

Progression in Science



Science is observing, describing and experimenting to discover more about the world

Our beliefs

The principal focus of science teaching is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. (National Curriculum 2014).

Science teaching at Studley Green aims to give all children a strong understanding of the world around them whilst acquiring specific skills and knowledge to help them to think scientifically, to gain an understanding of scientific processes and also an understanding of the uses and implications of Science, today and for the future.

At Studley Green, scientific enquiry skills are embedded in each topic the children study and these topics are revisited and developed throughout their time at school. It will develop the natural curiosity of the child, encourage respect for living organisms and the physical environment and provide opportunities for critical evaluation of evidence.

Scientific skills (Green= NC)

| | Plan | Do - obtaining evidence | Recording | concluding | Evaluating | vocabulary |
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| 1 | <ul style="list-style-type: none"> asking simple questions and recognising that they can be answered in different ways <p>Answer simple questions stimulated by observations & exploration of their world e.g. Why a stone lying on the ground does not move? 'Why did that get hot?'</p> | <ul style="list-style-type: none"> observing closely, using simple equipment performing simple tests identifying and classifying <p>Present evidence in templates provided for them and make simple observations e.g. use a simple tally of boy v girls in class. Which is the majority gender?</p> | <ul style="list-style-type: none"> gathering and recording data to help in answering questions <p>Use and interpret simple pictograms / tables</p> <p>Use evidence to answer questions & recognise that they can be answered in different ways e.g. Q. 'How do you know which one dissolved?'</p> | <ul style="list-style-type: none"> using their observations and ideas to suggest answers to questions <p>Draw on their everyday experience to help answer questions. e.g. explains that rain makes them wet</p> | | question answer observe observing equipment identify classify sort group record diagram chart map data table pictogram describe biology chemistry physics |
| 2 | <ul style="list-style-type: none"> asking simple questions and recognising that they can be answered in different ways <p>Make some suggestions about how to find things out or how to collect data to answer a question.</p> | <ul style="list-style-type: none"> observing closely, using simple equipment performing simple tests identifying and classifying <p>Compare objects, materials and living things e.g. compare the limbs of different animals; texture/hardness of different material.</p> | <ul style="list-style-type: none"> gathering and recording data to help in answering questions <p>Use and interpret simple tables where appropriate e.g. blocks graphs, pictograms, tally charts</p> | <ul style="list-style-type: none"> using their observations and ideas to suggest answers to questions <p>Use what they see and their own ideas to suggest answers to questions e.g. says that a plant will die without water</p> <p>and use 'because' to suggest their reason</p> | | question answer observe observing equipment identify classify sort group record diagram chart map data table pictogram block graph tally chart compare contrast describe reason biology chemistry physics |
| 3 | <ul style="list-style-type: none"> asking relevant questions and using different types of scientific enquiries to answer them setting up simple practical enquiries, comparative and fair tests <p>Use straightforward scientific evidence to answer questions, or to support findings eg "How do you think changing the amount of light will affect the plant"?</p> | <ul style="list-style-type: none"> making systematic and careful observations and where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers <p>Suggest answers or solutions to questions/problems given to them. Answer questions such as: "How could we keep it hotter for longer?"</p> <p>Choose, from a list, at least one variable that needs to be kept the same in an investigation to make it a fair test e.g. same distance when timing cars down a ramp.</p> | <ul style="list-style-type: none"> gathering, recording, classifying and presenting data in a variety of ways to help in answering questions recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables <p>Present simple data in a variety of ways, using that data to identify findings.</p> | <ul style="list-style-type: none"> reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions identifying differences, similarities or changes related to simple scientific ideas and processes Using straightforward scientific evidence to answer questions or to support their findings <p>Identify straightforward patterns in observations or in data presented in tables, pie and bar charts e.g. Identify which food was the best source of energy from a bar chart.</p> | <ul style="list-style-type: none"> using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions <p>Make predictions. Draw simple conclusion referring back to their testing. Use of the words because, therefore, I know, I believe</p> | research- relevant questions scientific enquiry comparative and fair test systematic careful observation accurate measurements equipment - thermometer, datalogger data- gather, record, classify, present record- drawings, labelled diagrams, keys, bar charts, tables oral and written explanations conclusion predictions |

