Year Six Science Progression Steps

Year 6	Developing	Expected Standard	Exceeding	Scientific Language
Animals including humans (Biology) Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Describe the ways in which nutrients and water are transported within animals, including humans.	• Pupil can indicate the position and role of the heart, lungs and skeleton in the body. • Pupil can explain how blood circulates around the body. • Pupil recognises that blood carries oxygen, energy and carbon dioxide around the body • Pupil can explain why it is important to exercise and eat healthily. • Pupil can name a range of healthy and unhealthy foods giving some reasons for their choice. • Pupil explains that our energy comes from food and this should be from a balanced diet • Pupil understands that we need water to keep our body hydrated and enable it to function effectively • Pupil can name some of the dangers to the body of taking drugs and medicines inappropriately.	• Pupil can identify the role of the skeleton and its parts in protecting the heart and circulatory system, as well as enabling the circulatory cycle. • Pupil can name the main parts of the human circulatory system and describe the function of each part. • Pupil can explain the composition and function of blood within the body, including how it carries oxygen and carbon dioxide. • Pupil can explain the impact on the heart and circulatory system of exercise and nutrition. • Pupil can describe the impact of exercise upon the body and the benefits of a healthy, active lifestyle compared to an inactive, sedentary, unhealthy lifestyle in the short and long term. • Pupil understands that the human body needs energy to function properly and this comes from our food. • Pupil can describe what happens to the body if we have too little/too much food to meet its needs. • Pupil can explain how energy from our food is released and carried around the body to those organs and tissues which need it. • Pupil can explain how water is absorbed from the digestive system and transported around the body to ensure good health and function of organs/tissues. • Pupil can describe how other animals transport/store energy, oxygen and water noting how their systems may have evolved differently to man's due to the extreme/different habitats in which they live. • Pupil can identify a range of helpful (medicines) and harmful drugs and explain their effect on the body including the addictive nature of many drugs.	• Pupil can describe some of the health problems which may occur if the circulatory system is not working correctly. • Pupil can explain that blood is also composed of platelets, serum, white blood cells, hormones etc which affect how the body operates • Pupil can suggest specific activities to keep the heart and circulatory system healthy. • Pupil can explain in some detail about the long-term effect of an unhealthy lifestyle and diet upon the individual, family and broader community. • Pupil can describe how some animals adapt to survive in areas where water is scarce • Pupil can describe the additive nature and effect on the body of a number of harmful drugs suggesting reasons for people taking/becoming addicted to these drugs	Key vocabulary: (See also lower KS2 vocabulary for digestion, skeleton & muscles) cardiovascular system; transport; respiration; energy; blood; blood cells; red cells; white cells; plasma; platelets; haemoglobin; capillaries; organ; heart; heart rate; pulse; chamber; atrium; valve; artery; vein; blood vessel; ventricle; aorta; contract; oxygen; oxygenated; deoxygenated; carbon dioxide; exercise; cycle; glucose; vitamins; nutrient; immune system; lungs; alveoli; bronchiole; clot; bronchus; trachea; drugs; medicine; medication; side-effect; addiction; respiratory system; vitamins; minerals; nutrient; anti-body

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Electricity (Physics) Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. Use recognised symbols when representing a simple circuit in a diagram.	• Pupil can create a simple electrical circuit with more than one component – a complete circuit. • Pupil can create a simple electrical circuit with more than one component – a complete circuit. • Pupils can identify and use some electrical symbols in a drawing of an electrical circuit but may not be accurate in drawing a circuit diagram. • Pupil can identify some practical uses for simple circuits they make in the classroom. Pupil can identify some metals and other materials which are electrical conductors/insulators. • Pupil is aware of the need to be safe around electricity and can describe some precautions.	• Pupil can use knowledge of symbols and circuit diagrams to create an accurate series circuit. • Pupil can draw a circuit diagram using recognised symbols. • Pupil can explain what happens to other components in a circuit if additional bulbs, buzzers are added but the number of cells/battery remains the same. • Pupil can explain what will happen to components in a circuit if the number of cells/batteries is increased or reduced. • Pupil can explain why some metals are electrical conductors and other insulators. • Pupil can explain how current flows in a circuit and what happens if the current is changed or a part of the circuit does not work/function appropriately. • Pupil can explain the dangers of working with electricity and the safety precautions which must be taken. • Pupil can explain how electrical appliances have safety features in their circuits to prevent electrocution or electric shock.	• Pupil has opportunity to compare the difference between a series and parallel circuit. • Pupil use their knowledge of electricity and circuits to design and build a range of electrical items .g. alarm; traffic lights. • Pupil use data-loggers to produce quantifiable data which show the effect of changing, increasing, decreasing components in the circuits they build. • Pupil use data-loggers to produce quantifiable data which show the effect of changing, increasing, decreasing components in the circuits they build. • Pupil can explain how resistance to the flow of a current is produced from wires and components in a circuit. Pupil can suggest why wires of different thickness are used in different types of circuits/appliances. • Pupil can explain why plastic is used for the casing on electrical wires. Pupil can describe the movement of protons and electrons to generate a current. • Pupil can describe how a defibrillator works by using an electrical charge to restart the heart after it has stopped.	Key vocabulary: (See also Year 4 'Electricity' Electrical current; circuit; series circuit; symbols; cell; battery; bulb; buzzer; motor; switches; conductor; insulator; safety precautions; electrocution; electric shock; defibrillator; open switch; closed switch; positive terminal; negative terminal; electrons; protons; static electricity; volts; voltage; watts; Ohms; resistance; amps; fuse; earth; live.
