Year 7 Topics

In year 7 we teach the following modules over the course of the year. Each module draws on prior learning from KS2 and builds on understanding from the KS2 programme of study. Each module develops and deepens the Core knowledge that will underpin all areas of the curriculum at KS3 and KS4.

Topic	Rationale	Knowledge acquisition	Key vocabulary	Skills and enrichment e.g independence, problem solving, evaluation, analysis, creativity, literacy, numeracy and oracy
Cells and movement	The building blocks of life that will allow a clearer understanding of how living organisms function. How complex organisms function will have links to all aspects of work on living organisms e.g adaptations, respiration, sensitivity	What is a cell?	Unit, biological	• Practical use of Microscopes. • Numeracy skills when calculating magnification. • Observational skills in drawing a 'live' sample • Oracy – debate ethical issues of stem cells
		Structure of plant and animal cells	Cell Membrane, Cell Wall, Cytoplasm, Nucleus, Chloroplast, Vacuole	
		Function of internal organelles	Reactions, control, solvent, respiration, photosynthesis,	
		How do microscopes work?	Microscope, focus, light	
		How to view a cell sample under a microscope?	Lens, light, focus	
		Types of specialised cells related to their function	Sperm, neurone, muscle, epithelial, palisade, root hair	
		How are multicellular organisms organised to help them stay alive?	Tissues, aggregation, organ, function, organ system	
		Types of tissues and organs	Muscle, gland, epithelial, palisade, heart, lung, leaf, flower, stem	
		What are organ systems and how do they work?	Immune, Reproductive, Digestive, Circulatory, respiratory, vascular	
		How are Unicellular organisms able to survive without organ systems?	Diffusion, surface area, volume, ratio	

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Reactions: Acids and Alkalis	The pH of a solution depends on the strength of the acid: strong acids have lower pH values than weak acids. Mixing an acid and alkali produces a chemical reaction, neutralisation, forming a chemical called a salt and water. Students can use this knowledge to rationalise different reactions. Some of the reactions they may have come across in everyday life. Why certain substances are harmful and how you can make them safe i.e. neutral.	1. Properties of acids and alkalis and safety	Safety, acid, alkali, irritant, corrosive, harmful	Practical skills, acids and alkalis safety. Identifying variables. Identifying trends based on scientific data. Identify the best indicator to distinguish between solutions of different pH, using data provided. Use data and observations to determine the pH of a solution and explain what this shows. Explain how neutralisation reactions are used in a range of situations. Describe a method for how to make a neutral solution from an acid and alkali. Practical skills, acids and alkalis safety. Identifying variables. Identifying trends based on scientific data.
		2. Indicators	Indicators, pH, acids, alkalis, litmus, phenolphthalein, universal indicator solution.	
		3. pH Scale	Indicators, pH, acids, alkalis,	
		4. Neutralisation	Indicators, pH, acids, alkalis, neutralisation	
		5. Uses of neutralisation	Neutralisation, pH, acids, alkali, neutral,	

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Reactions: Metals and Non-Metals	Metals and non-metals react with oxygen to form oxides which are either bases or acids. Link to rusting. Metals can be arranged as a reactivity series in order of how readily they react with other substances I why different metals are used for different applications. .	1. Periodic table of the elements	Periodic table, elements, atoms, Mendeleev, period, group	Describe an oxidation, displacement, or metal-acid reaction with a word equation. Use particle diagrams to represent oxidation, displacement and metal-acid reactions. Identify an unknown element from its physical and chemical properties – problem solving skills. Place an unfamiliar metal into the reactivity series based on information about its reactions. This also involves problem solving skills. Develop practical skills during scientific experiments. Identifying variables. Identifying trends based on scientific data.
		2. Properties of metals	Malleable, conductivity, conductor, sonorous, shiny, property, melting point,	
		3. Properties of non-metals	Brittle, insulators, melting point, dull,	
		4. Metals and oxygen	Reaction, reactants, products, metal oxide, metals, oxygen, aluminium, magnesium	
		5. Metals and acids	Reaction, reactants, products, metal, metals, aluminium, magnesium, chloride, sulphate, nitrite, hydrogen	
		6. Reactivity Series	Reactivity, series, hydrogen, period, group	
		7. Reactions of carbonates	Reactivity, carbonates, Reaction, reactants, products,	

