

**Year 7 Science – 90 hours approx to include reviews, 12 hours of skills and 3 tests**

**Biology: 30 hours**

Topic	KS3 Programme of Study statements	Skills opportunity Investigation title Smaths Literacy Applied PT
<p><b>The Human Body 10</b></p>	<p>Cells and organisation</p> <ul style="list-style-type: none"> <li>♣ cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope</li> <li>♣ the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts</li> <li>♣ the similarities and differences between plant and animal cells</li> <li>♣ the role of diffusion in the movement of materials in and between cells</li> <li>♣ the structural adaptations of some unicellular organisms</li> <li>♣ the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms. The skeletal and muscular systems</li> <li>♣ the structure and functions of the human skeleton, to include support, protection, movement and making blood cells</li> <li>♣ biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles</li> <li>♣ the function of muscles and examples of antagonistic muscles.</li> </ul>	<p>Diffusion in agar cubes (surface area)</p> <p>Joints and Force investigation</p> <p>Scale of cells</p> <p>Microscope license</p> <p>Specialised cells</p> <p>Large Key words (cells and specialised cells)</p> <p>Animal vs Plant Cell Venn</p> <p>Plant/animal cell card sort</p> <p>Simple plant/animal label activity</p> <p>Specialised cells card sort</p> <p>Diffusion direction activity</p> <p>Levels of organisation card sort</p>
<p><b>Ecosystems 10</b></p>	<p>Photosynthesis</p> <ul style="list-style-type: none"> <li>♣ the reactants in, and products of, photosynthesis, and a word summary for photosynthesis</li> <li>♣ 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</li> <li>♣ the adaptations of leaves for photosynthesis</li> <li>♣ the role of leaf stomata in gas exchange in plants.</li> </ul>	<p>% Energy transfers through a food chain</p> <p>Importance of plants for food security</p> <p>Conservation</p>

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	<ul style="list-style-type: none"> <li>♣ plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots.</li> </ul> <p>Relationships in an ecosystem</p> <ul style="list-style-type: none"> <li>♣ the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops</li> <li>♣ the importance of plant reproduction through insect pollination in human food security</li> <li>♣ how organisms affect, and are affected by, their environment, including the accumulation of toxic materials</li> </ul>	<p>Ecosystems Key Words + card sort</p> <p>Bioaccumulation card sort</p> <p>Creating food webs pics+ words</p> <p>Large Photosynthesis equation pic +words</p>
<b>Reproduction 10</b>	<p>Reproduction</p> <ul style="list-style-type: none"> <li>♣ 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</li> <li>♣ reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.</li> </ul>	<p>Germination investigation</p> <p>Seed dispersal investigation</p> <p>Scale of cells and gametes</p> <p>Large Key words</p> <p>Reproduction card sort</p> <p>Label male and female reproductive system</p> <p>Fertilisation/implantation storyboard</p> <p>Life cycle of a plant jigsaw</p>

**Chemistry: 30 hours**

Topic	KS3 Programme of Study statements	Skills opportunity
<b>Planet Earth 9</b>	<p>Earth and atmosphere</p> <ul style="list-style-type: none"> <li>♣ the composition of the Earth</li> <li>♣ the structure of the Earth</li> <li>♣ the rock cycle and the formation of igneous, sedimentary and metamorphic rocks</li> <li>♣ Earth as a source of limited resources and the efficacy of recycling</li> </ul>	<p>Investigation</p> <p>Smaths Literacy Applied</p> <p>% of gases in atmosphere</p> <p>% of product by mass</p> <p>Climate impacts</p>