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| 4 | <ul style="list-style-type: none"> asking relevant questions and using different types of scientific enquiries to answer them setting up simple practical enquiries, comparative and fair tests <p>Use scientific evidence through research to answer questions or support findings</p> | <ul style="list-style-type: none"> making systematic and careful observations and where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers <p>Choose correct equipment from a given list, or content from information provided, to investigate a question/idea e.g. beaker to heat water, thermometer to measure temp.</p> | <ul style="list-style-type: none"> gathering, recording, classifying and presenting data in a variety of ways to help in answering questions recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables <p>Draw tables & bar charts to present simple data labelled correctly. Choose the most appropriate way.</p> | <ul style="list-style-type: none"> reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions identifying differences, similarities or changes related to simple scientific ideas and processes Using straightforward scientific evidence to answer questions or to support their findings <p>Recognise scientific evidence that is for or against an argument, or supports a scientific idea or not e.g. evidence for how sound travels through different materials.</p> | <ul style="list-style-type: none"> using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions <p>Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</p> | <p>research- relevant questions scientific enquiry comparative and fair test systematic careful observation accurate measurements equipment - thermometer, datalogger data- gather, record,classify, present record- drawings,labelled diagrams, keys, bar charts, tables oral and written explanations conclusion predictions</p> |
| 5 | <p>planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p> <p>Give examples of where science cannot answer all our questions. e.g. Is there life on other planets?</p> <p>Identify the main variables that may affect investigative results and select which ones to change or keep the same e.g. how forces affect elastic materials.</p> | <ul style="list-style-type: none"> taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate <p>Choose correct equipment, or content from information provided, to investigate a question/idea e.g. beaker to heat water, thermometer to measure temp. with confidence.</p> | <ul style="list-style-type: none"> recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs <p>Identify the evidence used in making a conclusion e.g. UK diet is the least healthy</p> | <ul style="list-style-type: none"> reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. <p>Suggest different possible conclusions from the same range of evidence (pri or sec) Come up with alternative conclusions..."What could this show? What else could it show?"</p> | <ul style="list-style-type: none"> using test results to make predictions to set up further comparative and fair tests. identifying scientific evidence that has been used to support or refute ideas or arguments <p>Recognise that scientific ideas change and develop over time sometimes refuting or supporting previous understanding e.g. evidence for or against global warming</p> | <p>plan variables measurements accuracy precision repeat repeats record data scientific diagrams labels classification keys tables scatter graphs bar graph line graph predictions further comparative and fair tests report and present conclusions casual relationships explanations degree of trust oral and written display presentation evidence support refute ideas arguments identify, classify and describe patterns systematic quantitative measurements</p> |
| 6 | <p>planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p> | <ul style="list-style-type: none"> taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate <p>Make sets of observations or measurements and say what the range and intervals are e.g. record a set of results and state the highest, lowest measurement</p> | <ul style="list-style-type: none"> recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs <p>Interpret data from tables, bar & line graphs etc...to draw conclusions consistent with the evidence e.g. Use graphs & charts to describe the effects of diet on health.</p> | <ul style="list-style-type: none"> reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. <p>Use clear sentences and correct scientific words and symbols to describe ideas and observations e.g. Describe heat transfer using correct wording.</p> | <ul style="list-style-type: none"> using test results to make predictions to set up further comparative and fair tests. identifying scientific evidence that has been used to support or refute ideas or arguments <p>Evaluate practical investigation methods and suggest improvements. e.g. Describe some strengths and weaknesses of the plan/method. Make a comment on reliability.</p> | <p>plan variables measurements accuracy precision repeat repeats record data scientific diagrams labels classification keys tables scatter graphs bar graph line graph predictions further comparative and fair tests report and present conclusions casual relationships explanations degree of trust oral and written display presentation evidence support refute ideas arguments identify, classify and describe patterns systematic quantitative measurements</p> |

