Wennington Hall School

Science Curriculum Map 2021-22

This is a live document and is open to amendment.

Curriculum Mapping 2020 – 2021												
Subject	Autumn				Spring				Summer			
English	Half Term 1	Skills/Knowledge	Half Term 2	Skills/Knowledge	Half Term 3	Skills/Knowledge	Half Term 4	Skills/Knowledge	Half Term 5	Skills/Knowledge	Half Term 6	Skills/Knowledge
Year 7	**Safety and science processes** **Life processes**	Use an existing model or analogy to explain a phenomenon eg why are you hot when you run around? How do we see things? Why do you smell food from far away? Recognise that scientists of all disciplines and nationalities often work together – sharing data – link to internet and reliability versus competition. Promote concept of ideas based on observation and analysis – evidence. Organisms and the seven life processes, taxonomy, food webs and interdependence. Keeping alive – growing plants and seeds.	**Particle Model** **Chemical reactions**	Describe matter 1 using a simple model and use it to explain changes of state recognise the link 2 between heating and cooling and changes of state 3 use the simple particle model to explain the physical characteristics of solids, liquids and gases Recognise common reactions and sort into reversible and irreversible Know that new materials are made in reactions. Describe and record patterns in reactions	Energy Forces	Storage eg food and chemicals gravity potential coal, oil, gas, kinetic. Know energy in action and potential. Simple electric circuits, heating and cooling. Storage leads to transfers -uses. Recognise the forces acting on an object in different situations. Distinguish between situations involving balanced and unbalanced forces Know that forces can combine or wholly or partly cancel each other out and their size and direction can be represented using arrows. Know that there are contact forces and forces that act at a distance.	**Behaviour** **Variation**	Describe simple learned and innate behaviours in response to internal and external stimuli and how these aid survival. Question our choices – learned or innate? Can we modify? What is peer pressure? Describe how organisms can vary and how this may lead to their survival in changing environments describe how the Examine major taxonomic groups are classified. Use a combination of food chains within a habitat to produce food webs	**The earth and space** **Environment and sustainability**	Describe the apparent movement of the Sun across the sky and the moon. Know the cause of day and night, the seasons and the year. Recognise the processes involved in the formation of rocks. Describe how natural and human processes have changed the atmosphere over time. Examine impact of quarrying on a local area.	**Electricity and magnetism**	Know electricity flows in circuits. Recognise a range of conductors and non-conductors Make a simple circuit in series. Make in parallel. Use a switch to control a light bulb. Use an ammeter and voltmeter to record data. Use batteries to increase voltage. Observe effect of voltage increase.

Amendments to plan

This scheme is taken from the latest document (May 2021) on course content for science in ks3. The first module allows a short introduction to the concept of scientific though and of course, safety and expectations. As students arrive to school as an unknown quantity a module on life processes will allow students to start from their own base line re literacy and numeracy through measuring our heights, observing eye colour, testing reflexes etc – all being done whilst cognizant of particular needs and sensitivities outlined on student's IEP.

The course moves through a blend of biology chemistry physic so that topics and concepts can be revisited on a regular basis to allow refreshment of ideas and teaching points over the year. There will be opportunity to apply and develop maths and literacy skills through developing basic language skills within the science framework, leading to a growth in specialist vocabulary.