Evolution and Inheritance (Biology) 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.	• Pupil can explain how fossils are formed. • Pupil understands that there are different periods of time in the Earth's past when living organisms lived which are not in existence today. • Pupil can describe some adaptations of plants/animals living in extreme environments • Pupil can explain that parents give some characteristics to their offspring. • Pupil understands that sometimes offspring are not like their parents and this can have a positive or negative effect on their survival.	• Pupil can explain how fossils have been formed and what they tell us about animals/plants living in the past • Pupil can describe key stages in the Earth's history and offer suggestions as to why different creatures/plants lived then compared to now. • Pupil can explain that some living things are able to survive better than others in different environments e.g. desert – cactus & succulent plants and the camel; penguins in polar/sub polar areas • Pupil understands that in sexual reproduction offspring inherit characteristics from each parent but will not be same as either, although have some features in common. • Pupil can explain that variation occurs in sexual reproduction. • Pupil can describe how the process of variation (or mutation) can give offspring an advantage over other offspring so they will be more	• Pupil can explain some of the limitations of fossils. • Pupil can create a timeline showing the different stages of the Geological record and explain how some creatures no longer exist. • Pupil can give valid reasons why some living organisms became extinct linking this to evolution through genetic change and/or successful adaptation to new environments by species. • Pupil can explain that characteristics passed from parents to their offspring are contained in genetic material within cells. • Pupil can describe that variation occurs when mutation happens during recombination of genetic material. • Pupil may show some awareness of recent genetic research, such as cloning and selective breeding by agricultural scientists.	Key vocabulary: (Build upon rocks/fossils vocabulary from LKS2) Adapt; adaptation; evolution; inheritance; reproduce; reproduction; fertilise; fertilisation; genes; chromosomes; characteristics; variation; natural selection; selective breeding; generation; species; trait; desirable; mutations; heredity; reproduce; diversity; survival; extinct; off spring; parents; identical; cloning; genetic engineering; naturalist; habitat; predator; prey; organisms; life cycles; Geology; Palaeontologist; Cambrian; Ordovician; Devonian; Silurian; Jurassic; Tertiary; Palaeozoic; Triassic; Carboniferous; Quarternary; Cretaceous; Permian; Cenozoic; Mesozoic.

		successful. • Pupil can explain that some animals/plants have evolved over time due to changes in the environment and positive physical traits which made them better able to survive and link this to evidence in fossil record/geology of Earth. • Pupil can explain that some organisms reproduce asexually and the offspring will be almost identical to the parent.		
Light (Physics) Recognise that light appears to move 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	• Pupils can name different light sources. • Pupil knows that we see because light is reflected from objects and enters our eyes. • Pupil understands that light travels faster than sound and in straight lines. • Pupil can label some of the key parts of the eye • Pupil can explain that we see images because our brain is sent messages along the optic nerve from the eye. • Pupil understands that we see in colour because of how different properties reflect light • Pupil can explain that shadows are formed when light is blocked from passing through an object.	• Pupil can explain how light travels from a light source in straight lines. • Pupil suggests ways that they can show light travels in straight lines. • Pupil can describe the process whereby light travels from light sources and is reflected from objects/materials to our eyes. • Pupil can label the parts of an eye and discuss how each part is involved in seeing an object from which light is reflected. • Pupil can describe that we see colour because some colours are absorbed by an object when light is reflected from its surface. • Pupil can describe how light is reflected by mirrors – plane; concave; convex • Pupil can explain how shadows are formed and how the transparency or opaque property of an object determines the clarity of the shadow we see. • Pupil explains that a shadow has the same shape as the object casting it but may be elongated or shorter depending on the position of the light source. • Pupil identifies that an object looks different when observed in two media e.g. water & air • Pupil can describe how the process of light reflection can be used commercially e.g. manufacture of periscope; microscope; rear view mirrors; telescopes.	• Pupil can explain that light is a spectrum and describe the visible and invisible parts of the spectrum. • Pupil uses their knowledge of light reflection to create a product which may be useful in school e.g. positioning of mirrors to see around corners in school, to see food at lunch-time. • Pupil can describe how the brain interprets the information sent to it from the eye as an image. • Pupil can explain how we see images in colour and name the parts of the eye involved. • Pupil shows their understanding of shadow formation by creating shadows of different sizes and shape by altering the position and intensity of the light source in relation to the object making the shadow. • Pupil can describe that refraction of light makes an object appear different when we view it across two different media. • Pupil can describe adaptations animals have developed to see in low light or dark environments e.g. deep sea; nocturnal creatures • Pupil can discuss technology which allows man to work in low light environments e.g. night vision goggles/TV cameras	Key vocabulary: (Build on Y3 vocabulary) reflection; refraction; reflective; opaque; transparent; translucent; light source; shadow; straight; filter; prism; spectrum; optic nerve; retina; iris; lens; rods; cones; pupil; inverse; cornea; plane mirror; convex; concave; optical illusions; filament; focus; optician; luminescence; bioluminescence; incandescent; nocturnal; Infra-red light; light meter; lumens; visible; invisible; telescope; microscope; short sighted; long sighted

