

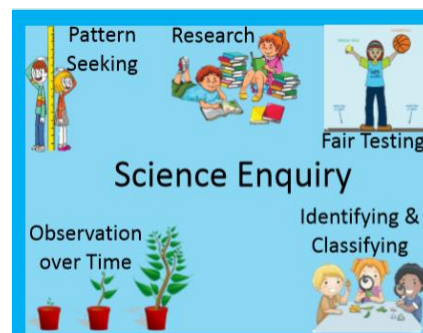


Science Passport- Year 1



Working Scientifically

- I can ask simple questions
- I know that questions can be answered in different ways
- I can use simple equipment to observe objects closely
- I can perform simple tests
- I can identify and classify objects
- I can use my observations and ideas to suggest answers to questions
- I can collect and record data to help answer questions



Everyday materials



- I know the difference between an object and the material from which it is made
- I can name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
- I can describe the simple physical properties of a variety of everyday materials e.g. strong, smooth etc
- I can compare and group together a variety of everyday materials on the basis of their simple physical properties

Animals including Humans

- I can name a variety of common animals including, fish, amphibians, reptiles, birds and mammals
- I can name a variety of common animals that are carnivores, herbivores and omnivores
- I can describe and compare the parts of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets)
- I can name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.



Seasons

- I can observe changes across the four seasons
- I can observe and describe weather associated with the seasons and how day length varies

Plants

- I can name a variety of common wild and garden plants, including deciduous and evergreen trees
- I can name and describe parts of common flowering plants, including trees.





Science Passport- Year 1



Vocabulary

properties, observe, test, magnifying glass, object, record, equipment

absorption, matter, property, wood, plastic, glass, metal, water, rock

Energy, growth, habitat, fish, amphibian, reptile, bird, mammal, offspring, carnivore, herbivore, omnivore, vertebrate, skeleton, organ

freezing, melting, orbit, reflection, Sun, clouds, wind, snow, ice, spring, summer, autumn, winter

component, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower



Skills

Looks at things closely and carefully

Can use simple equipment, for example a magnifying glasses to observe objects closely

Asks questions about the world and how things work

Uses information and observations to answer questions

Able to identify or sort objects into groups based on their observable properties

Can use talk to communicate their ideas, knowledge and what they find out.

Can write down numbers and words or draw pictures to record what they find



Science Passport- Year 1



Knowledge

Working Scientifically

Knows that we can test our questions to see if they are true



Every day Materials



Know that an object is made from/of a material

Knows the difference between an object and the material that it is made from

Know from observation how to distinguish between materials made of wood, plastic, glass, metal, water, rock

Know that materials can be hard, soft, strong, weak, absorbent, heavy, light, solid and runny, smooth and rough; these descriptions denote the physical properties of a material

Know that matter (stuff) is made from tiny building blocks

Animals including Humans

Know that a trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal

Know that herbivorous animals eat plants; a carnivorous animal eats other animals; omnivorous animals eat both animals and plants

Know that a cat is an example of a carnivore; that a rabbit is an example of a herbivore;

Know that many humans are examples of omnivores (though not vegetarians or vegans)

Know that fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a back bone

Know that fish are different in having gills so that they can breathe under water and scaly skin

Know that amphibians are different in that they begin their lives with gills but then develop lungs and breathe on land

Know that reptiles are different in that they breathe air and have scaly skin

Know that birds are different to other animals in that they have feathers and wings

Know that mammals are different to other animals in that they have fur/hair and they f



Know that feet, legs, arms, hands, torso, head, skin, ears, eyes, nose, mouth and tongue are part of the body and identify them

Know that eyes are associated with sight, ears with sound, nose with smell, tongue with taste and skin with touch.





Science Passport- Year 1



Knowledge

Seasons

Know that days are longer in the summer and shorter in winter

Know that weather changes through the year, getting hotter in the summer and colder in the winter

Know that the winter is likely to bring ice on the ground when water freezes due to the cold

Know that the Earth orbits the Sun with one orbit constituting a year of 365/366 days



Plants

Know a rose bush, a sunflower and a dandelion by sight

Know an oak tree, a birch tree and a horse chestnut tree by sight

Know a variety of common wild and garden plants, including deciduous and evergreen trees

Know that evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn



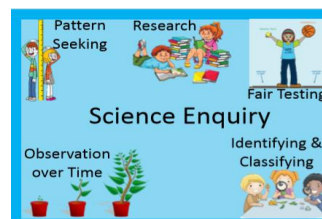


Science Passport- Year 2



Working scientifically

- I can ask simple questions
- I know that questions can be answered in different ways
- I can use simple equipment to observe objects closely
- I can perform simple tests
- I can identify and classify objects
- I can use my observations and ideas to suggest answers to questions
- I can collect and record data to help answer questions



Using everyday materials

- I can identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for different uses
- I can compare how things move on different surfaces.
- I can find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

Animals Including Humans

- I know that animals, including humans, have offspring which grow into adults
- I can find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
- I can describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene

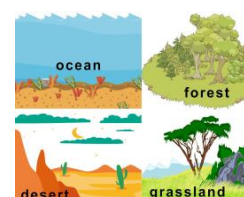


Plants

- I can observe and describe how seeds and bulbs grow into mature plants
- I can find out about and describe how plants need water, light and a suitable temperature to grow and stay healthy.

Living things and their habitats

- I can explore and compare the differences between things that are living, dead, and things that have never been alive
- I can identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other
- I can identify and name a variety of plants and animals in their habitats, including microhabitats
- I can describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.





Science Passport- Year 2



Knowledge

Using every day materials

Know that materials can have useful properties for a given job (including being waterproof, strong, hard, soft, flexible, rigid, light or heavy.)

Know that many types of plastic are waterproof, that steel (a type of metal) is strong, that rock is hard, that cotton wool is soft, that rubber is flexible, that rock is rigid, that polystyrene (a type of plastic) is light and that iron (a type of metal) is heavy,

Know and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.

