**Maryport CE Primary School Science Curriculum Overview**

Taken from the Department of Education Science programmes of study: key stages 1, 2 and 3- National curriculum in England.

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| EYFS | EYFS follow the Birth to 5 Matters strands. In EYFS, science is very much child led. Topics are often decided and explored depending on the children’s interests. Reception also use The Ogden Trust’s Science Experiment cards.  |
| Year 1 | Plants | Animals, including humans | Everyday materials | Seasonal changes |  |
| Year 2 | Plants | Animals, including humans | Uses of everyday materials | Living things and their habitats |  |
| Year 3 | Plants | Animals, including humans | Light | Rocks | Forces and magnets |
| Year 4 | Electricity | Animals, including humans | States of matter | Living things and their habitats | Sound |
| Year 5 | Earth and Space | Animals, including humans | Properties and changes of materials | Living things and their habitats | Forces |
| Year 6 | Electricity | Animals, including humans | Light | Living things and their habitats | Evolution and Inheritance |

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| Working Scientifically |
| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
| During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:* Asking simple questions and recognising that they can be answered in different ways
* Observing closely, using simple equipment performing simple tests
* Identifying and classifying using their observations and ideas to suggest answers to questions
* Gathering and recording data to help in answering questions.
 | During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:* Asking relevant questions and using different types of scientific enquiries to answer them setting up simple practical enquiries, comparative and fair tests
* Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
* 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
* Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
* Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
* Identifying differences, similarities or changes related to simple scientific ideas and processes
* Using straightforward scientific evidence to answer questions or to support their findings.
 | During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:* Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
* Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
* Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
* Using test results to make predictions to set up further comparative and fair tests
* 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
* Identifying scientific evidence that has been used to support or refute ideas or arguments.
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| Year 1 | Plants* 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.
 | Animals including humans* 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 common animals (fish, amphibians, reptiles, birds and mammals, including pets)
* Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.
 | Everyday materials* 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
* Compare and group together a variety of everyday materials on the basis of their simple physical properties.
 | Seasonal changes* Observe changes across the four seasons
* Observe and describe weather associated with the seasons and how day length varies.
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| Year 2 | Plants* 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.
 | Animals including humans* 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.
 | Uses of everyday materials* 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.
 | Living things and their habitats* 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.
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| Year 3 | Plants* 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 how they vary from plant to plant
* Investigate the way in which water is transported within plants
* Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
 | Animals including humans* 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 support, protection and movement.
 | Light* 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
* Recognise that shadows are formed when the light from a light source is blocked by an opaque object
* Find patterns in the way that the size of shadows change.
 | Rocks* 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
* Recognise that soils are made from rocks and organic matter.
 | Forces and magnets* 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
* 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.
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| Year 4 | Electricity* 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.
 | Animals including humans* 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.
 | States of Matter* 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.
 | Living things and their habitats* 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.
 | Sound* 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.
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| Year 5 | Earth and Space * Describe the movement of the Earth, and other planets, relative to the Sun in the solar system Describe the movement of the Moon relative to the Earth
* Describe the Sun, Earth and Moon as approximately spherical bodies
* Use the idea of the Earth’s rotation to explain day and night and the apparent movement of the sun across the sky.
 | Animals including humans* Describe the changes as humans develop to old age.
 | Properties and changes of materials* 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
* 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.
 | Living things and their habitats* Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
* Describe the life process of reproduction in some plants and animals.
 | Forces* Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
* 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.
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| Year 6 | Electricity* 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.
 | Animals including humans* 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.
 | Light* 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.
 | Living things and their habitats* 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.
