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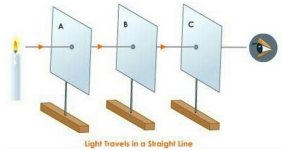
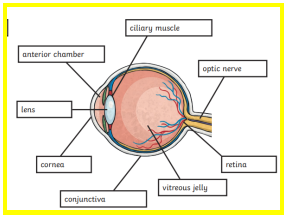
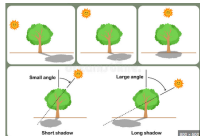
Year 6 Science Knowledge Goals Autumn 1 **- Light**

	The moon is <u>not</u> a source of light but reflects the Sun's light back to Earth. Stars however <u>are</u> sources of light but do not give us the same light and heat that the Sun does (our closest star) due to the distances involved. The stars appear to disappear in the daytime due to the brightness of the Sun. Light travels as waves. Light waves don't always need particles to travel through. They can also travel through **outer space** or a **vacuum.** Light waves travel in straight lines. You can detect them with your eyes, and also with instruments such as cameras. They are **reflected** by mirrors and **change direction** when they travel from the air into glass or water. Light travels very fast. It has a speed of **300 million metres per second** in a vacuum. It only takes 8 minutes and 20 seconds for light to travel from the Sun to the Earth. Light travels through the air about a million times faster than sound, which explains why you see lightning before you hear thunder.
	We are able to see because light enters our eyes. Our eyes make use of any available light so that we can see things with faded colours and at night there often is some light (reflected light from the Moon, lights from homes, etc.) The light bounces off the objects that we see and travels into our eyes so that we can see the objects. As the image passes through the lens, muscles in our eye adjust the lens so that it focuses just like a camera. The image is then projected onto the back wall (retina) of the inside of the eye. This then sends a message to our brain to tell us what it is we are looking at. As the image passes through the lens it gets turned outside down, it is our brain that turns it back up the right way so that we see things the right way up!
	Since light travels in straight lines, a shadow is formed when a light source produces light rays that are blocked by an opaque object. Behind this, since there is no light there is an absence of light, or a shadow. The shadow decreases in size as the light sources decrease in distance. The closer an object is to the light source, the larger the shadow it casts. This is because an object closer to the source will block a larger area of the light, increasing its shadow size.
	A fair test is a test that controls all but one variable when attempting to answer a scientific question. Only changing one variable allows the person conducting the test to know that no other variable has affected the results of the test.
	When drawing conclusions it is important to link it directly to the question and hypothesis. Did you prove or disprove your question and were there any barriers impacting the experiment.

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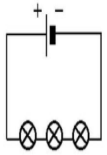
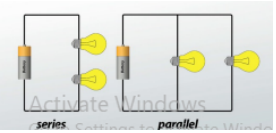
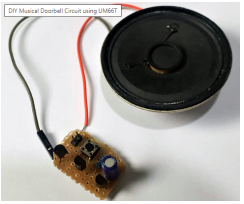
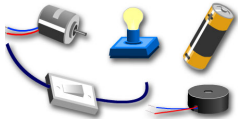
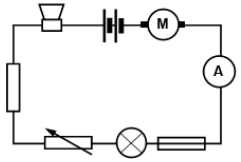
Year 6 Science Knowledge Goals Autumn 2 - **Electricity**

	A circuit is a complete path around which electricity can flow .We use scientific symbols to represent the components (parts) of a circuit. Engineers need to be able to understand how electrical circuits are drawn and communicated. This includes the use of circuit symbols to produce circuit diagrams and schematics. This knowledge could be used when investigating, designing or making electrical and electronic circuits in the future
	The brightness of a bulb or the loudness of a buzzer is affected by the number of cells in a circuit. The brightness of a bulb or the loudness of a buzzer is affected by the voltage of cells in a circuit. The number of components in a circuit can affect how they function. The arrangement of components in a circuit can affect how they function. The length of wires in a circuit can affect how the components function
	A light is not essential for a successful circuit. We do not need something to light up to show electricity i.e think about a doorbell. This is connected to a circuit - when the circuit is complete the doorbell will make a sound.
	A fair test is a test that controls all but one variable when attempting to answer a scientific question. Only changing one variable allows the person conducting the test to know that no other variable has affected the results of the test.
	When drawing conclusions it is important to link it directly to the question and hypothesis. Did you prove or disprove your question and were there any barriers impacting the experiment.