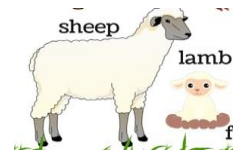
Know that when objects move across a surface there is friction as the two surfaces rub against each other.

Know that sometimes this friction is larger or smaller, depending on the surfaces that are rubbing against each other.

Know that squashing, bending, twisting and stretching an object can change its shape.



Animals including Humans



Know that animals produce offspring that grow into adults.

Know that animals, including humans, need food, water and air to survive.

Know the basic food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods.

Know that more than half of our diet should be made up of carbohydrates, fruit and vegetables.

Know that fats and sugary foods should be eaten rarely and in small amounts.

Know that people need to exercise often to help their body stay strong and fit.

Know that keeping clean, including washing and brushing teeth, is an important part of staying healthy.



Plants

Know that seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under the right conditions (water, warmth).

Know that plants that are deprived of light, food or air will not grow and will die.

Know that plants produce offspring that grow into adults.





Science Passport- Year 2



Knowledge



Living things and their habitats

Know that living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.

Know that most living things live in habitats to which they are adapted and provide them with what they need to survive.

Know and name a variety of plants and animals in their habitats, including microhabitats.

Know that polar bears are an example of an animal adapted to its environment—thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice.

Know that sharks are another example—smooth skin and streamlined shape for quick swimming; and gills for breathing under water.

Know that cacti are an example of a plant adapted to its environment—thick skin keeps a store of water safe; sharp spikes keep animals from stealing the water.

Know that pine trees have thick bark and pine cones to protect against cold winters.

Know that woodlice live under logs—an example of a microhabitat—as they need somewhere dark and damp so that they do not dry out.

Know that frogs can live in ponds—an example of a microhabitat—as they water in which to lay their eggs (frogspawn).

Know that plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals.

Know that the arrows on a food chain show the direction that the energy travels.





Science Passport- Year 3



Working Scientifically

I can ask questions and use different types of scientific enquiry to answer them

I can set up simple practical enquiries, comparative and fair tests

I can make careful observations, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers

I can gather, record, classify and presenting data in a variety of ways to help answer questions.

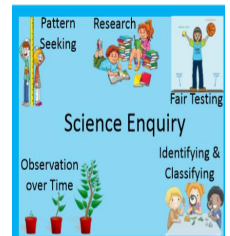
I can record my findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables

I can report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

I can use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.

I can identify differences, similarities or changes related to simple scientific ideas and processes.

I can use scientific evidence to answer questions or to support my findings.



Plants



I can identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers

I can experiment to find the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant

I can investigate the way in which water is transported within plants

I can explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal

Light

I know that things need light in order to see things and that dark is the absence of light

I can see/ notice that light is reflected from surfaces

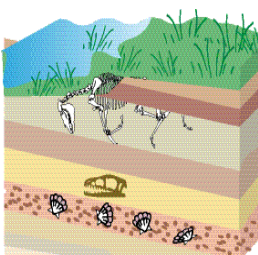
I know that light from the Sun can be dangerous and that there are ways to protect their eyes

I know that shadows are formed when the light from a light source is blocked by a solid object

I can find patterns in the way that the size of shadows change



Rock and Fossils



I can compare and group together different kinds of rocks on the basis of their appearance and simple physical properties

I can describe in simple terms how fossils are formed when things that have lived are trapped within rock

I know that soils are made from rocks and organic matter.



Science Passport- Year 3



Forces and Magnets

I know that some forces need contact between 2 objects, but magnetic forces can act at a distance

I can compare how things move on different surfaces

I can observe how magnets attract or repel each other

I can observe how magnets attract some materials and not others

I can describe magnets as having 2 poles

I can predict whether 2 magnets will attract or repel each other, depending on which poles are facing.

I can 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



Animals including Humans



I know that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat

I know that humans and some other animals have skeletons and muscles for support, protection and movement



prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

wave, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, data logger

fruit, nectar, anther, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization.

magnetic, non-magnetic, pole, north, south, sliding friction, static friction, elastic, resist, attraction, repulsion

igneous, metamorphic, sedimentary, palaeontologist, weathering, molten rock, crust, tectonic plates, scavengers, fossil

extinction, vitamin, balanced diet, cartilage, invertebrate, contract, loosen, ribcage, insect

Skills

Asks questions and answers them by setting up different types of scientific enquiry

Makes predictions that can be tested in a scientific enquiry

Can use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stop watches.

Can present results and scientific data in a variety of ways.

Can 'write-up' a scientific enquiry including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion.

Uses their communication skills to summarise a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry.

Can interpret results, drawing conclusions and suggesting further scientific enquiries based on the results.



Science Passport- Year 3



Knowledge

Working Scientifically

Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same.

Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw an eat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table.

Know how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion.

Know how to summarise a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry.

Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true.

Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary.

Know that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry.

Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant—does this work with other plants /different types of light / etc)

Know that they can draw conclusions from the findings of other scientists.

Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry.

Plants

Know that plants need air, light, water, nutrients from soil, and room to grow for life and growth. What plants need may vary from plant to plant.

Know that different parts of plants have one or more functions (jobs).

Know that the roots collect water and minerals from the soil, and hold the plant in the ground.

Know that the stem holds up the leaves so that they can gather light to make food

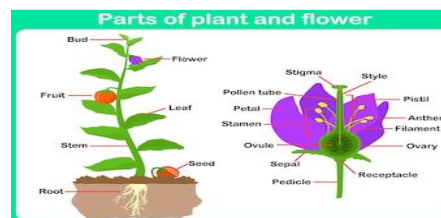
Knows that the stem holds up the flowers so that they can receive pollen and disperse their fruits

Knows that the stem transports water and minerals from the roots to the other parts of the plant

Know that the leaves make food by trapping light and using its energy to turn carbon dioxide and water into carbohydrates.