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Subject	Autumn				Spring				Summer			
English	Half Term 1	Skills/Knowledge	Half Term 2	Skills/Knowledge	Half Term 3	Skills/Knowledge	Half Term 4	Skills/Knowledge	Half Term 5	Skills/Knowledge	Half Term 6	Skills/Knowledge
Year 8	**Life processes**	Explain how the organs and tissues in plants and animals function to support the seven life processes in a healthy organism Explain how variation has benefits and limitations for the survival of organisms in specific habitats	**Particle Model** **Chemical reactions**	Apply and use the particle model to describe a range of physical observations. Apply and use the particle model to describe a range of separation techniques Recognise that materials can be made up of one or more kinds of particles. Describe the type and arrangement of atoms in elements, compounds and mixtures describe and develop a particle model to explain the differences between the terms atoms, elements, compounds and mixtures Describe patterns in a range of chemical reaction	**Energy** **Forces**	Use a simple model of energy transfer to describe common observations. Explain why quantitative measures of energy transfer should also be considered when making informed decisions, e.g. building wind farms. Explain how electricity is generated using a variety of energy resources Apply ideas about balanced and unbalanced forces to explain the way objects move. Investigate situations where forces are applied over large and small areas or have a turning effect Recognise that forces at a distance get weaker as the distance increases	**Behaviour** **Variation**	Explain how changes in learned behaviour due to internal and external stimuli are of benefit to the organism Explain how variation has benefits and limitations for the survival of organisms in specific habitats. Describe some examples of variation arising from inherited and environmental factors. Explain energy transfer in food chains and webs and relate this to the abundance of organisms	**The earth and space** **Environment and sustainability**	Describe the position of the Earth in relation to the position of other bodies in the Solar System and use this to explain some phenomena. Recognise that astronomy and space science provide evidence about the Solar System Explain some of the changes that have led to the composition of the current atmosphere Recognise simple ideas of sustainable development	**Changing Earth**	Describe the processes involved in the formation of sedimentary, metamorphic and igneous rocks and use the characteristics of the rocks to explain how they formed
Amendments to plan This programme of study builds on year 7 in a coherent way, maintain the sequences of year 7 and interspersing the domains of biology, chemistry and physics so that review and refreshing of topics can occur. There is a move towards more tier 2 language and greater opportunity for planning and undertaking practical investigations that encouraging thinking about what we do rather than simply following a proscriptive set of instructions. Explaining ideas verbally and then in writing will be promoted using more appropriate level 2 language and attending to clear expression of relevant points. This will develop language in itself and also prepare students for writing extended answers in an examination / formal format – a useful skill not only for exams but beyond school.												

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English	Half Term 1	Skills/Knowledge	Half Term 2	Skills/Knowledge	Half Term 3	Skills/Knowledge	Half Term 4	Skills/Knowledge	Half Term 5	Skills/Knowledge	Half Term 6	Skills/Knowledge