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	<ul style="list-style-type: none"> <li>♣ the carbon cycle</li> <li>♣ the composition of the atmosphere</li> <li>♣ the production of carbon dioxide by human activity and the impact on climate.</li> </ul>	<p>Recycling purposes</p> <p>Large Keywords Earth's Layers card sort Rock Type card sort Planet Earth key words card sort</p>
<b>Particles 9</b>	<p>The particulate nature of matter</p> <ul style="list-style-type: none"> <li>♣ the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure</li> <li>♣ changes of state in terms of the particle model. Atoms, elements and compounds</li> <li>♣ a simple (Dalton) atomic model</li> <li>♣ differences between atoms, elements and compounds</li> <li>♣ chemical symbols and formulae for elements and compounds</li> <li>♣ conservation of mass.</li> <li>♣ chemical reactions as the rearrangement of atoms</li> </ul>	<p>Melting temperature of ice invn</p> <p>Scale of atoms Conservation of mass</p> <p>Useful materials and sources</p> <p>Large Key words Label an atom Identify elements in compounds S, L, G card sort/properties</p>
<b>Chemical Reactions</b>	<p>Chemical reactions</p> <ul style="list-style-type: none"> <li>♣ chemical reactions as the rearrangement of atoms representing chemical reactions using formulae and using equations</li> <li>♣ displacement reactions</li> <li>♣ defining acids and alkalis in terms of neutralisation reactions</li> <li>♣ the pH scale for measuring acidity/alkalinity; and indicators</li> <li>♣ reactions of acids with metals to produce a salt plus hydrogen</li> <li>♣ reactions of acids with alkalis to produce a salt plus water</li> <li>♣ what catalysts do.</li> </ul>	<p>Neutralisation investigation</p> <p>% of product by mass Balancing equations</p> <p>Purpose of acids and alkalis</p> <p>Large Keywords pH scale work sheet simple acid/alkali/neutral match up Chemical Reactions keyword card sort</p>

**Physics: 30 hours**

Topic	KS3 Programme of Study statements	Skills opportunity Investigation Smaths Literacy Applied
<p><b>Force and motion</b> <b>11</b></p>	<p>Describing motion</p> <ul style="list-style-type: none"> <li>♣ speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time)</li> <li>♣ the representation of a journey on a distance-time graph</li> <li>♣ relative motion: trains and cars passing one another.</li> </ul> <p>Forces</p> <ul style="list-style-type: none"> <li>♣ forces as pushes or pulls, arising from the interaction between two objects</li> <li>♣ using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces</li> <li>♣ moment as the turning effect of a force</li> <li>♣ 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</li> <li>♣ forces measured in newtons, measurements of stretch or compression as force is changed</li> <li>♣ force-extension linear relation; Hooke’s Law as a special case</li> <li>♣ non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets</li> </ul>	<p>Stretching a spring (version of)</p> <p>Static investigation</p> <p>Speed calculation</p> <p>Large Keywords Balance vs Unbalanced Contact vs non-contact Friction vs Drag Distance Time graph sort activity Forces keyword card sort</p> <p>Calculation of speed by gradient on dt graph</p> <p>Graph skills – Hooke’s Law Resultant Forces (simple)</p> <p>Applications of forces</p>
<p><b>Waves</b> <b>10</b></p>	<p>Observed waves</p> <ul style="list-style-type: none"> <li>♣ waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition.</li> </ul> <p>Sound waves</p> <ul style="list-style-type: none"> <li>♣ frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound</li> </ul>	<p>Reflected rays – changing angle of incidence</p> <p>Hearing ranges – frequencies Calculating speed of sound Calculating speed of light</p>

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	<ul style="list-style-type: none"> <li>♣ sound needs a medium to travel, the speed of sound in air, in water, in solids</li> <li>♣ sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal</li> <li>♣ auditory range of humans and animals. Energy and waves</li> <li>♣ pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound; waves transferring information for conversion to electrical signals by microphone.</li> </ul> <p>Light waves</p> <ul style="list-style-type: none"> <li>♣ the similarities and differences between light waves and waves in matter</li> <li>♣ light waves travelling through a vacuum; speed of light</li> <li>♣ the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface</li> <li>♣ 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</li> <li>♣ light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras</li> <li>♣ colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.</li> </ul>	<p>Measuring angles of incidence and reflection</p> <p>Hearing and uses of ultrasound</p> <p>Comparison of eye to camera</p> <p>Large Keywords Pitch and amplitude card sort Light card sort Refraction/reflection label Hearing Ranges Sound Question card sort Sound/Light Keyword card sort</p>
<p><b>Earth and Space 9</b></p>	<p>Space physics</p> <ul style="list-style-type: none"> <li>♣ gravity force, weight = mass x gravitational field strength (g), on Earth <math>g=10 \text{ N/kg}</math>, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only)</li> <li>♣ our Sun as a star, other stars in our galaxy, other galaxies</li> <li>♣ the seasons and the Earth's tilt, day length at different times of year, in different hemispheres</li> <li>♣ the light year as a unit of astronomical distance.</li> </ul>	<p>Electromagnets – current/coils Calculating weight Graph plotting planetary temps</p> <p>Uses of electromagnets Why do we study space?</p> <p>Stars and galaxies</p> <p>Earth and Space Keyword card sort</p>