Know that the function of a flower is reproduction: where flowers of the same kind exchange pollen—made by an anther—in a process called fertilisation, a structure in the flower's ovary

called an ovule becomes a seed; the ovary then becomes a fruit which help process called dispersal.



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Science Passport- Year 3



Knowledge

Light

Know that light is a form of energy.

Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another.

Know that we need light to see things and that darkness is the absence of light.

Know that light travels in straight lines.

Know that light is reflected when it travels from a light source and then 'bounces' off an object or surface.

Know that everything that we can see is either a light source or something that is reflecting light from a light source into our eyes.

Know that the Sun is a light source, but that the Moon is reflecting light from the Sun.

Know that many light sources give off light and heat.

Know that the Sun gives off light and heat when hydrogen turns into helium.

Know that filaments in traditional bulbs heat up until they glow, giving off light and heat.

Know that fluorescent bulbs glow when electricity adds energy to a gas within the bulb.

Know that sunglasses can protect eyes from sun light but looking at the Sun directly—even with sunglasses—can damage the eyes.

Know that opaque objects block light creating shadows and that light passes through transparent objects.

Know that opacity/transparency and reflectiveness are properties of a material.

Know that shadows are formed when the light from a light source is blocked by an opaque object.

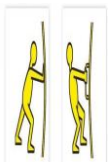
Know that as objects move towards a light source, the size of the shadow increases.

Know how to show the changing of shadow size by drawing a diagram with straight lines representing light.



Forces and Magnets

Know that a force can be thought of as a push or a pull.



Know that there are three types of contact force: impact forces (when two surfaces collide), frictional forces (when two surfaces are in contact) and strain forces (when an elastic material is stretched or squashed).

Know that objects move differently on rough and smooth surfaces;



Know that there are non-contact forces that can act between objects without them touching- e.g. magnetism, thus acting at a distance.

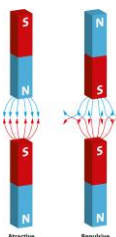
Know that magnets have two poles called north and south.

Know that there is a magnetic field around a magnet which is strongest at each pole.

Know that the same poles (south-south and north-north) of two magnets repel each other and that opposite poles of two magnets (north-south) attract each other.

Know that some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnetic.

Know how to compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet.





Science Passport- Year 3



Knowledge

Rocks and Fossils

Knows how to compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.

Know that there are three kinds of rocks: igneous, sedimentary and metamorphic

Know that the Earth has a solid crust made up of tectonic plates with molten rock beneath

Know that granite and basalt are types of igneous rock and that igneous rocks form from molten rock below the Earth's crust

Know that limestone and sandstone are types of sedimentary rock which form when small, weathered fragments of rock or shell settle and stick together, often in layers

Know that marble and slate are types of metamorphic rock which form when rocks in Earth's crust get squashed and heated in processes such as when tectonic plates press against each other

Know that fossils form when a plant or animal dies and is quickly covered with silt or mud so that it cannot be rotted by microbes or eaten by scavenging animals;

Know that soil is made from tiny particles of rock broken down by the action of weather (weathering) and organic matter.



Animals including Humans

Know that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat.

Know that proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth).

Know that getting the right amount of each food group (including over half of the diet made up of fruit, vegetables and carbohydrates) is called a balanced diet.



Know that lack of a nutrient can cause ill health.

Know that excess of a food group can cause ill health, such as tooth decay due to excess sugar.

Know that excess fat from fatty foods and fat created in the body from excess calories—builds up in the body and can cause obesity.

Know that excess body fat can lead to heart disease and increases the strain on joints and growing bones.

Know that animals, including humans, have a skeleton made up of solid objects.

Know that some animals (such as insects) have an exoskeleton—a solid covering on the outside of their body.

Know that many invertebrates (such as earthworms and slugs) have water held inside by muscles which act like a skeleton.

Know that skeletons provide support for muscles and protects the body.

Know that human skeletons are made up of bones and cartilage.

Know that muscles can only contract, so they must be arranged in pairs in the body so that as one contracts the other loosens.





Science Passport –Year 4



Working Scientifically

I can ask relevant questions and using different types of scientific enquiries to answer them.

I can set up simple practical enquiries, comparative and fair tests.

I can make systematic and careful observations

I can take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.

I can gather, record, classify and present data in a variety of ways to help in answering questions.

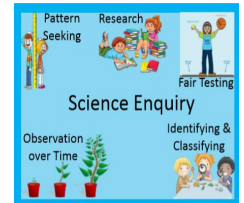
I can record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.

I can report findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

I can use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.

I can identify differences, similarities or changes related to simple scientific ideas and processes.

I can use straightforward scientific evidence to answer questions or to support their findings.



Animals Including Humans

I can describe the simple functions of the basic parts of the digestive system in humans.

I can identify the different types of teeth in humans and their simple functions.

I can make and understand a variety of food chains, identifying producers, predators and prey

Sound

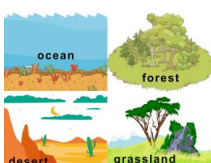
I can identify how sounds are made, associating some of them with something vibrating.

I can recognise that vibrations from sounds travel through a medium to the ear.

I can find patterns between the pitch of a sound and features of the object that produced it.

I can find patterns between the volume of a sound and the strength of the vibrations that produced it.

I understand that sounds get fainter as the distance from the sound source increases.



Living things and their habitats

I understand that living things can be grouped in a variety of ways.

I can use classification keys to help group, identify and name a variety of living things in my local and wider environment.

I understand that environments can change and that this can sometimes pose dangers to living things.



Science Passport –Year 4



Electricity

I can identify common appliances that run on electricity.

I can make a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.

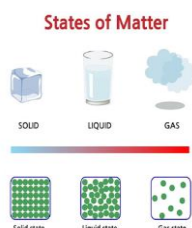


I can identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery.