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Voltage, current and resistance	The understanding of how electricity flows around a circuit is vital in the wider context of how machines work and drawing links between the key scientific principles of particle model and energy.	1. Conductors and insulators and examples of each	Electrical conductor, electrical insulator, flow	Students will have to: • develop a wide range of practical skills throughout this topic including how to effectively build circuits and use their knowledge to fault find. • demonstrate their ability to manipulate data and rearrange formula to calculate resistance, current and voltage. • predict effects of changing components in a circuit. • draw conclusions about safety risks related to voltage, current and resistance
		2. What is a circuit and what components might you find in a circuit?	Circuit, wire, bulb, switch, fuse, cell, battery	
		3. How can symbols be used to represent the components in a circuit	Wire, bulb, switch, fuse, cell, battery	
		4. What is voltage?	Potential difference, voltage	
		5. How to measure voltage in a circuit.	Voltmeter, voltage, volts	
		6. Voltage in a series and parallel circuit	In series, in parallel	
		7. What is current?	Electrons, flow, charge	
		8. Current in series and parallel circuits and what might make it change	Electrons, flow, charge	
		9. How does resistance affect the flow of electricity through a circuit?	Resistor	
		10. How can resistance be calculated?	Ohms	
		11. Electric field around a charged object	Electrostatic force	

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Earth (Universe)	Understanding the Earth and solar system, how it is arranged. Why we have day and night and the seasons.	Why do we have day and night?	Earth, Sun, Moon, axis, tilt.	Explain why places on the Earth experience different daylight hours and amounts of sunlight during the year.
		What are the seasons?	Earth, Sun, Moon, axis, tilt.	Explain the position of the Earth in relation to the Sun, the tilt of the Earth on its axis.
		Understanding the moon and the eclipses.	Earth, Sun, Moon, axis, tilt.	Describe the appearance of planets or moons from diagrams showing their position in relation to the Earth and Sun.
		Understanding the solar system.	Earth, Sun, axis, tilt, galaxy, Light year, Stars, Orbit, Exoplanet	Explain the choice of particular units for measuring distance.
		Space exploration	Earth, Sun, axis, tilt, galaxy, Light year, Stars, Orbit, Exoplanet	Describe how space exploration and observations of stars are affected by the scale of the universe.

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Energy	The fundamental concepts that underpins all scientific understanding.	1. Definition of energy	Work, Joules	• Numeracy manipulation of data when calculating % efficiency. • Scale drawing of Sankey diagram. • Literacy skills in developing an evaluation of the most effect type of energy resource including use of contrasting connectives.
		2. Types of energy store	Thermal, chemical, gravitational potential, elastic, kinetic	
		3. Energy transfers	Input, output, release, light, sound, electrical	
		4. Energy efficiency	Useful, dissipated, efficiency	
		5. What is power?	Speed, energy, transferred	
		6. Using power to work out the cost of electricity.	Kilowatt hour, unit, time	
		7. Energy content in food	Thermometer, temperature	
		8. Types of energy resources	renewable and non-renewable	
		9. Renewable energy	biomass, nuclear, wave, tidal, solar, wind, geothermal,	
		10. Non-renewable energy	Coal, oil, gas, nuclear	
		11. Formation of fossil fuels	Heat pressure, layer, decomposition, coal, oil, natural gas	
		12. Advantages and disadvantages of different energy resources	Environment, global warming, acid rain, cost	