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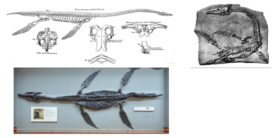
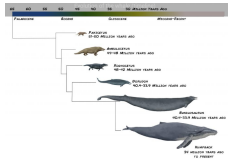
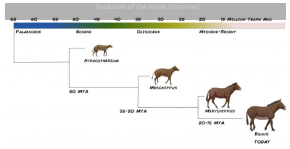
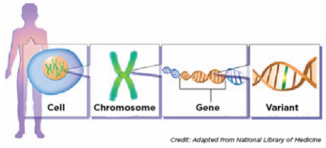
Year 6 Science Knowledge Goals Spring 1 - **Evolution and Inheritance**

	The two key elements in evolution are: Adaptation and Natural Selection. **Adaptation and evolution** is the process whereby a living thing changes over time to suit its environment in order to survive. **Natural Selection** is the process whereby organisms better adapted to their environment tend to survive and produce more offspring.
	Living things have differences or vary. This means that some are more likely to survive than others. If they survive longer it is more likely that they will reproduce and pass on these variations to their children (offspring). As time goes on more and more of the plants or animals **inherit** this useful **variation** because the ones without it don't live as long. In this way plants and animals can change over time. This process is called **evolution.** **Charles Darwin** was the first scientist to come up with the theory of evolution for explaining how living things change over time.
	Adaption It is a special skill which helps an animal to survive and do everything it needs to do. **Adaptations** could be **physical change** to the animals body or **behavioural changes** in how an individual animal or a society do things in their daily lives. Animals adapt over time to better suit their **environmen**t. Adaptation may lead to **evolution**
	The study of human origins, or beginnings, involves figuring out how and when human beings began to exist. Scientists have many different theories about human origins. But they agree that humans developed over many millions of years from early ancestors that were like apes. The process by which one type of living thing develops into another type is called **evolution**. Modern humans evolved in stages from a series of ancestors, including several earlier forms of humans. The bodies of these ancestors changed over time. In general, their brains became larger. The jaws and teeth became smaller. Human ancestors also began walking upright on two feet and using tools. As they did, the shape of their legs, feet, hands, and other body parts changed.
	Inheritance is the process by which genetic information is passed on from parent to child. This is why members of the same family tend to have similar characteristics. We actually have two genomes each (a genome is the complete set of genetic information in an organism). We get one copy of our genome from each of our parents. Acquired traits are the ones that a person develops during his lifetime. These are not passed from one generation to another. On the other hand, inherited traits are present in a person since the time of his birth and are passed on from one generation to another.

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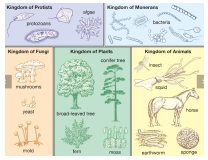
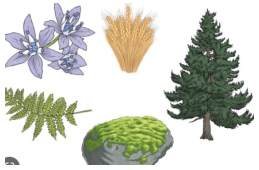
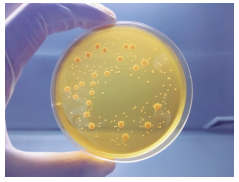
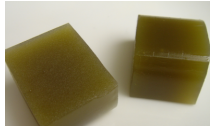
Year 6 Science Knowledge Goals Spring 2 **- Living Things and their Habitats**

	Scientists sort and group living things according to their similarities and differences. This is called classification. Scientists who classify living things are called taxonomists- the system of classification was created by Carl Linnaeus. **Vertebrates** is an animal that has a backbone e.g. fish, snake, human. **Invertebrates** is an animal lacking a backbone e.g. jellyfish, snail, spider.
	There are millions of different plant species. **Botanists** (scientists who study plants) must find a way to categorise the many different species. While all plants are made up of similar parts that are essential in maintaining their survival (i.e. having roots, stem, leaves, etc.), they often look different. These differences in characteristics are used to group plants into species, which provides a way of classifying and therefore organising plants. All green plants, algae, ferns and mosses (plants that do not produce seeds), conifers (gymnosperms) and angiosperms (flowering plants)-plants that do produce seeds. The two groups can be split into further, smaller groups. For example, one way is to group them into vascular and non-vascular plants.
	Microorganisms are living things that are too small to be seen with the naked eye. They are normally viewed using a microscope. Bacteria, viruses, and some moulds are examples of microorganisms. Most microorganisms are essential to life on earth. However, some of them are harmful to humans, animals, and plants and can cause disease. Microorganisms will be classified into three sub strands: Monera (bacteria), Protista (virus) and Fungi.
	Investigation to compare bacteria growth on two petri dishes containing nutrient agar: one that has been touched by a finger washed only with water and one that has been touched by a finger washed with soap. A dependent variable is a part or variable of an experiment that is kept the same to be used for comparison and controlled, e.g. the petri dishes. A control is needed to compare results when the experiment is done.
	The microorganisms transferred on to the agar from the washed hand, will grow less bacteria than the fingerprint created by the hand that was unwashed with soap.