 | Evolution and Inheritance* Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
* Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents
* Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
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| **Key Stage 3 Science Curriculum Objectives**  |
| **Key stage 3**The principal focus of science teaching in key stage 3 is to develop a deeper understanding of a range of scientific ideas in the subject disciplines of biology, chemistry and physics. Pupils should begin to see the connections between these subject areas and become aware of some of the big ideas underpinning scientific knowledge and understanding. Examples of these big ideas are the links between structure and function in living organisms, the particulate model as the key to understanding the properties and interactions of matter in all its forms, and the resources and means of transfer of energy as key determinants of all of these interactions. They should be encouraged to relate scientific explanations to phenomena in the world around them and start to use modelling and abstract ideas to develop and evaluate explanations.Pupils should understand that science is about working objectively, modifying explanations to take account of new evidence and ideas and subjecting results to peer review. Pupils should decide on the appropriate type of scientific enquiry to undertake to answer their own questions and develop a deeper understanding of factors to be taken into account when collecting, recording and processing data. They should evaluate their results and identify further questions arising from them.‘Working scientifically’ is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Teachers should feel free to choose examples that serve a variety of purposes, from showing how scientific ideas have developed historically to reflecting modern developments in science.Pupils should develop their use of scientific vocabulary, including the use of scientific nomenclature and units and mathematical representations. |

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| **Working scientifically** |
| **Scientific attitudes** |
| Through the content across all three disciplines, pupils should be taught to:* pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility
* understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review
* evaluate risks
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| **Experimental skills and investigations** |
| * ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience
* make predictions using scientific knowledge and understanding
* select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables
* use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety
* make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements
* apply sampling techniques
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| **Analysis and evaluation** |
| * apply mathematical concepts and calculate results
* present observations and data using appropriate methods, including tables and graphs
* interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions
* present reasoned explanations, including explaining data in relation to predictions and hypotheses
* evaluate data, showing awareness of potential sources of random and systematic error
* identify further questions arising from their results
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| **Measurement** |
| * understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature
* use and derive simple equations and carry out appropriate calculations
* undertake basic data analysis including simple statistical techniques
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| **KS3 Science Curriculum Overview** This is a suggested breakdown of the topics required for key stage three science, taught over three years. |
| Year 7 (KS3) | Biology | Chemistry | Physics |
| Cells and Organization * cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope
* the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts
* the similarities and differences between plant and animal cells
* the role of diffusion in the movement of materials in and between cells
* the structural adaptations of some unicellular organisms
* the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms
* the structure and functions of the human skeleton, to include support, protection, movement and making blood cells
* biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles
* the function of muscles and examples of antagonistic muscles
 | States of Matter and Separating Mixtures* the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure
* similarities and differences including density difference between solids, liquids and gases
* conservation of material and of mass, and reversibility, in melting freezing and evaporation, sublimation, condensation and dissolving
* the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice-water transition
* atoms and molecules as particles
* changes with temperature in motion and spacing of particles
* internal energy stored in materials
* energy changes on change of state
* the concept of a pure substance
* the identification of pure substances
* Brownian motion in gases
* changes of state in terms of the particle model
* diffusion in terms of the particle model
* mixtures, including dissolving
* simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography
* diffusion in liquids and gases driven by differences in concentration
 | Energy Changes and Transfers * energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change
* comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions
* work done and energy changes on deformation
* using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes
* simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged
* heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference; use of insulators
* other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels
* comparing energy values of different foods (from labels) (kJ)
* comparing power ratings of appliances in watts (W, kW)
* comparing amounts of energy transferred (J, kJ, kW hour)
* domestic fuel bills, fuel use and costs
* fuels and energy resources
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| Reproduction* reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta
* reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms
 | Atoms and the Periodic Table * a simple (Dalton) atomic model
* differences between atoms, elements and compounds
* chemical symbols and formulae for elements and compounds
* the varying physical and chemical properties of different elements
* the principles underpinning the Mendeleev periodic table
* the periodic table: periods and groups; metals and non-metals
* how patterns in reactions can be predicted with reference to the periodic table