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Living things and their habitats (Biology) ***Teach after 'Animals including Humans' & 'Evolution and Inheritance' as they can inform this unit*** Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals. Give reasons for classifying plants and animals based on specific characteristics.	• Pupil can identify livings things using the acronym – MRS GREN • Pupil understand that the work of some scientists helps us to identify all living things • Pupil can describe the key features of the main animal and plant groups • Pupil can give a definition of a vertebrate animal • Pupil can give a definition of an invertebrate animal • Pupil understands that there are flowering and non- flowering plants. • • Pupil understands that microbes can be harmful or helpful • Pupil can use simple dichotomous keys to identify a range of common animals and plants from the world around them •	• Pupil explain the features of all living things e.g. MRS GREN • Pupil can describe the work of scientists in creating a binomial classification systems e.g. Carl Linnaeus • Pupil can identify differences and similarities between the broad classification groups of living things • Pupil understands that there are 7 main groups of vertebrates (Chordata) - Mammals, Bony Fish, Cartilaginous Fish, Birds, Amphibians and Reptiles • Pupil understands that invertebrates are also classified into groups and can name some of these groups: Sponges, Cnidarians, Echinoderms, Molluscs, Segmented worms (annelids), Arthropods, Crustaceans, Insects, Round worms (Nematodes), Flat worms (Platyhelminths). • Pupil understands that there are 5 main groups of plants: algae; mosses & liverworts; ferns, club mosses and horsetails; conifers and flowering plants. • Pupil understands there are more than one type of micro-organism e.g. fungi; bacteria; virus; protists and name examples • Pupil can describe how some micro-organisms are helpful and others harmful, naming examples of both. • Pupil can use dichotomous keys to identify a range of living things from within the local habitat and increasingly from a diverse range of habitats around the world • Pupils can create simple dichotomous keys to identify living things from a range of habitats •	• Pupil can describe and name the 7 levels of taxonomic rank used to identify all living things e.g. using a pneumonic to help – keeping precious creatures organised for grumpy scientists = kingdom-phylum-class-order- family-genus-species • Pupil can identify differences and similarities between animal and plant groups using this information to classify them accurately as below: • Pupil can identify animals as vertebrates (Chordata) Mammalia (Mammals), Actinopterygii (Bony Fish), Chondrichthyes (Cartilaginous Fish), Aves (Birds), Amphibia (Amphibians) and Reptilia (Reptiles) – using classification keys to identify individual examples of each. • Pupil can identify the key invertebrate groups— Poriferans (sponges), Cnidarians (such as sea jellies and corals), Echinoderms (such as sea urchins and sea stars), Molluscs (such as octopuses, snails, and clams), Annelids (worms), Arthropods, Crustaceans, Insects, Round • Pupil can identify the key invertebrate groups— Poriferans (sponges), Cnidarians (such as sea jellies and corals), Echinoderms (such as sea urchins and sea stars), Molluscs (such as octopuses, snails, and clams), Annelids (worms), Arthropods, Crustaceans, Insects, Roundworms (Nematodes), Flat worms (Platyhelminths) - using classification keys to identify individual examples of each. • Pupil can identify that there are 5 main groups of plants: algae; mosses & liverworts; ferns, club mosses and horsetails; conifers and flowering plants - using classification keys to identify individual examples of each • Pupil can explain there are 4 types of micro-organisms e.g. fungi; bacteria; virus; protists and name examples. • Pupils can explain how microbes are used in the world around them and how they can be exploited for commercial purposes. • Pupil has an understanding of how the process of vaccination protects some living things from harmful micro-organisms Pupil can create their own and use a range of commercially produced keys to identify animals and plants in both the local environment and other global environments.	Key vocabulary: classification system; taxonomy; vertebrates; invertebrates; micro-organisms; plants; algae; mosses; liverworts; ferns; horsetails; conifers; flowering plants; animals; insects; spiders; snails; segmented worms; fish; amphibians; reptiles; birds; mammals; echinoderms; molluscs; crustaceans; flat worms; round worms; phylum; class; order; family; genus; species; fungi; bacteria; virus; protists; vaccination; symbiotic; parasite; toxins; unicellular; multi-cellular; autotroph; heterotroph; membrane; cell; nucleus; DNA; exoskeleton;