxton)</i></p>
Prior Learning		Key Questions		Future Learning	
<ul style="list-style-type: none"> The Human Body: The skeletal and muscular systems, exercise, digestive system and healthy eating, circulatory system, nervous system, preventing illness, germs and disease. (Y2) The Human Body: Cells, organ systems, the digestive system, teeth and senses, a healthy diet, vitamins and minerals (Y3) 		<ul style="list-style-type: none"> Why do we need a skeleton? What types of skeleton are there? Are all skeletons the same? Can something survive without a skeleton? What happens if we break a bone? How do we move? Are bones that are bigger, stronger? Why do we need joints? Why do muscles get tired? Can we 'break' muscles? 		<ul style="list-style-type: none"> The Human Body: Circulation - The circulatory system, the heart, the blood vessels, the blood, blood pressure and heart rate; The respiratory system Process of taking in oxygen and getting rid of carbon dioxide (Y5) The Human Body: Hormones and reproduction; Human growth stages, adolescence and puberty, The human reproductive system, The endocrine system and glands. The skeletal and muscular systems: the structure and functions of the human skeleton, to include support, protection, movement and making blood cells; biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles; the function of muscles and examples of antagonistic muscles. (KS3) 	
 <p>Comparative & Fair tests</p>	 <p>Identify & Classify</p>	 <p>Observation over time</p>	 <p>Pattern Seeking</p>	 <p>Research</p>	<p>BIG Question: Assessment Opportunity</p>
<p>How does the angle that your elbow/knee is bent affect the circumference of your upper arm/thigh? How does the skull circumference of a girl compare with that of a boy?</p>	<p>How do the skeletons of different animals compare?</p>	<p>How does our skeleton change over time? (from birth to death)</p>	<p>Do male humans have larger skulls than female humans?</p>	<p>Why do different types of vitamins keep us healthy and which foods can we find them in?</p>	<p>Why do animals have skeletons? What is a healthy diet and why is it important?</p>

Year 4 – Classification of Plants and Animals

National Curriculum Objectives		Core Knowledge		Vocabulary	
<ul style="list-style-type: none"> Recognise that living things can be grouped in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments can change and that this can sometimes pose dangers to living things. 		<p>Scientists classify animals according to the characteristics they share, for example: Cold-blooded or warm-blooded. Vertebrates (have backbones and internal skeletons) or invertebrates (do not have backbone or internal skeletons). Children should become familiar with examples of animals in each class and some basic characteristics of each class, such as:</p> <ul style="list-style-type: none"> Fish: aquatic animals, breath through gills, cold-blooded, most have scales, most develop from eggs that the female lays outside her body Amphibians: live part of their life cycle in water and part on land, have gills when young, later develop lungs, cold-blooded, usually have moist skin Reptiles: hatch from eggs, cold-blooded, have dry, thick, scaly skin Birds: warm-blooded, most can fly, have feathers and wings, most build nests, hatch from eggs, most baby birds must be fed by parents and cared for until they can survive on their own (though some, like baby chickens and quail, can search for food a few hours after hatching) Mammals: warm-blooded, have hair on their bodies, parents care for the young, females produce milk for their babies, breathe through lungs, most are terrestrial (live on land) though some are aquatic. 		<p>classification, habitat, environment, organisms, plants (flowering, nonflowering), animals, vertebrates, invertebrate, fish, amphibians, reptiles, mammals, Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate herbivore, carnivore, omnivore, evolution, adaptations, characteristics</p>	
				<p>Key Scientists</p> <p>David Attenborough Henry Turner - zoologist</p>	<p>Linked Texts</p> <p><i>Animalium (Jenny Broom)</i> <i>Botanicum (Kathy Willis)</i> <i>The Variety of Life (Nicola Davies)</i> <i>Creature Features (Natasha Durley)</i></p>
Prior Learning		Key Questions		Future Learning	
<ul style="list-style-type: none"> Living Things in their Environments – Plants. Habitats: rainforest, desert, meadow and underground habitats. Plants: Environmental change (Y2) Living Things in their Environments – Animals. Food chains, oceans and undersea habitats, deep ocean habitats and habitat destruction and damage; classification of animals (Y2) Cycles in Nature: Seasonal cycles and plants, animal migration. Life cycles of a plant and a frog. (Y3) Insects: Characteristics of insects, habitats, classifying insects, helpful and harmful insects, life cycles, social insects. (Y3) 		<ul style="list-style-type: none"> Why do some animals eat other animals? What habitats do we have locally? Can we use the classification keys to identify all the animals that we caught pond dipping? Do all plants and animals stay in the same habitat throughout the year? Can you compare and contrast the living things observed? Can you use classification keys to name unknown living things? How can we classify living things found in different habitats based on their features? 		<ul style="list-style-type: none"> Evolution; Fossils, adaptation, characteristics passing through generations, Mary Anning, Alfred Wallace, Charles Darwin, Darwin’s sketches of finches. (Y5) Classification of Living Things; Classifying organisms, plant and animal cells, fungi, protists, monera, taxonomy, Latin names, vertebrates. (Y6) 	
 <p>Comparative & Fair tests</p>	 <p>Identify & Classify</p>	 <p>Observation over time</p>	 <p>Pattern Seeking</p>	 <p>Research</p>	<p>BIG Question: Assessment Opportunity</p>
<ul style="list-style-type: none"> Compare and contrast the living things observed 	<ul style="list-style-type: none"> Use classification keys to name unknown living things Classify living things found in different habitats based on their features 	<ul style="list-style-type: none"> Keep a careful record of living things found in different habitats throughout the year 	<ul style="list-style-type: none"> How can we classify living things found in different habitats based on their features? 	<ul style="list-style-type: none"> Use secondary sources to find out about human impact, both positive and negative, on environments. 	<ul style="list-style-type: none"> I’m thinking of a living thing.... Write a branching database for a variety of living things