Year 9	**Reactions –** cooking, burning, dissolving. Introduce chemicals. periodic table: periods and groups; metals and non-metals Patterns in reactions with reference to the periodic table, properties of metals and non-metals, properties of metal and oxides -acidity. The order of metals and carbon in the reactivity series the use of carbon in obtaining metals from metal oxides DO PRACTICALS, SHEETS AND QUIZES TO ASSESS.	Know import. Of science to everyday life – recognise range of chemicals – prediction, evidence based judgement, analysis of data. Record observations, know how metals affect society, be able to work safely and respect others.	**Electricity** Current, amperes, series, parallel circuits, current as flow of charge. P.D, volts, battery /bulb ratings; resistance, ohms, ratio of PD/I. Differences in resistance between conducting and insulating components (quantitative) Separation of + or - charges when objects rub together: transfer electrons, forces on charged objects. Electric field, forces act across space between objects not in contact. LAB PRACTICALS AND SHEETS TO ASSESS.	Measuring/ recording, predicting, graphing data and develop understanding of dangers of electricity. Know role of electricity in our life, record in tables, write sentences relevant to observations. Choose format to present data.	**Chemical reactions -** rearrangement of atoms. Show reactions using formulae and equations Combustion, thermal decomposition, oxidation and displacement. Acids and alkalis in terms of neutralisation reactions pH scale- 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 energy changes on changes of state (qualitative) exothermic and endothermic chemical reactions (qualitative)	Safe working with chemicals, measuring, recording and predicting, drawing conclusions from evidence, develop ability to reason from particular to general, apply appropriate scientific language and verbalise observations. Write some simple sentences to describe events and observations, draw a conclusion.	**Photosynthesis** Reactants and products. Word summary, role of PSIN for almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight to build essential molecules- energy, levels of atmospheric gases. Adaptations of leaves for photosynthesis and factors affecting it.	Lead into holistic view- global warming /geog. , human impact. Read graphs, draw conclusions from data, conduct experiments and develop motor skills and careful working. Discuss issues and learn to debate, express oneself in appropriate fashion, develop ideas of interaction and value judgements	**Cells and organisation**- basic unit of life: how to observe, interpret and record cell structure using a light microscope Functions of cell wall, membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts. similarities and differences -plant and animal cells Role of diffusion in 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.	What is life? How to use/respect a scope, magnification and relative size, making schematic diagrams, labelling and linking structure to function. Applying knowledge across topics eg diffusion in chemistry re plants. Ethical discussions on life, attitudes towards animals and reproduction, our ability to adapt/ alter life – should we? Using data to back up claims and make conclusions based on robust evidence.	**Describing motion** speed, distance and time (speed = distance ÷ time) representation of journey- distance-time graph Relative motion: trains, people, cars, falling. Forces Pushes or pulls, interaction between objects. Forces to start/stop motion, change direction. using force arrows, adding forces in 1 dimension, balanced and unbalanced forces Moment as the turning effect of a force. Deform, stretch and squash– balls and springs; with rubbing and friction, pushing, resistance to motion of air/ water. Newtons, and measure of stretch or compression as force is changed. Atmospheric pressure, decrease with height. Pressure in liquids, increasing with depth; up thrust effects, floating and sinking. pressure measured by ratio of force over area – acting normal to any surface	Estimating, comparing. Faster, slower, plotting graphs and reading them, describing in words and writing. Timing events and applying data to problems. Practical skills – careers- mechanics, driving, transport. Relevance to life outside school. How gravity affects things on earth and in space, how pressure impacts on everyday life, case studies – Titanic and Hindenburg- how science changes and develops.