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Forces: Speed and gravity	Investigating how to calculate speed, gravitational force, how mass and weight are different and how to calculate using formula.	How do we measure speed?	Speed, Average speed, Relative motion, Acceleration	Maths skills - Use the formula: speed = distance (m)/time (s) or distance-time graphs, to calculate speed.
		How do we calculate speed?	Speed, Average speed, Relative motion, Acceleration	Maths skills - Use the formula: speed = distance (m)/time (s) or distance-time graphs, to calculate speed.
		Skill- Distance time graphs	Speed, Average speed, Relative motion, Acceleration	Maths skills - Use the formula: speed = distance (m)/time (s) or distance-time graphs, to calculate speed.
		Skill – Using prior knowledge to calculate the speed of a stomp rocket	Speed, Average speed, Relative motion, Acceleration	Literacy opportunity, writing up an experiment. Use the formula: speed = distance (m)/time (s) or distance-time graphs, to calculate speed. Use the formula: weight (N) = mass (kg) x gravitational field strength (N/kg).
		What is gravity?	Weight, Non-contact force, Mass, Gravitational field strength, g, Field	Maths skills - Use the formula: weight (N) = mass (kg) x gravitational field strength (N/kg).
		What is the difference between mass and gravity?	Weight, Non-contact force, Mass, Gravitational field strength, g, Field	Maths skills - Use the formula: weight (N) = mass (kg) x gravitational field strength (N/kg). Literacy opportunity – graded long answer questions.

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Variation	There is variation between individuals of the same species. Some variation is inherited, some is caused by the environment and some is a combination. Variation between individuals is important for the survival of a species, helping it to avoid extinction in an always changing environment.	1. Variation	Genetic, variation, environmental, similarities, differences, characteristics, species,	Numeracy skills when: • Measuring height and wrist circumference. • Construction of tally chart • Drawing graphs using data collected in variation survey. Observational skills in collection of data for eye colour Oracy – discussion surrounding categorisation of type of variation for some characteristic. Literacy- completion of the DMT on why variation is important.
		2. Continuous variation	Variation, Inheritance, Characteristic Environmental, Genetic, Discontinuous Continuous	
		3. Discontinuous variation	Variation, Inheritance, Characteristic Environmental, Genetic, Discontinuous, Continuous	
		4. Variation survey	Circumference, height, eye colour, Discontinuous, Continuous, variation	
		5. Analysing data from variation survey	Frequency, bar chart, line graph, histogram, line of best fit, co-ordinates	
		6. Why is variation important?	Variation, Extinction, Adaptation, Mutation, Natural selection, Evolution	

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Human Reproduction	On a basic level it is imperative that all students gain a detailed understanding of where and how human life starts. This links to prior learning on specialised cells, cell division and differentiation. Students should also be able to link the topic to how an organ system, made of several organs works. Understanding human reproduction is also a vital precursor to a deeper understanding of variation, how and why organisms differ.	What is a sexual reproduction and why is it important?	difference, variation, species	e.g independence, problem solving, evaluation, analysis, creativity, literacy, numeracy and oracy Literacy/creativity – production of comic strip
		Structure of human gametes	tail, mitochondria, swim, jelly, yolk, nucleus, size, chromosomes	
		The production of gametes by the organs in the Human reproductive system	ovary, teste, number	
		The stages involved in the process of fertilisation	penis, erection, vagina, ejaculation, semen, glands sperm tube, oviduct	
		The stages involved in implantation	embryo, uterus, lining, blood	
		The stages involved gestation	zygote, embryo, cell division, foetus amnion, placenta, amniotic fluid	
		How the placenta passes substances from the mother to the foetus and vice versa	Blood, vein, artery, umbilical cord, soluble food, oxygen, carbon dioxide, urea, oxygen diffusion	
		What effect can cigarettes, alcohol or drugs have on the developing foetus?	Poison, oxygen, energy, growth, addiction. premature	
		The stages involved in childbirth	contraction, muscle, hormone, cervix dilate, amnion, amniotic fluid, vagina	
		The stages of the Menstrual cycle	ovulation, menstruation, hormones, uterus, lining	
		What factors affect male and female fertility?	alcohol, smoking, obesity	
		How do contraceptives prevent pregnancy? and	hormones, barrier, condom,	
		How do fertility drugs work to increase the chances of pregnancy?	Increase, production, ova (egg cell), probability, fertilisation	

