# CURRICULUM PLAN

## PHYSICS

BRAMHALL HIGH SCHOOL

## Curriculum Intent

It is our intention as Science Department to provide all children, regardless of their prior learning, background, or special needs, with a broad and balanced science curriculum. We aim to promote positive attitudes to science as an interesting and enjoyable subject. To develop pupils` awareness of how science impacts on their everyday life.

Pupils are encouraged to develop their practical skills, to work collaboratively and to query and evaluate scientific evidence.

We aim to cultivate an environment conducive to learning. We encourage and value our pupils' opinions, ideas, and contributions. Similarly, we expect pupils to strive for excellence and respect the contributions of other adults and their peers. Our intention is for pupils to enjoy their learning, to be resilient, make progress and achieve at an appropriate level.

# YEAR 7

| Term | Programme of Learning | Links to the National Curriculum / Specification / Additional | Assessments | What extra learning opportunities are planned? | Disciplinary Literacy |
|---|---|---|---|---|---|
| **Term 1a** | **Science Intro lesson**<br><br>**7I Energy**<br>- Energy stores & transfers<br>- Generating electricity<br>- Non-renewable resources<br>- Environmental Issues<br>- Renewable resources | Energy<br>Changes & transfers<br>Changes in systems<br>Scientific attitudes<br>Experimental Skills<br>Analysis and Evaluation<br>Units | 7I End of topic test | Demonstrate steam engines as power station<br><br>Literacy and development of presentation skills | **Tier 1:** Energy, fuel, light, heat energy, sound.<br>**Tier 2:** Energy transfer, energy resources, *renewable, non-renewable,<br>**Tier 3:** Joule (J), kilojoule (kJ), kinetic, nuclear, electricity, gravitational potential energy, |
| **Term 1b** | **7I Energy**<br>- Energy in food<br>- Food requirements<br><br>**7J Electricity**<br>- Conductors<br>- Insulators<br>- Circuit symbols<br>- Switches | Electricity<br>Current electricity<br>Analysis and Evaluation<br>Measurement | CPR – Modelling electrical circuits | Test variety of foods<br><br>Investigation – "Do some conductors conduct better than others?"<br><br>Use pHET - Circuit builder | **Tier 1:** Current, circuit, lamp, charge, switch, cells.<br>**Tier 2:** Series, parallel, *conductor, insulator, model.<br>**Tier 3:** Ammeter, ampere. |

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| **Term 2a** | **7J Electricity**<br>- Series circuits<br>- Parallel circuits<br>- Voltage & resistance<br>- Modelling electric current<br>- Electrical dangers<br>- Electrical safety<br><br>**7K Forces**<br>- Types of forces<br>- Density | Electricity<br>Current Electricity<br>Experimental Skills<br>Analysis and Evaluation<br>Measurement<br><br>Forces<br>Balanced forces<br>Experimental skills<br>Measurement | 7J End of topic test | High voltage dangers video<br><br>Demo Wire wool & fuses<br><br>Investigate wire length and resistance | **Tier 1:** Current, circuit, lamp, *charge, switch, cells.<br>**Tier 2:** Series, parallel, conductor, insulator, model. *density<br>**Tier 3:** Ammeter, ampere. |
| **Term 2b** | **7K Forces**<br>- Forces on elastic objects<br>- Friction and its effects<br>- Pressure on solid surfaces | Electricity<br>Forces<br>Balanced forces<br>Forces & motion<br>Particle model<br>Experimental skills<br>Measurement | CPR - Springs | Explore the link between density and the particle nature of matter.<br><br>Using Focus software to model Hooke's Law | **Tier 1:** Force, area, depth.<br>**Tier 2:** altitude, fluid, elastic, *pressure |