(See Dawn Cottle and Science Assessment statements in Curriculum file Science/ assessment / Science assessment steps year 1 to 6 small for more broken down and explicit statements for each science knowledge area)

Our Science Knowledge Curriculum (highlighted Orange is the sticky knowledge)

| | Biology | | | Chemistry | Physical processes | | | | |
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| | Plants | Animals inc Humans | Living things and their habitats | Materials | Seasonal changes/Earth in space | Light | sound | Forces | Electricity |
| 1 | <ul style="list-style-type: none"> identify and name a variety of common wild and garden plants, including deciduous and evergreen trees identify and describe the basic structure of a variety of common flowering plants, including trees. | <ul style="list-style-type: none"> identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals identify and name a variety of common animals that are carnivores, herbivores and omnivores describe and compare the structure of a variety of | | <ul style="list-style-type: none"> distinguish between an object and the material from which it is made identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock describe the simple physical properties of a variety of everyday materials | <ul style="list-style-type: none"> observe changes across the four seasons observe and describe weather associated with the seasons and how day length varies | | | | |

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| | | <p>common animals (fish, amphibians, reptiles, birds and mammals, including pets)</p> <ul style="list-style-type: none"> identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. | | <ul style="list-style-type: none"> compare and group together a variety of everyday materials on the basis of their simple physical properties | | | | |
| Vocab | <p>common wild plants garden plants tree deciduous evergreen trunk branches leaf root plant leaf bud flowers blossom petals root stem fruit vegetables bulb seed</p> | <p>common animals fish amphibians reptiles birds mammals pets carnivores meat cat dog lion tiger fox shark killer whale eagle hawk snake herbivores plants cow hamster guinea pig tortoise omnivores meat and plants badger human bear chickens hear neck arms elbows legs knees face ears eyes hair mouth teeth</p> | | <p>material wood plastic glass metal water rock properties hard soft stretch stiff shiny dull rough smooth bendy waterproof absorbent brick paper fabrics elastic foil</p> | <p>season spring summer autumn winter weather hot/ warm cool/ cold sun/ sunny cloud/ cloudy wind/ windy rain/ rainy snow/ snowing hail/ hailing sleet frost fog/ mist ice/ icy rainbow thunder lightning storm light/ dark day/ night</p> | | | |
| y2 | <p>Plants</p> <ul style="list-style-type: none"> observe and describe how seeds and bulbs grow into mature plants find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. <p>From Yr 3 National Curriculum</p> <ul style="list-style-type: none"> explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. | <p>Animals inc Humans</p> <ul style="list-style-type: none"> notice that animals, including humans, have offspring which grow into adults find out about and describe the basic needs of animals, including humans, for survival (water, food and air) describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene. | <p>Living things and their habitats</p> <ul style="list-style-type: none"> explore and compare the differences between things that are living, dead, and things that have never been alive. 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 identify and name a variety of plants and animals in their habitats, including micro-habitats 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. | <p>Materials</p> <ul style="list-style-type: none"> identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. | | | | |
| Vocab | <p>water light suitable temperature grow healthy germination, reproduction</p> | <p>offspring grow adults nutrition reproduce survival water food air exercise hygiene egg-chick-chicken egg-caterpillar-pupa-butterfly spawn-tadpole-frog lamb-sheep baby-toddler-child-teenager-ad ult</p> | <p>living dead never alive habitats micro-habitats food food chain sun-grass-cow-human alive healthy logs leaf litter stony path under bushes shelter seashore woodland ocean rainforest conditions hot/ warm/ cold dry/ damp/ wet bright/ shade/ dark</p> | <p>wood metal plastic glass brick rock paper cardboard squashing bending twisting stretching metal – coins, cans, cars, table, legs wood – matches, floors, telegraph poles spoons – plastic, wood, metal John Dunlop- rubber Charles Macintoshwaterproof fabric</p> | | | | |
| y3 | <p>Plants</p> <ul style="list-style-type: none"> identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers explore the requirements of plants for life and growth (air, light, water, nutrients from soil and room to grow) and | <p>Animals inc Humans</p> <ul style="list-style-type: none"> identify 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 identify that humans and some other animals have skeletons and muscles for | | <p>Materials</p> <ul style="list-style-type: none"> compare and group together different kinds of rocks on the basis of their appearance and simple physical properties describe in simple terms how fossils are formed when things that have lived are trapped within rock | | <p>Light</p> <ul style="list-style-type: none"> recognise that they need light in order to see things and that dark is the absence of light notice that light is reflected from surfaces recognise that light from the sun can be dangerous and that there are ways to protect their eyes | <p>Forces</p> <ul style="list-style-type: none"> compare how things move on different surfaces notice that some forces need contact between two objects but magnetic forces can act at a distance observe how magnets attract or repel each other and attract some materials and not others. | |