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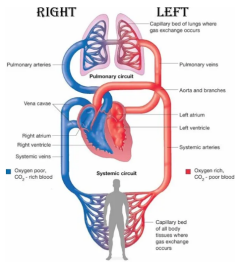
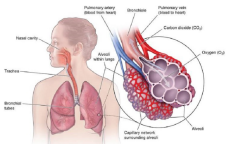
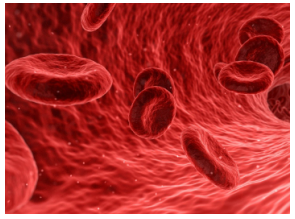
Year 6 Science Knowledge Goals Summer 1 **- Animals including Humans**

	The human circulatory system is referred to as a double circulatory system. All mammals have a double circulatory system as there are two loops. One loop sends blood from the heart to the lungs and the other loop is from the heart to the rest of the body. The circulatory system is a network consisting of blood, blood vessels, and the heart. This network supplies tissues in the body with oxygen and other nutrients, transports hormones, and removes unnecessary waste products. **The word circulation means 'the movement to, fro or around something'.**
	The lungs are responsible for transferring oxygen into the blood system. It is important that they start to understand that humans don't just inhale oxygen and exhale carbon dioxide. The exchange of gases that happens in the lungs is known as **respiration**. The act of **breathing** in and out through our nose (& mouth) replenishes the oxygen and removes the carbon dioxide from our blood. The blood in the arteries transports the oxygen to all the parts of the body & then the veins carry the deoxygenated blood back to the heart.
	Blood is made up of different components. Four of the main components are: Plasma – 55% Red blood cells – 44% Platelets – 0.05% White blood cells – 0.05% Blood is pumped around the body through blood vessels: arteries, blood vessels that carry blood away from the heart; veins that carry blood back towards the heart & capillaries, tiny blood vessels that carry blood to the individual cells Capillaries join the arteries to the veins. There are about 59,962 miles or about 96,500 kilometres (twice round the world) of blood vessels in one body! Blood has many functions: it transports oxygen to the cells (carried by the red blood cells); carries nutrients (food) to the cells; transports waste away from the cells (including carbon dioxide); helps protect the body from infection (the white blood cells); carries hormones (chemical messengers) to the cells, and helps keep the body at 37ºC. Blood is composed of red blood cells (44%), which carry oxygen throughout the body, white blood cells (1%), which fight infections/germs by engulfing and destroying them or by producing antibodies against them (which help identify the invading germs), platelets, which are small cells that help you stop bleeding (blood clotting) if you get a cut and plasma (55%), a yellowish liquid that carries nutrients, hormones, and proteins throughout the body.

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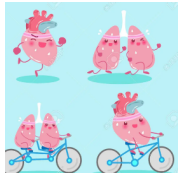
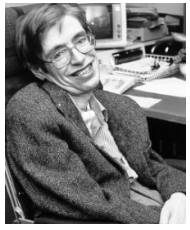
	When your heart beats, it pumps blood around your body to give it the energy and oxygen it needs. As the blood moves, it pushes against the sides of the blood vessels. The strength of this pushing is your blood pressure. If your blood pressure is too high, it puts extra strain on your arteries (and your heart) and this may lead to heart attacks and strokes. Eating healthily & exercising can help keep your blood pressure normal.
	Investigation on what exercise has the most impact on our hearts and lungs.

Year 6 Science Knowledge Goals Summer 2 **- Inventors**

	Stephen Hawking was an English scientist. One of his theories was that mini black holes were formed following the '**big bang**'. These mini black holes contain one billion tons of mass but occupy less than the space of an **atom**.

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	Libbie Hyman was a zoologist who researched vertebrates and invertebrates..She described the anatomy and characteristics of different vertebrates and invertebrates and explained how they should be classified. **Vertebrates** is an animal that has a backbone e.g. fish, snake, human. **Invertebrates** is an animal lacking a backbone e.g. jellyfish, snail, spider.
	Marie Maynard Daly became the first black woman with a PhD in chemistry in the USA. She made huge advances in our understanding of how the heart and circulatory system are affected by sugar and **cholesterol** in our diets. Her work has demonstrated that too many fatty and sugary foods can make the arteries narrower and can cause heart disease.
	Alexander Fleming In 1928 a Scottish doctor named Alexander Fleming discovered the effects of penicillin. During research on bacteria, Fleming noticed that the bacteria would not grow near a certain mold. He found that the mold was a type called *Penicillium notatum*. This mold is similar to the green fuzzy mold that grows on bread. From the mold Fleming developed the antibiotic now known as penicillin.
	Building on Year 3 knowledge. Mary Leakey was a British paleoanthropologist who discovered many fossils of early hominins and their tools. These fossils provide evidence for the evolution of humans.