Amendments to plan

The plan places topics in a more varied order, instead of following BIOLOGY CHEMISTRY PHYSICS there is an interspersing of domains. The first topic – basic chemistry – allows an introduction to lab practises at a more advanced level and techniques in an accessible way. Electricity builds on knowledge of particles and reactions / material behaviour to enhance the idea of science as an agent of change.

Two biology units run concurrently to take advantage of improving weather and to provide an introduction to sustained and coherent progression of ideas. The electrical and chemical principles learned earlier should influence the learning positively of life processes – we are essentially bags of chemicals controlled by electrical impulses. But we will not ignore, rather we shall embrace, the opportunity to discuss the nature of what it is to be alive and sentient. This should lead into issues linking science with moral components which is essential for our students. Can we use rational thought and knowledge to make better informed life choices in and beyond school?

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Curriculum Mapping 2020 – 2021 YEAR NINE

Subject	Autumn				Spring				Summer			
Science	Half Term 1	Skills/Knowledge	Half Term 2	Skills/Knowledge	Half Term 3	Skills/Knowledge	Half Term 4	Skills/Knowledge	Half Term 5	Skills/Knowledge	Half Term 6	Skills/Knowledge
Year 9	**Introduce elements in the same group in periodic table -** same number of electrons in their highest energy level (outer electrons) and this gives them Similar chemical properties. **Discuss halogens and their readiness to bond.** **----------** **Discuss the elements in Group 0 of the periodic table -** Called the noble gases. Unreactive-have stable arrangements of electrons. Show that as elements react, their atoms join with other Atoms to form compounds. This involves giving, Taking or sharing electrons to form ions or molecules. Compounds formed from metals and non-metals Consist of ions. Reactions – elements join to form compounds. Compounds formed from non-metals Consist of molecules. In molecules the atoms are held together by covalent bonds **Metals and non-metals = ions.** **Non-metals = molecules.** **Covalent bonding –** introduce concept of non-metal compounds eg water and the covalent bond, and show how they are formed.	Know that position depends on electron outer level and the properties. Know halogens have properties linked to 7 electrons. Discuss uses of noble gases – know they can glow and act as media for transmitting substances and energy. Know that reactions can be word and symbol represented. Know that material is conserved not lost. Know that covalent bonds are common and are a sharing of electrons	**Animal and plant cells** Review organelles-Functions of the organelles. Required practical: Microscopy Use a light microscope to observe, draw and label a selection of plant and animal cells. Cell differentiation, stem cells and their uses and ethical issues. Cloning and breeding. Practical and ethical issues. Stem cell technology. Transport - osmosis and practical on diffusion. Into and out of cells across membranes by diffusion. Definition of diffusion and factors affecting rate. Oxygen, carbon dioxide and urea passes through cell membranes by diffusion. Single celled organisms have a bigger surface area to volume ratio than multicellular organisms, so transfer sufficient substances across their surface.	Label diagrams of animal and plant cells. Describe the function of the main organelles. Prepare slides of plant and animal cells and describe the procedure. Correctly use a microscope to observe cells under different magnifications. Describe the order of size of: cell, nucleus, chromosome and gene. Explain cloning discuss ethical of stem cell research - issues relating to curing disease, use of human tissue. MICROSCOPY Carry out calculations using the formula: real size=(image size)/magnification Rearrange the equation to calculate image size or magnification. Convert values for the units: cm, mm, µm and nm.	**Energy transfer conduction, convection and radiation, rates investigated.** Insulation- reducing heat loss- U values and payback Heat capacity Infra-red radiation – show heaters, bunsens and hot wires as emitters Kinetic theory – relate kinetic theory to all above and to differing amounts of energy in materials. Evaporation and condensation Surface area and volume: Explain and demo how heat is lost by various surfaces and liquids and how U values are applied. Solar panels and their use to heat water or generate electricity. Specific heat capacity Mass x shc x v Efficiency – energy is lost or dissipated but not destroyed. Show how transfers occur eg battery gives electric gives light. Energy transfers to heat which becomes less useful. Efficiency = useful/total x 100.Electric in the home – KWh and costs. Show how a range of equipment use varying amounts of power Power generation: Coal oil gas Nuclear. Renewables Solar, Geothermal power, wind, hydroelectric. National grid and power supplies – high voltage and low ampage - transformers	Know three ways of transfer Be able to apply to heat loss. Calculate loss and payback times. Objects emit and absorb infrared radiation. Hotter object is the more infrared radiation it radiates in a given time. Dark, matt surfaces are good absorbers and good emitters of infrared radiation. Light, shiny surfaces are poor absorbers and poor emitters of infrared radiation. Light, shiny surfaces are good reflectors of infrared radiation. Know that different materials absorb heat at differing rates Know the main energy transfers in common appliances. Know how energy is lost in steam engines light bulbs and cars etc as heat noise and movement Understand kwh and power Benefits and costs of ff in terms of waste, inefficiency and pollution Application to large and small scale uses eg fridges in remote locations. Know use of transformers and the benefits of various power stations.	**Molecular bonding.