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| | <p>how they vary from plant to plant</p> <ul style="list-style-type: none"> investigate the way in which water is transported within plants. <p>explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p> | support, protection and movement. | | <ul style="list-style-type: none"> recognise that soils are made from rocks and organic matter. | | <ul style="list-style-type: none"> recognise that shadows are formed when the light from a light source is blocked by a solid object find patterns in the way that the size of shadows change. | | <ul style="list-style-type: none"> 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 describe magnets as having two poles predict whether two magnets will attract or repel each other, depending on which poles are facing. | |
| | <p>structure – flowering plants, roots, stem/ trunk, leaves, flowers</p> <p>function – nutrition, support, reproduction, makes own food</p> <p>requirements for life and growth – air, light, water, nutrients from the soil, room to grow, fertiliser</p> <p>life cycle - flowers pollination, seed formation, germination, seed dispersal</p> | <p>nutrition vitamins minerals fat protein carbohydrates fibre water skeletons – support, protection skulls – brain ribs – heart, lungs joint muscles- movement, pull, contract relax diet</p> | | <p>rock stone pebble boulder soil fossil grains crystals hard/ soft texture absorb water marble chalk granite sandstone slate sandy soil clay soil chalky soil peat</p> | | <p>light see dark reflect reflective surface natural star Sun Moon artificial torch candle lamp translucent transparent</p> | | <p>force push pull open surface magnet magnetic attract repel magnetic poles north south metal iron steel</p> | |
| y4 | | <p>Animals inc Humans</p> <ul style="list-style-type: none"> describe the simple functions of the basic parts of the digestive system in humans identify the different types of teeth in humans and their simple functions. construct and interpret a variety of food chains, identifying producers, predators and prey | <p>Living things and their habitats</p> <ul style="list-style-type: none"> recognise that living things can be grouped in a variety of ways explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment recognise that environments can change and that this can sometimes pose dangers to living things. | <p>Materials</p> <ul style="list-style-type: none"> compare and group materials together, according to whether they are solids, liquids or gases observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature | | | <p>Sound</p> <ul style="list-style-type: none"> identify how sounds are made, associating some of them with something vibrating recognise that vibrations from sounds travel through a medium to the ear find patterns between the pitch of a sound and features of the object that produced it find patterns between the volume of a sound and the strength of the vibrations that produced it recognise that sounds get fainter as the distance from the sound source increases. | | <p>Electricity</p> <ul style="list-style-type: none"> identify common appliances that run on electricity construct a simple series electrical circuit identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers 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 recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit recognise some common conductors and insulators, and associate metals with being good conductors |
| | | <p>human digestive system mouth tongue-mixes, moistens, saliva teeth: incisors- cutting, slicing canines- ripping, tearing molars-chewing, grinding oesophagus transports stomach acid enzymes small intestine large intestine carnivore herbivore omnivore brush floss food chain Sun producers prey predators</p> | <p>environment flowering non-flowering plants animals vertebrate danger invertebrates- snails, slugs, worms, spiders, insects vertebrates- fish, amphibians, reptiles, birds, mammals plants – flowering plants, nonflowering plants population development litter deforestation</p> | <p>solid liquid gas air oxygen powder grain/ granular crystals ice/ water/ steam water vapour heated/ heating cooled/ cooling temperature degrees Celsius melt freeze solidify melting point molten boil</p> | | | <p>sound sound source noise vibrate travel solid liquid gas pitch tune high low volume loud quiet fainter muffle vibrations insulation instrument percussion strings brass woodwind tuned instrument</p> | | <p>appliances electricity electrical circuit cell wire bulb buzzer danger electrical safety sign insulators wood rubber plastic glass conductors metal water switch open closed components plug motor mains</p> |
| y5 | <ul style="list-style-type: none"> describe the life process of reproduction in some plants sexual reproduction | <p>Animals inc Humans</p> <ul style="list-style-type: none"> describe the changes as humans develop to old age | <p>Living things and their habitats</p> <ul style="list-style-type: none"> describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird | <p>Properties and changes of materials</p> <ul style="list-style-type: none"> compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity | <p>Earth and Space</p> <ul style="list-style-type: none"> describe the movement of the Earth, and other planets, relative to the Sun in the solar system describe the movement of the Moon relative to the Earth | | | <p>Forces</p> <ul style="list-style-type: none"> explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. | |