I understand that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.

I understand some common conductors and insulators, and associate metals with being good conductor.

States of Matter



I can compare and group materials together, according to whether they are solids, liquids or gases.

I understand 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).

I understand the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.



prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

dissolving, digestion, excretion, peristalsis, anus, duodenum, small intestine, large intestine, stomach, rectum, esophagus, tongue, saliva, acid, bile, enzymes, incisors, canines, molars, predator, prey, producer, consumer, primary, secondary, tertiary

insulator, particle, vibration, percussion instrument, wind instrument, string instrument, frequency, volume, pitch, transverse wave, longitudinal wave, medium, vacuum

kingdom, classification key, species, fungi, bacteria, climate change, characteristics, offspring, extinction, pollution

circuit, appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative terminal, positive terminal, chemical reaction, emit

bond, condensation, evaporation, reversible, boiling point, melting point, liquid, gas, thermometer, water cycle, continuous precipitation, transpiration, surface run off process, sublimation

Skills

Asks questions and answers them by setting up different types of scientific enquiry

Makes predictions that can be tested in a scientific enquiry

Can use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stop watches.

Can present results and scientific data in a variety of ways.

Can 'write-up' a scientific enquiry including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion.

Uses their communication skills to summarise a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry.

Can interpret results, drawing conclusions and suggesting further scientific enquiries based on the results



Science Passport –Year 4



Knowledge

Working Scientifically

Know how to conduct a fair test, taking into account independent and dependent variables, while all other conditions are kept the same.

Know how to: draw bar charts; label a diagram using lines to connect information to the diagram; use a coloured key; draw a neat table; draw a classification key; show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table.

Know how to write a simple scientific enquiry write-up.

Know how to summarise a scientific enquiry write-up into a brief oral discussion.

Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true.

Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary.

Know that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry.

Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts.

Know that they can draw conclusions from the findings of other scientists.

Know that a theory is an explanation of observations that has been tested and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry.

Sound

Know that sound is generated when an object vibrates; some of the energy from the vibrating object is transferred to the air, making the air particles move.



Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another.

Know that sound is a form of energy that transfers in a longitudinal wave-like that seen in a slinky-nota transverse wave-like that seen in water ripples.

Know that sound travels through particles e.g. the air and thus sounds does not travel through a vacuum which has no particles in it.

Know that longitudinal sound waves are detected in the ear by humans and that the brain interprets this as the sounds we hear.

Know that sound travels at different speeds through different objects; this is why we often hear thunder after we see lightning as the light reaches our eye before the sound reaches our ears.

Know that pitch is how high or low a sound is and that this is determined by how many vibrations per second are being made by the vibrating object; the number of vibrations per second is called frequency.

Know how to identify patterns between the pitch of a sound and features of the object that produced it.

Know that volume is how loud or quiet a sound is and that this is determined by the amount of energy in the wave.

Knows how to find patterns between the volume of a sound and the strength of the vibrations that produced it.

Know that the volume of a sound is quieter if the listener is further away from the object.



Science Passport –Year 4



Knowledge

Animals including Humans

Know that 'digestion' is food passing through the body with the nutrients being extracted and the waste products excreted.

Know that digestion involves breaking complex foodstuffs into simpler building blocks that can be absorbed by the body.

Know that digestion begins with food being chewed in the mouth by the teeth and saliva added.

Know that a human has three types of teeth.

Know that incisors slice food, canines tear food (especially meat) and that molars grind food.

Know that children develop an initial set of teeth which are gradually replaced between the ages of 6 and 12.

Know that food is squeezed down the esophagus towards the stomach in a wave-like action called peristalsis.

Know that the stomach is an organ; is a part of living thing that is self-contained and has a specific important job. The stomach releases acid and enzymes to continue breaking down the food.

Know that further enzymes and bile break down the food further as it moves through the duodenum towards the small intestine.

Know that the small intestine adds more enzymes and then absorbs the nutrients.

Know that the large intestine absorbs water from the undigested food.

Know that undigested food is stored in the rectum before being excreted through a muscle called the anus.

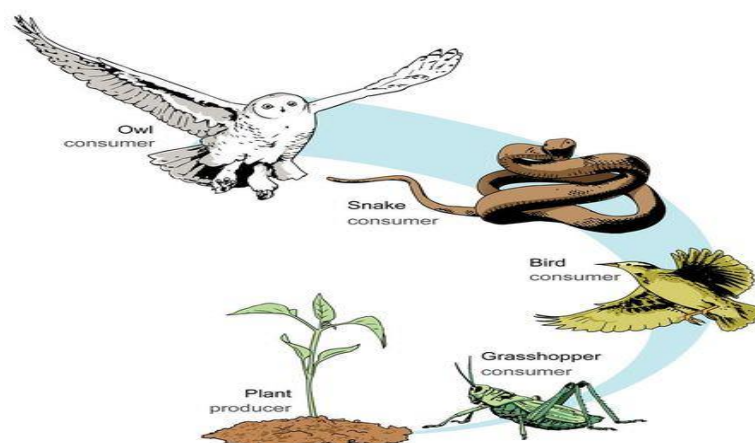
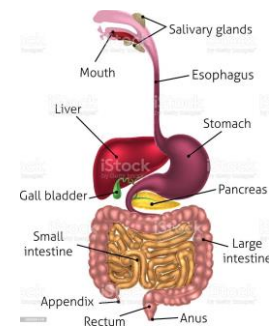
Know that a food chain traces the path of energy through a habitat.

Know that all energy for a food chain initially comes from the Sun which is absorbed and turned into energy by plants which are called producers. Consumers take in energy by eating.

Know that an animal that is eaten by another is called prey, and that an animal that eats other animals is called a predator.

Know that the first consumer in a food chain is called a primary consumer, the second is called a secondary consumer and above it is called a tertiary consumer.