* the properties of metals and non-metals
* the chemical properties of metal and non-metal oxides with respect to acidity
 | Forces* forces as pushes or pulls, arising from the interaction between 2 objects
* using force arrows in diagrams, adding forces in 1 dimension, balanced and unbalanced forces
* moment as the turning effect of a force
* forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water
* forces measured in newtons, measurements of stretch or compression as force is changed
* force-extension linear relation; Hooke’s Law as a special case
* work done and energy changes on deformation
* non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets, and forces due to static electricity
* opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface
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| Year 8 (KS3) | Biology | Chemistry | Physics |
| Health and the Human Body* the structure and functions of the gas exchange system in humans, including adaptations to function
* the mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume
* the impact of exercise, asthma and smoking on the human gas exchange system
* the structure and functions of the gas exchange system in humans, including adaptations to function
* the mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume
* the impact of exercise, asthma and smoking on the human gas exchange system
* the role of leaf stomata in gas exchange in plants
* the effects of recreational drugs (including substance misuse) on behaviour, health and life processes
 | Chemical Reactions* The difference between chemical and physical changes
* conservation of mass changes of state and chemical reactions
* chemical reactions as the rearrangement of atoms
* representing chemical reactions using formulae and using equations
* combustion, thermal decomposition, oxidation and displacement reactions
 | Electricity and Magnetism* electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge
* potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current
* differences in resistance between conducting and insulating components (quantitative)
* separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects
* the idea of electric field, forces acting across the space between objects not in contact
* magnetic poles, attraction and repulsion
* magnetic fields by plotting with compass, representation by field lines
* Earth’s magnetism, compass and navigation
* the magnetic effect of a current, electromagnets, DC motors (principles only)
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| Photosynthesis and Respiration * the role of leaf stomata in gas exchange in plants
* plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots
* the reactants in, and products of, photosynthesis, and a word summary for photosynthesis
* the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere
* the adaptations of leaves for photosynthesis
* plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots
 | Earth and Atmosphere * the composition of the Earth
* the structure of the Earth
* the rock cycle and the formation of igneous, sedimentary and metamorphic rocks
* Earth as a source of limited resources and the efficacy of recycling
* the composition of the atmosphere
* the production of carbon dioxide by human activity and the impact on climate
 | Space* gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and sun (qualitative only)
* our sun as a star, other stars in our galaxy, other galaxies
* the seasons and the Earth’s tilt, day length at different times of year, in different hemispheres
* the light year as a unit of astronomical distance
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| Year 9 (KS3) | Biology | Chemistry | Physics |
| Inheritance and Evolution * heredity as the process by which genetic information is transmitted from one generation to the next
* a simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model
* differences between species
* the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation
* the variation between species and between individuals of the same species meaning some organisms compete more successfully, which can drive natural selection
* changes in the environment which may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction
 | Acids and Alkalis * defining acids and alkalis in terms of neutralisation reactions
* the pH scale for measuring acidity/alkalinity; and indicators
* reactions of acids with metals to produce a salt plus hydrogen
* reactions of acids with alkalis to produce a salt plus water
* what catalysts do
 | Motion and Pressure* speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time)
* the representation of a journey on a distance-time graph
* relative motion: trains and cars passing one another
* forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)
* change depending on direction of force and its size
* atmospheric pressure, decreases with increase of height as weight of air above decreases with height
* pressure in liquids, increasing with depth; upthrust effects, floating and sinking
* pressure measured by ratio of force over area – acting normal to any surface
* moment as the turning effect of a force
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| Eco systems and Interdependence * the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops
* the importance of plant reproduction through insect pollination in human food security
* how organisms affect, and are affected by, their environment, including the accumulation of toxic materials
* the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material
 | Materials and Recycling * Earth as a source of limited resources and the efficacy of recycling
* the order of metals and carbon in the reactivity series
* the use of carbon in obtaining metals from metal oxides
* properties of ceramics, polymers and composites (qualitative)
 | Waves * waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition
* frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound
* sound needs a medium to travel, the speed of sound in air, in water, in solids
* sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal
* the auditory range of humans and animals
* pressure waves transferring energy; use for cleaning and physiotherapy by ultrasound; waves transferring information for conversion to electrical signals by microphone
* the similarities and differences between light waves and waves in matter
* light waves travelling through a vacuum; speed of light
* the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface
* use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye
* light transferring energy from source to absorber, leading to chemical and electrical effects; photosensitive material in the retina and in cameras
* colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection
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