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| | | | <ul style="list-style-type: none"> describe the life process of reproduction in some plants and animals | (electrical and thermal), and response to magnets <ul style="list-style-type: none"> know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic demonstrate that dissolving, mixing and changes of state are reversible changes explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. | <ul style="list-style-type: none"> describe the Sun, Earth and Moon as approximately spherical bodies use the idea of the Earth's rotation to explain day and night and that apparent movement of the sun across the sky. | | | <ul style="list-style-type: none"> identify the effects of air resistance, water resistance and friction, that act between moving surfaces recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. | |
| | | Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty | <u>life process of reproduction</u> plants animals vegetable garden flower border reproduction <u>plants</u> - sexual, asexual <u>animals</u> - sexual <u>life cycles</u> - mammal, amphibian, insect, bird <u>lifecycles around the world</u> rainforest, oceans, desert prehistoric similarities differences germination pollination stamen stigma | properties hardness solubility transparency conductive response to magnets dissolve liquid solution solute separate separating solids, liquids, gases filtering sieving evaporating reversible changes mixing evaporation filtering sieving melting irreversible conductivity insulation chemical opaque translucent rusting residue condensing solid liquid gas air oxygen powder grain/ granular crystals ice/ water/ steam water vapour heated/ heating cooled/ cooling temperature degrees Celsius melt freeze solidify melting point molten boil | Earth planets Sun solar system Moon celestial body sphere/ spherical rotate/ rotation spin night and day Mercury Venus Mars Jupiter Saturn Uranus Neptune Pluto 'dwarf' planet orbit revolve geocentric model heliocentric model shadow clocks sundials astronomical clocks | | | fall gravity force air resistance water resistance friction moving surfaces mechanisms levers pulleys gears magnetic force magnet attract | |
| y6 | Evolution and Inheritance <ul style="list-style-type: none"> 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 | Animals inc Humans <ul style="list-style-type: none"> 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 | Living things and their habitats <ul style="list-style-type: none"> 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 | | | Light <ul style="list-style-type: none"> recognise that light appears to travel in straight lines use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. | | | Electricity <ul style="list-style-type: none"> 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 |

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| | ways and that adaptation may lead to evolution | | | | | | | | |
| | <p>evolution suited/ suitable adapted/ adaptation offspring characteristics vary/ variation inherit/ inheritance fossils</p> | <p>circulatory system heart blood blood vessels pumps oxygen carbon dioxide lungs nutrients water diet exercise drugs lifestyle</p> | <p>organism micro-organism fungus mushrooms classification keys environment fish amphibians reptiles birds mammals vertebrates invertebrates</p> | | | <p>light travels straight reflect reflection light source object shadows mirrors periscope rainbow filters</p> | | | <p>appliances electrical circuit complete circuit circuit diagram circuit symbol components cell battery positive/ negative terminal connection loose connection short circuit wire crocodile clip bulb brightness switch buzzer volume motor conductor insulator voltage current resistance danger series circuit</p> |