Know that the arrows in a food chain show the direction that energy is travelling through a habitat.





Science Passport –Year 4



Knowledge

Living things and their Habitats

Know a variety of living things in their local and wider environment.

Know that animals can be grouped based on their physical characteristics (e.g. vertebrates and invertebrates) and based on their behaviour (e.g. herbivores, carnivores and omnivores).

Know that living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms.

Know that a species is a group of living things that have many similarities. A species can reproduce together to produce offspring.

Know that a classification key uses questions to sort and identify different living things.

Know how to use a classification key to identify and group living things.

Know how to create a classification key to sort plants that are in or around the school grounds.

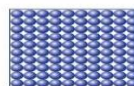
Know that changes to the environment can make it more difficult for animals to survive and reproduce; in extreme cases this leads to extinction, where an entire species dies.

Know that human activity—such as climate change caused by pollution—can change the environment for many living things, endangering their existence.

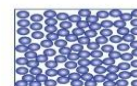
Know examples of climate change endangering the existence of a species; e.g. polar bears, as the ice gets warmer, the sea ice on which polar bears live reduces in amount making it harder for them to survive and reproduce.



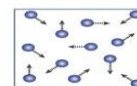
States of matter



Solid



Liquid



Gas

Know that things are composed of a material in one of three states of matter; solid, liquid or gas. Materials can be grouped according to their state.

Know that things are made of particles (tiny building blocks) and that are organized differently in different states.

Know that materials can change state when their temperature changes; and can measure or research the temperature at which this happens in degrees Celsius (°C).

Know that there are bonds between the particles in a solid; as temperature increases, these bonds are overcome as the particles absorb energy and solids can change into liquids; with a further increase in temperature, the particles become even more energetic and the bonds are overcome entirely so the liquid changes into a gas.

Know that when solids turn into liquids, this is called melting and that the reverse process is called freezing.

Know that when liquids turn into gases, this is called evaporation and that the reverse process is called condensation.

Know that when a solid turns into a gas without passing through the liquid state, this is called sublimation.

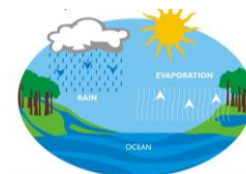
Know that the melting point of water is 0°C and that the boiling point of water is 100°C.

Know that water flows around our world in a continuous process called the Water Cycle.

Know that water on the Earth's surface moves to the air in a process called transpiration in which water turns into water vapour (gas) on the surface of leaves on plants.

Know that rain condenses in clouds and falls to earth as rain, snow or hail in a process called precipitation.

Know that water flows across land in rivers and streams in a process called surface run-off and under the ground as ground water.

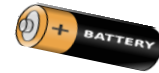




Science Passport –Year 4



Knowledge



Electricity

Know the name of common appliances that run on electricity.

Know that electrical energy is one of many forms of energy.

Know that static electricity is an imbalance of charged particles on a material; it does not operate by flowing around a complete circuit.

Know that current electricity is the flow of charged particles called electrons around a circuit.

Know that electrical current flows well through some materials, called electrical conductors, and poorly through other materials, called electrical insulators,

Know some common examples of insulators and conductors.

Know that conductors have free electrons and that when electrical current flows around a conductor the electrons move.

Know that electrical conductivity (how well a material conducts electricity) is an example of a property.

Know that metals are good electrical conductors.

Know that a chemical reaction inside a cell produces the charged particles that can flow around a circuit.

Know that more than one cell lined up to work together is called a battery.

Know that electrical current can flow if there is a complete circuit.

Know that wires—which contain a conductor inside them, usually made of metal—can allow electrical current to flow around a circuit.

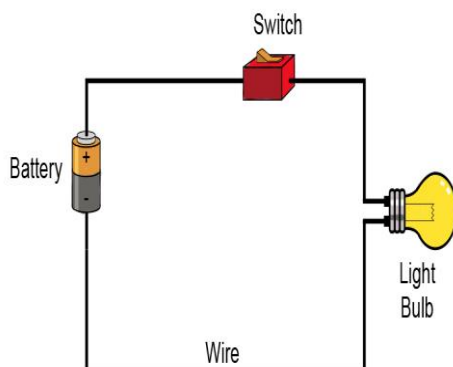
Knows the basic electrical parts, including cells, wires, bulbs, switches and buzzers.

Know that when electrical current flows through a circuit, components within that circuit—such as buzzers which make a noise and bulbs which emit light—begin to work.

Know that a switch functions by completing or breaking a complete circuit and associate this with whether or not a lamp lights in a simple series circuit.

Know how to construct a simple series electrical circuit using components.

Know that exposure to high levels of electrical current can be dangerous.





Science Passport –Year 5



Working Scientifically

I can plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.

I can take measurements, using a range of scientific equipment, within creasing accuracy and precision.

I can record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs.

I can use test results to make predictions to set up further comparative and fair tests.

I can report and present findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations.

I can identify scientific evidence that has been used to support or refute ideas or arguments.



Animals including Humans

I can describe the changes as humans develop to old age.

Properties and changes of materials

I can 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.

I know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.

I can use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.

I can give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.

I can demonstrate that dissolving, mixing and changes of state are reversible changes.

I can 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.



Earth and Space



I can describe the movement of the Earth, and other planets, relative to the Sun in the solar system.

I can describe the movement of the Moon relative to the Earth.

I can describe the Sun, Earth and Moon as approximately spherical bodies.

I can use the idea of the Earth's rotation to explain day and night, and the apparent movement of the Sun across the sky.



Science Passport –Year 5



Forces

I can explain how unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.

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

I know that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.