** Chemical bonding-transferring or sharing electrons in the highest shells of atoms to gain structure of a noble gas. When atoms form chemical bonds by transferring electrons, they form ions. Atoms that lose electrons become positively charged ions. Atoms that gain electrons become negatively charged ions. Ions have the structure of noble gas (Group 0). The alkali metals, all react with non-metal elements to form ionic compounds. The elements in Group 7 of the periodic table, the halogens, all react with the alkali metals to form ionic compounds. When melted or dissolved in water, ionic compounds conduct electricity because the ions are free to move and carry the current. An ionic compound is a giant structure of ions. Ionic compounds held together by strong electrostatic forces. These forces act in all directions-ionic bonding. Ionic compounds have regular structures (giant ionic lattices), strong electrostatic forces in all direction between oppositely charged ions. These have high melting points and high boiling points. Shared electrons make covalent bonds. These are strong. Some covalently bonded substances are simple molecules eg H2, Cl2, O2, HCl, H2O, NH3 and CH4. Carbon and nano science. Fullerenes and polymers. Substances that consist of simple molecules are gases, liquids or solids that have relatively low melting points and boiling points. Electric charge, metals, alloys and conductivity of electricity.	Recognise that compounds with low melting and boiling points, Classify compounds according to their properties. Know covalent bonds are not broken during changes of state. Describe the electronic structure of the ions in salts. Recognise that the noble gas structure is unreactive. Explain why ionic substances are electrical conductors Represent the covalent bonds in molecules such as water, ammonia, hydrogen, hydrogen chloride methane and oxygen, and in giant structures such as diamond and silicon dioxide. Know why covalent molecules have low melting and boiling points AND DO NOT CONDUCT ELECTRIC. Use the pattern of a substance's properties to suggest the type of structure it will have. Describe the structure of metals, and explain why they conduct electricity. Use the structure of metals to explain their ability to bend and be shaped. Describe what alloys are, why they can be more useful than pure metals, and how the metal structure is altered Understand uses of memory alloys, and be able to give an example. Recognise properties of graphite and diamond. Describe the covalent bonding in graphite. Apply knowledge of fullerenes to explain the use of nanotubes Know how plastics are made and their uses. Substances that consist of simple molecules are gases, liquids or solids that have relatively low melting points and boiling points. Electric charge, metals, alloys and conductivity of electricity.	**Photosynthesis** Equation for reaction, words and symbols. Factors affecting rate of reaction – light, temp, CO2. Products – glucose, oxygen, and uses of glucose. Amino acids – role of nitrogen, making proteins, fats and starches. Aerobic and anaerobic respiration. Relate to PE, oxygen levels and lactic acid production. Muscle fatigue. Lactic acid and oxygen debt. Yeast anaerobic respiration and commercial uses. Bread and alcohol. Agriculture. Regulating cell and organ function. Nerves, enzymes and hormones. Central nervous system, reflex arc, and conditioned/ voluntary / involuntary responses. Practical – ruler test. Glands and endocrine system. Pituitary as control gland. Thyroid, Adrenals and testes / ovaries. Control of blood sugar, temperature and salt levels	Be able to interpret data and to apply knowledge to real world situations eg food production. Know how energy is used in exercise, at rest, in repair, and be able to interpret data from graphs. Discuss benefits of exercise on health and fitness, dangers of excessive sugar/fat consumption. Commercial interests eg brewing and baking – link to ancient civilisations and spread of knowledge and culture. Link to food chains and ethical issues of plant/meat use. Debate / discuss issues with appropriate language. Know the motor neurone, sensory neurone and synapse. Parts of CN System their role. Know the location of major glands and their function in maintain sugar, water, salt and temp. levels. Understand roles of hormones in male and female fertility and the use in contraception. Relate to PSHE and decision making re lifestyle choices.	**Static electricity** - loss of electrons gives a positive charge. Rubbing insulators shift electrons. Show balloons, combs and hair and paper to illustrate, When two electrically charged objects are brought together they exert a force on each other. Electrical charges can move easily through some substances, eg metals. CURRENT ELECTRICITY. Electric current is a flow of electric charge. The size of the electric current is the rate of flow of electric charge. The size of the current is given by the equation: I = Q / t. Voltage = joules/ coulomb of energy transferred. It is a measure of energy. Resistance- this is the ability to turn energy into heat and is given by v = I x r. Resistance creates more heat as does raised current. Household electricity- ac current not dc – created by revolving armature. Introduce ac and dc currents and show current from a revolving motor / generator being + and -. Use oscilloscope traces to show + and - for ac and flat line for dc. Power = j/s in watts. Power = amps x volts	Know how to charge a plastic object, dangers and benefits – eg aerosol painting vs sparks and explosions. Describe how static feels. Demonstrate static with VDG generator and use spark to show lightning effect. Know conductivity of metals and salt solutions is good. Give examples of useful conductors and insulators. Calculate the volts and amps in a series circuit, work out resistance from meters used in lab, Explain resistance in terms of flow – football analogy. Measure voltage in series and parallel circuits. Calculate and explain resistance in a range of circuits and wires according to length and thickness.