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Matter: Particle model and separating mixtures	Properties of solids, liquids and gases can be used to rationalise ever day occurrences. Observations where substances change temperature or state can be described in terms of particles gaining or losing energy and students can gain awareness of what causes them to feel the temperature of different substances and how heating works. A pure substance consists of only one type of element or compound and has a fixed melting and boiling point. Mixtures may be separated due to differences in their physical properties, application to separate different substances – this is something that needs to be done in many different industries.	1. Particle model	Particles, Particle models, sold, liquid, gas, kinetic energy, volume, regular, irregular,	Explain the properties of solids, liquids and gases based on the arrangement and movement of their particles. Explain changes in states in terms of changes to the energy of particles. Draw before and after diagrams of particles to explain observations about changes of state, gas pressure and diffusion. Students can use graph skills and describe heating and cooling curves in terms of particles. Required practical on insulation where students can investigate different materials – problem solving.
		2. Changing state	Melting, evaporating, condensing, freezing, vibrate, kinetic energy,	
		3. Density	Volume, mass, Eureka, Calculate,	
		4. Diffusion	Diffusion, spreading, particles, concentration,	
		5. Solution	Solute, solvent, solution, soluble, insoluble,	
		6. Dissolving and saturation	Solute, solvent, solution, soluble, insoluble, saturation, particles	
		7. Rock-salt: Filtering	Filter, particles, soluble, funnel, beaker	
		8. Rock-salt: Evaporation	Evaporation, crucible, Bunsen burner, tripod, gauze,	
		9. Distillation	Distillation, boiling, boiling point, evaporation, condensing, Liebig condenser	
		10.Chromatography	Chromatography, soluble, ink,	

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Waves: Light and sound	Sound and light travel in waves. Students investigate how light and sound travel and how they react to different media.	What is the difference between light and sound?	Wave, particles, vibrations, speed, light, sound,	Use observations to explain how sound is reflected, transmitted or absorbed by different media.
		How do soundwaves travel?	Vibration, Longitudinal wave, Volume, Pitch, Amplitude, Wavelength, Frequency, Vacuum, Oscilloscope, Absorption, Auditory range, Echo	Use drawings of waves to describe how sound waves change with volume or pitch.
		How the oscilloscope shows sound waves.	Vibration, Volume, Pitch, Amplitude, Wavelength, Frequency, Oscilloscope, Auditory range	Explain observations of how sound travels using the idea of a longitudinal wave. Describe the amplitude and frequency of a wave from a diagram or oscilloscope picture.
		How we hear sound and potential damage to the ear.	Vibration, Longitudinal wave, Volume, Pitch, Amplitude, Wavelength, Frequency, Vacuum, Oscilloscope, Absorption, Auditory range, Echo	Design of an ear defender using literacy skills and maths skills to measure each material.
		How does light reflect?	Incident ray, Reflected ray, Normal line, Angle of reflection, Angle of incidence	Construct ray diagrams to show how light reflects off mirrors, forms images and refracts.
		How does light refract?	Incident ray, Reflected ray, Normal line, Angle of reflection, Angle of incidence, Refraction, Absorption, Scattering, Transparent, Translucent, Opaque	Construct ray diagrams to show how light refracts through transparent objects and prisms.
		How we see colours, how do filters work?	Absorption, Scattering, Transparent, Translucent, Opaque, Convex lens, Concave lens, Retina	Investigate filters, predict the colour of materials when light passes through filters.