Living things and their habitats

I can describe the differences in the lifecycles of a mammal, an amphibian, an insect and a bird

I can describe the life process of reproduction in some plants and animals.



line graph, relationship, outlier

life cycle, life span, embryo, womb, weaned, adolescence

irreversible, dissolve, soluble, insoluble, solvent, solute, solution, filter, sieve, saturation, crystallization, thermal, chemistry

planet, satellite, sphere, solar system, eclipse, star, universe, constellation, axis, celestial body, Moon, rotating, lunar, solar, telescope, rotation

acceleration, air resistance, buoyancy, effort, force meter, fulcrum, gravity, load, mass, mesh, Newton, pivot, rigid, streamlined, terminal velocity, unsupported, water resistance, weight.

, metamorphosis, pupa, larva, chrysalis, caterpillar, tadpole, hatchling, fledgling, insect.

Skills

Uses measuring devices accurately, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device

Presents brief oral findings from an enquiry, speaking clearly and with confidence, using notes where necessary.

Writes a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion

Makes predictions, interprets data, draws conclusions and uses evidence to support or refute ideas or arguments



Science Passport –Year 5



Knowledge

Working Scientifically

Know how to choose appropriate variables to test a hypothesis (e.g. plant height as a dependent variable when measuring effect of light on plant growth).

Know how to identify conditions that were imperfectly controlled and can explain how these might affect results.

Know how and when to repeat measurements, how to find an average of a set of measurements and how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement.

Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection).

Animals including Humans

Know that humans go through stages of development;

- they begin as fertilized eggs and then develop in to embryos before developing into babies;
- once they are born, these newborn babies become infants (roughly 2 months to 2 years)
- young children (roughly 2-12 years old);
- children develop into adults during adolescence (roughly 12-16 years old) at which age they become physically capable of reproduction;
- adults develop into old age (roughly 55+ years old) they experience changes in their body which require them to move more carefully and rest more frequently.



Living things and their habitats

Know that the life cycle of a living thing is a series of stages of development starting with a fertilized egg in animals or a seed in many plants.



Know that in most mammals (e.g. dogs) a fertilized egg develops in the womb into an embryo and is then born. It is fed on milk before it is weaned onto the food that is adapted to eat. Then develops to maturity in a period called adolescence after which it can reproduce and the cycle can begin again.

Know that in amphibians (e.g. frogs) a fertilized egg develops into an embryo and then hatches into a tadpole; the tadpole develops adult characteristics, metamorphoses into the adult form after which it can reproduce and the cycle can begin again.

Know that in many insects (e.g. butterflies) a fertilized egg develops into wingless feeding form called a larva (caterpillar); the larva feeds then later becomes a pupa (chrysalis) with a protective cocoon; inside this cocoon, the pupa metamorphoses into the adult butterfly after which it can reproduce and the cycle can begin again.

Know that in birds (e.g. robins) a fertilized egg hatches in a nest (a hatchling) and is fed by its parents until it is ready to fly (i.e. becomes a fledgling); it then leaves the nest and grows into an adult after which it can reproduce and the cycle can begin again





Science Passport –Year 5



Knowledge

Earth and Space

Know that the universe comprises all matter and space in existence.

Know that a celestial body is a large object in the universe.

Know that a star is an exceptionally hot ball of gas, originally made from hydrogen and helium.

Know that the Sun is a star.

Know that a planet is defined as a spherical celestial body that orbits a star and that has cleared the neighbourhood of its orbit of other objects, some of which crash into the planet and others that become moons of that planet.

Know it was once thought that everything orbited the Earth, but that scientists like Copernicus and Galileo used telescopes and measurement to show that the Earth orbited the Sun.

Know that there are eight major planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune

Know that the universe is utterly vast and that our solar system makes up a tiny fraction of the universe.

Know that a satellite orbits a planet and that moons are natural satellites.

Know that the Moon orbits the Earth roughly every 28 days.

Know that as the Moon orbits the Sun, different parts of it are lit up by the Sun, which is why we see a different shape lit up on the Moon as the lunar cycle progresses.

Know that humans have sent man-made satellites into orbit that assist with telecommunication.

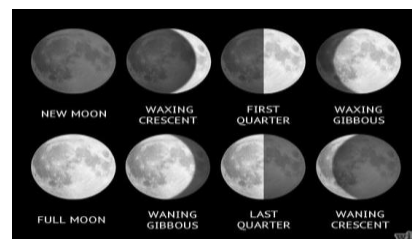
Know that all the planets in the solar system orbit the Sun and that the further away they are from the Sun, the longer their orbit.

Know that the Earth spins around an imaginary line through its centre called an axis and that this axis is tilted relative to the Earth's orbit.

Know that night and day are the result of the Earth rotating on its axis.

Know that the tilt of the Earth towards and away from the Sun's light as the Earth orbits the Sun leads to the seasons as during winter the light is spread over a wider area.

Know that a solar eclipse occurs when the Moon is between the Sun and the Earth, casting a shadow on the Earth; a lunar eclipse occurs when the Earth is between the Sun and the Moon, casting a shadow on the Moon.





Science Passport –Year 5



Knowledge

Forces

Know that a force is measured in a unit called Newtons, named after a British scientist called Sir Isaac Newton who discovered lots about gravity and how planets move.

Know that pull forces can be measured using a device called a force meter.

Know that the amount of matter (stuff) in an object is its mass.

Know that gravity is a force that acts between all objects in the universe, but that it acts much more strongly between objects that have more mass and that are close together.

Know that unsupported objects are pulled towards the Earth by the force of gravity.

Know that acceleration is a change in speed and that unbalanced forces acting on an object cause it to accelerate.

Know that air resistance is a force felt by an object as it moves through the air; it is caused by the object bumping into the gas particles that make up air; the quicker an object moves, the more gas particles it bumps into and the more air resistance it experiences.

Know that a falling object will accelerate until its air resistance matches the gravitational force pulling it down; at this point, the object will continue to move at this speed (called its terminal velocity) without getting any quicker or slowing down.

Know that a parachute's shape increases the air resistance that a falling object experiences, giving it a much lower terminal velocity.