Amendments to plan

The plan continues with a mix of blend of domains but there is greater emphasis on practical application of knowledge and teaching activities will be built around required practicals – this is

1 To develop engagement 2 To develop motor skills and careful working practices 3 To reinforce learning through actual practise 4 To develop skills in observation, recording, and the basing of ideas on robust evidence 5 To recognise that exam boards will recognise the absence of these skills in a COVID world and address those deficiencies in the coming year – we will be ready if that eventuality comes to pass.

There will be opportunity to develop higher language skills with attention paid to origins of words – covalent – co together, valent - value or effect, homeostasis – "same state" etc. There will also be a shift in assessment towards developing extended writing skills so that essays of one or two paragraphs, with co-joined ideas and an orderly sequence can be promoted.

The science course has always been strongly content -led. We shall maintain sufficient content for knowledge to be acquired but a shift in assessment towards preparing written responses rather than worksheets / circle the answer / fill in the blanks will be adopted. This should enhance orderly thought and provide a life skill for use after school.

The maths element of the course will emphasise applying skills from abstract ideas (eg resource use graphs) towards more everyday situations. What is range? How do small changes have bigger impacts? Can you order things ib terms of size / frequency / importance? How do we decide importance? The ultimate aim is to provide abilities that allow students to better navigate the world when the y leave school.

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Year 11	**Oils and hydrocarbons –** crude oil is mixture – show a range of liquid oil fuels. Allkanes and fractional distillation Use according to molecule size. Combustion releases energy water and co2. Sulphur and nitrogen can pollute but may be removed from oils. Biofuels are an alternative with many economic and ethical issues. Cracking produces alkanes and alkenes. These provide fuels and alkenes can be used to make polymers and plastics. Renewable energy sources – water wind geothermal and their applications. Plant oils can be used as high energy foods, make emulsions for salad dressings, coating substances, ice creams and cosmetics. Unsaturated oils are detected by bromine water and can be saturated to make margarine etc. Plate tectonics Wegener proposed crust movement theory in the 1920s but was not believed. Evidence but no prediction of events. Earth contains crust mantle, core, and conv. currents from radioactivity cause plate shifts. Atmosphere has changed - earth process/ human activity. Atmosphere formed from vulcanism and for a billion years was developing. In the last 200 million years it has been relatively stable. Ammonia and methane may have reacted with lightning to produce the first amino acids- there are many theories regarding the origin of life. The oceans act as a carbon sink but human activity has increased co2 level Air is mixture of gases- fractionally distilled to produce nitrogen and other gases for commercial use.	Know crude is a mixture of hc. Understand role of boiling points. Know the dangers of pollutants and some of the moral choices in pursuing different energy strategies. Know ethical issues of land use for fuel not food and benefits of reduced co2 levels and carbon neutrality. Understand that cracking increases range of fuels available and produces plastics Know that energy changes form less polluting sources have benefits and costs Know the benefits and problems of plant oil production and the uses of oils. Know a range of plates covers the crust and that they have a range of margins. Be able to name the gases in atmosphere and their relative levels. Know n is inert o is flammable and so2 co2 are pollutants and know their dangers. Know that simple chemicals produce more complex molecules and that life most likely evolved as a result of this. Know the constituents of air and the role of nitrogen oxygen and other gases in the atmosphere.	**Genetics.** Meiosis and mitosis, cell division in typical and gamets. DNA replication, sex determination, dominant and recessive alleles, punnet square. Cloning, cystic fibrosis and Huntingdon's, DNA and the human genome – dna replication. Evolution – observed characteristics, mutation – how do we adapt? Darwin and Galapagos finches, moths and survival, mutation, emergence of species, selective breeding and extinction. Make punnet squares, complete quiz on genetics and evolution, answer sheets on mutation. GM crops and food production, dangers and benefits, gene therapy and IVF / abortion to be discussed. ECOLOGY The chemistry of earth, distribution and abundance of organisms, why do we have resource shortage? How do we compete for them? How can we sustain our planet and its development? Know photosynthesis provides all food. Identify biotic and abiotic factors in population control and recognise need for sustainable development. Adaptation, predation, population balance all influence environment. Explain biomes in terms of energy flows and competition for resources.	Know DNA is a helix, contains genes, which can be dominant or recessive. Explain how single gene can express for hair colour or eye colour. Complete a Punnett square to show ratios of offspring. Explain Cystic fibrosis and Huntington's Chorea in terms of dominant/recessive alleles. Use genetic cross diagrams to explain inherited characteristics. Know heterozygous and homozygous gene types. Be able to estimate the number of plants in a region using sampling, know about predation, competition and factors affecting extinction. Understand and describe a food chain and a biomass pyramid. Be able to express a view on environmental issues and defend it. Verbal and written assessment in line with required practical and exam style responses. Be able to trace energy flows and interpret graphs and data.	