Know that water resistance is a force felt by an object as it moves through water; it is caused by the object bumping into the water particles.

Know that the shape of an object determines how much air resistance or water resistance it experiences; shapes of object that experience little air resistance or water resistance are described as streamlined.

Know how to draw a force diagram with arrows representing the different forces acting on an object.

Know that a lever is a rigid length pivoting around a fulcrum.

Know that a pulley is a wheel with a fulcrum that supports a moving cable or belt.

Know that a gear is a rotating wheel with cut teeth that mesh with the teeth of another gear so that turning one gear turns an adjacent gear in the opposite direction.

Know that gears, levers and pulleys are simple machines that used to allow a smaller force to have a greater effect; they do this by moving a smaller force over a longer distance at one end of the machine, which the machine turns into a larger force over a small distance at the other end.





Science Passport –Year 5



Knowledge



Properties and Changes of Materials

Know that materials can be compared and sorted in a variety of ways based on their properties including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.

Know that in some solid materials the bonds between particles break when surrounded by a liquid; this allows the liquid to absorb the solid; when this happens, the solid is called a solute, the liquid is called a solvent and the result is a solution; when a solid does dissolve in a liquid it is described as being soluble in that solvent (e.g. sugar in water); when it cannot it is insoluble (e.g. sand in water).

Know that a given amount of solvent can only absorb a certain amount of solid before no more will dissolve; when this happens the liquid is said to be saturated.

Know that when a solvent is evaporated from a solution, the original solute is left behind; the remaining solid will often form crystals—the slower the solvent evaporates, the larger the crystals that will be formed.

Know how to dissolve a solute in a solvent and then how to evaporate the solvent to recover the solute.

Know and demonstrate that a reversible change is one that can be reversed and that examples of this are mixing, dissolving and changes of state where no chemical reaction takes place.

Know that an irreversible change is one that cannot be reversed and that examples of this often involve a chemical change where a new material is made, often a gas (e.g. burning, boiling an egg, the reaction of bicarbonate of soda and acid).

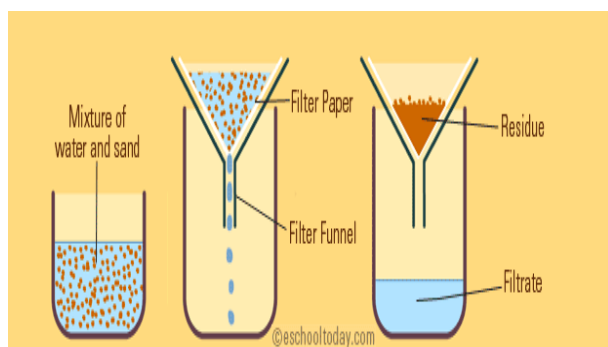
Know that filtering allows solids and liquids to be separated and that sieving allows solids made up of different sizes parts to be separated.

Know how to separate a mixture of sand, salt and small stones by sieving (to remove the small stones), followed by dissolving in water (so the salt is absorbed), followed by filtering to remove the sand from the mixture, followed finally by evaporation of the water to recover the salt.

Know that materials' different properties can be tested through acting upon them, including testing to find whether materials are magnetic, thermally conductive and electrically conductive;

Know that the various properties of different materials make them suitable for a given function.

Know how to explain orally and in writing the reasons why various materials are suited or unsuited to a function, based on evidence from comparative and fair tests.



Reversible and Irreversible Changes





Science Passport –Year 6



Working Scientifically

I can plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.

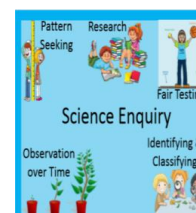
I can take measurements, using a range of scientific equipment, within creating accuracy and precision.

I can record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs.

I can use test results to make predictions to set up further comparative and fair tests.

I can report and present findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations.

I can identify scientific evidence that has been used to support or refute ideas or arguments.



Animals including Humans

I can identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.

I can recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.

I can describe the ways in which nutrients and water are transported within animals, including human.



Light

I can recognise that light appears to travel in straight lines.

I can 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.

I can 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.

I can use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.



Electricity

I understand the brightness of a lamp or the volume of a buzzer is associated with the number and voltage of cells used in the circuit.

I can 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.

I can use recognised symbols when representing a simple circuit in a diagram.





Science Passport –Year 6



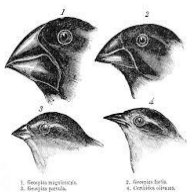
Living things and their habitats

I can 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.

I can give reasons for classifying plants and animals based on specific characteristics.



Evolution and adaptation



understand recognise that living things have changed overtime and that fossils provide nformation about living things that inhabited the Earth millions of years ago.

understand that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.

I can identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.



line graph, relationship, outlier

artery, aorta, atrium, blood vessels capillary, circulatory system, vein, pulse, ventricle, replenished, resting heart rate, body

angle of incidence, angle of reflection, refraction, spectrum, translucent, medium, periscope

series circuit, parallel circuit, resistance, voltage

micro-organism, virus, thorax, arthropod, abdomen, arachnid, antenna, jointed limbs

evolution, natural selection, variation, advantageous

Skills

Uses measuring devices accurately, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device

Presents brief oral findings from an enquiry, speaking clearly and with confidence, using notes where necessary.

Writes a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion

Makes predictions, interprets data, draws conclusions and uses evidence to support or refute ideas or arguments



Science Passport –Year 6



Knowledge

Know how to choose appropriate variables to test a hypothesis (e.g. plant height as a dependent variable when measuring effect of light on plant growth).

Know how to identify conditions that were imperfectly controlled and can explain how these might affect results.

Know how and when to repeat measurements, how to find an average of a set of measurements and how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement.

Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection).

Animals including humans

Know that the heart and lungs are organs protected by the rib cage.



Know that blood travels around the body transporting nutrients that have been absorbed into the blood stream from digestion

Know that blood travels around the body transporting oxygen, which is used to power the body; this use of oxygen to create energy is called respiration.

Know that the heart beats, pumping blood around the body and that blood vessels carry the blood; arteries carry blood away from the heart; veins carry blood towards the heart; capillaries are tiny blood vessels that connect arteries and veins.

Know that the heart is composed of four chambers: two atria and two ventricles; the aorta is the largest artery in the body and most major arteries branch off from it.

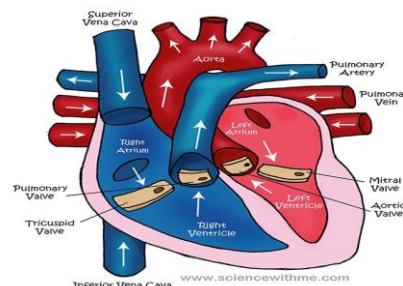
Know that when we exercise, our heart beats more frequently so that the oxygen that is used around the body can be replenished; it returns to a resting heart rate afterwards; fitter people tend to have lower resting heart rates.

Know that drugs are chemicals that have an impact on the natural chemicals in a person's; know that drugs can be harmful or helpful, depending on what they are and how they are used; know that all drugs can be harmful if over used.

Know that paracetamol and aspirin are examples of drugs that can be helpful as a painkiller.

Know that cannabis and cocaine are examples of illegal drugs that can have serious negative effects.

Know that alcohol and tobacco are examples of drugs that are legal to adults but that can have serious negative effects, such as liver disease and lung disease, respectively.





Science Passport –Year 6



Knowledge

Light

Know that translucent objects allow some light to pass through, but some of the light changes direction as it passes through the object; this means that something seen through a translucent object is not clearly defined.



Know that when light passes from one medium to another (e.g. from air to water), it changes direction; this is called refraction; this happens because light travels at different speeds in different media.

Know that white light comprises all the colours of light.

Know that white light refracted by two surfaces in a prism will spread out so that all of colours within it can be seen; this array of colours is called a spectrum; it happens because the different colours of that make up white light travel at different speeds.

Know how to draw a diagram to show why the shape of a shadow will match the shape of an object.

Know that when light reflects off an object, the angle of incidence is equal to the angle of reflection.

Know that a periscope takes advantage of the predictable angles of incidence and reflection to allow an image to be shown to a viewer.



Electricity

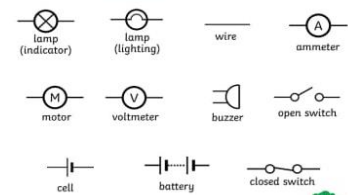
Know that voltage is a measure of the power of a cell to produce electricity; it is a measure of the 'push' of electric current, not the size of the electric current.

Know that as the number and voltage of cells in a circuit increases, the brightness of a bulb or the volume of a buzzer will increase (though too high a voltage may 'blow' the bulb or buzzer).

Know how to draw simple circuit diagrams.

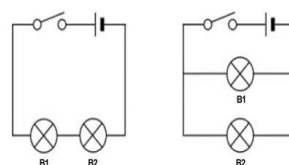
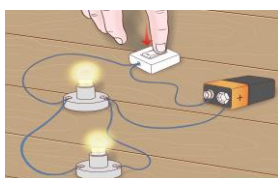
Know the recognized symbols for a battery, bulb, motor, buzzer and wire.

Know how to predict whether components will function in a given circuit, depending on whether or not the circuit is complete; whether or not a switch is in an on or off position; and whether or not there is a cell to provide electrical current to the circuit.



Know that two bulbs in a circuit can be wired up to create a series circuit or a parallel circuit; if one bulb blows in a series circuit the other will not shine as the circuit has been broken; in contrast, if one bulb blows in a parallel circuit, there will still be a complete circuit for the other bulb so it will continue to shine; use this.

Have the knowledge in order to explain the advantages of using parallel circuits (e.g. in the lighting in homes).





Science Passport –Year 6



Knowledge

Living things and their habitats

Know that living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals

Know how to use their knowledge to give reasons for classifying plants and animals based on specific characteristics.

Know that there are three types of micro-organism: viruses, fungi and bacteria; of these three, viruses are often not really considered to be alive by many scientists mainly because they don't have the 'machinery' to reproduce inside them.

Know that germs are disease-causing bacteria.

Know that an arthropod is an invertebrate with a hard, external skeleton and jointed limbs.

Know that insects are a type of arthropod; their bodies consist of six legs, a head, a thorax and an abdomen; most insects also have a pair of antennae and a pair of wings.

Know that an arachnid (e.g. spider) is a type of arthropod with eight legs and no antennae or wings

Know that a crustacean is a type of arthropod with two pairs of antennae (e.g. woodlouse).

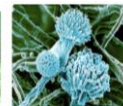
Know that a myriapod is an arthropod with a flat and long or cylindrical body and many legs (e.g. centipede).



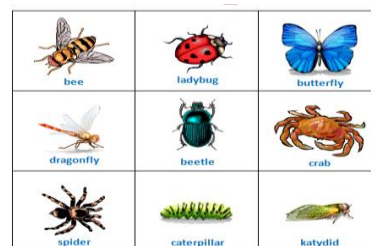
Bacteria



Virus



Fungus



Evolution and adaptation

Know that all life on Earth began from a single point around 4.5 billion years ago.

Know that animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

Know that living things change over time and that this gradual change is called evolution.

Know that natural selection is the cause of changes in a species; natural selection works across a species, there is natural variation within a species; there is also competition to survive and reproduce and that members of a species with advantageous characteristics survive and reproduce—these characteristics are passed down to their offspring; members of a species with less advantageous characteristics do not survive and reproduce—these characteristics are not passed down to offspring.

Know that offspring are of the same kind but vary and are not identical to their parents.

Know that Charles Darwin proposed this theory of evolution by natural selection.

Know that the gradual change of species over millions of years can be observed by looking at examples of fossil.