**Waves and radiation** Longitudinal and transverse Electromagnetic waves are transverse, sound waves are longitudinal and mechanical waves may be either transverse or longitudinal. Waves reflect at equal angles Investigate reflection. Know that normal is perpendicular to reflecting surface. Sound waves are longit, slower and have frequency and wavelength affected by Doppler effect. Investigate echoes and speed of sound. Distant galaxies show greater wavelengths. Red shift shows universal expansion. This illustrates big bang theory. CMBR dates from the big bang and can only be explained currently by BBT. RADIATION - some particles spontaneously emit matter which is radioactivity. Cosmic rays are from space, and man-made sources such as the fallout from nuclear weapons tests and nuclear accidents can occur. Alpha, beta and gamma radiations- can alter or ionise structures eg cells, causing cancers. Penetration and protection. Nuclear fission- use in nuclear reactors: uranium-235 and plutonium-239. Nuclear fission is splitting of atomic nucleus. Nuclear fusion is the joining of two nuclei to form a larger one. Done in stars, difficult on earth. Stars are dust/ gas from space pulled together by gravity. Small masses may become planets. Star cycle.	Recognise sound waves as long, emr as transverse. Investigate the wavelength of ropes and strings in waves. Split light into spectrum and use prisms and light sources. Calculate speed from frequency and wavelength. Know a spectrum is formed. All emr waves travel at speed of light in a vacuum. Sound is 720 mph in air. Have some grasp of age of universe and its enormous size. Discuss ethical issues of space travel, our role in universe. Are we alone? Alpha beta gamma radiation – Sources and uses of these – classify a range of substances as a b g radiators and work through means of protecting us from them. Alpha and beta radiations are deflected by both electric and magnetic fields but gamma radiation is not.	**Quantitative chemistry** Conservation of mass- Making substances – acids and metals react to produce salts and hydrogen, acids and alkalis produce water and salts. Salt production economically important. Analysis of foods and poisons. Measure and know how to calculate reactions, know products/ time measures rate. Temp. Pressure and concentration affect rate – devise investigation. Use catalysts to speed reactions. Carry out and explain reactions as exothermic or endothermic according to their energy levels. Make a range of salts from acids and metal oxides. Carry out electrolysis of NaCl and collect hydrogen gas, know economic importance of electrolysis nand its role in metal extraction. Be able to balance simple equations for acid / alkali reactions.	Mass (Mr) of a compound is the sum of the relative atomic masses of the atoms in the numbers shown in the formula. The relative formula mass of a substance, in grams, is known as one mole of that substance. Be able to calculate percent of an element in a compound. --- Calculate rate of reaction and interpret data on rates in line with particle theory. Relate reactions to pressure- Be able to explain the ways to alter reaction rates. Know the role of catalysts in industry and the body. Be able to interpret data from table and graphs on catalysts, Know diff between exo and endo and quote some examples of each. Know the acids and bases that produce particular salts and deduce missing part of incomplete equations. Deduce the reactants and products in a range of incomplete equations and write full word equations for reactions. Analyse labels on a range of products and know their contents. . KNOW that opposites attract and that metal ions move through solutions. Know practical applications for cars and zinc plates etc. Predict which materials are needed for electrolysis.	**Forces and effects** Show a range of forces and review push pull change speed and direction. Discuss speed distance and time and velocity Relate to graphs of d / t and a/ t and discuss format. Alcohol and drugs affect stopping in vehicles. Discuss thinking and breaking distances and effects of various drugs. Terminal velocity and factors affecting drag in fluids. Kinetic energy and braking – know energy is transformed to work so that vehicles slow down. Momentum is lost by crumple zones airbags	Know s = d/t, accel and decal and their graph rep, that vel is a vector. Know how speed is related to design of cars and wind resist, how terminal velocity depends on air or water resistance. Resultant forces. Know alc and drugs can depress brain or stimulate with bad effects. p is momentum in kilograms metres per second, kg m/s m is the mass in kilograms, kg v is the velocity in metres per second, m/s		

Amendments to plan

The plan continues in a mixing of biology chemistry physics and the ecolgy / human impacts modules have been placed here so that learning from the previous 7 halfterms can be applied to human impact and development issues. The ultimate aim of the course will be to instill in students the knowledge and attitudes that allow ideas to be linked so that ethical issues from PSHE (cloning / life and abortion,) or geography (resource development, issues of poverty) can be understood in a comprehensive manner.

There will be a strong emphasis on data collection and analysis especially in the ecology / physics units. The ecology units will lend themselves to developing essay style responses to questions on population issues, resource development etc, and the physics element will allow for data collection, graphing and number analysis. In this way the science course will complement the work of the English and Maths departments.

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