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| **Term 3a** | **7K Forces**<br>- Balanced forces<br>- Unbalanced forces<br><br>**7L Sound**<br>- Vibrations<br>- Comparing sounds<br>- Describing sound waves<br>- Media and sound<br>- Speed of sound | Forces<br>Pressure<br>Balanced forces<br>Waves<br>Sound waves<br>Analysis and Evaluation | 7K End of unit test<br><br>End of year 7 Exam | Maths skills on speed of sound<br><br>How can we improve the practical results we obtain? | **Tier 3:** Pressure, newton, pascal, atmospheric *pressure. Transverse, longitudinal,<br><br>**Tier 1:** Wave, volume, speed, ultrasound, reflect, echo.<br>**Tier 2:** *Vibration, pitch, frequency, velocity.<br>**Tier 3:** Amplitude, hertz, infrasound |
| **Term 3b** | **7L Sound**<br>- Hearing range<br>- Detecting sounds<br>- Ultrasound and its uses<br>- Transverse waves<br>- Longitudinal waves | Waves<br>Observed waves<br>Sound waves<br>Scientific attitudes<br>Experimental skills<br>Analysis and Evaluation<br>Measurement | CPR - Sound<br><br>7L End of unit test | Extend to GCSE uses of ultrasound.<br><br>Interference of waves and the uses of this<br><br>Why do we have a hearing range? | **Tier 1:** Wave, volume, speed, ultrasound, reflect, echo.<br>**Tier 2:** *Vibration, pitch, frequency, velocity.<br>**Tier 3:** Amplitude, hertz, *infrasound |

# YEAR 8

| Term | Programme of Learning | Links to the National Curriculum / Specification / Additional | Assessments | What extra learning opportunities are planned? | Disciplinary Literacy |
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| **Term 1a** | **8I Fluids**<br>- Particle Model<br>- Heating and cooling<br>- Changing state<br>- Density<br>- Floating and sinking<br>- Pressure in fluids<br>- Drag and streamlining | Matter<br>Physical changes<br>Energy in matter<br>Particle model<br>Forces<br>Pressure in fluids<br>Experimental skills<br>Analysis and Evaluation<br>Measurement | 8I End of unit test | Expansion & contraction<br>Anomaly of water to link to freeze thaw | **Tier 1:** Particle, atom, solid, liquid, gas, melt, freeze, boil, temperature, volume, drag, float, sink,<br>**Tier 2:** Evaporate, condense, density, compressible, incompressible, friction, resistance, *pressure<br>**Tier 3:** *State, Kinetic, equilibrium, balanced, |

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| **Term 1b** | **8J Light**<br>- Key definitions<br>- Specular reflection<br>- Diffuse reflection<br>- Refraction<br>- Convex Lenses<br>- Camera and eyes<br>- TIR | Particle model<br>Forces<br>Pressure in fluids<br><br>Observed waves<br>Light waves<br>Experimental skills<br>Analysis and Evaluation<br>Measurement | CPR - Heating<br><br>8I End of unit test | Boat design competition for LA<br><br>**Galileo** - invented the thermoscope on which the Galileo thermometer is based.<br><br>Use PHET for modelling and speed data | **Tier 1:** light, shadow, wave, ray.<br>**Tier 2:**<br>, transparent, opaque, translucent, beam, diffuse, specular, filter, absorption, transmission, *reflection.<br>**Tier 3:**<br>Incident ray, reflected ray. |
| **Term 2a** | **8J Light**<br>- Dispersion<br>- Colour and surfaces<br>- Colour and filters<br>- Eyes and colour<br><br>**8K Energy**<br>- Heat & temperature<br>- Conduction<br>- Convection | Waves<br>Observed waves<br>Light waves<br>Energy<br>Physical changes<br>Calculations<br>Changes & transformations<br>Scientific attitudes<br>Experimental skills<br>Analysis and Evaluation<br>Measurement | CPR – Periscope<br><br>8J End of unit test | Lenses and inverted images<br><br>Use LED and colours<br><br>Cones and rod cells and link to colour blindness<br><br>Miner chimney, beach breezes, PHET prep for GCSE core practical skill development | **Tier 1:** mirror, camera, eye, image, , lens. Heat, energy<br>**Tier 2:** Beam, inverted, virtual, converge, diverge, temperature,<br>**Tier 3:** Incident ray, reflected ray, *refracted ray, normal, focal point, conduction, convection, insulator |

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| **Term 2b** | **8K Energy**<br>- Radiation<br>- How Insulation works<br>- Insulation at home<br>- Payback time | Energy<br>Energy in matter<br>Calculations<br>Changes & transformations<br>Scientific attitudes<br>Experimental skills<br>Analysis and Evaluation<br>Measurement | CPR – Heat transfers | Thermal cameras and images<br><br>Calculating energy supplied if given the output and efficiency as a percentage | **Tier 1:** Rate, heat, Sankey, wasted, useful<br>**Tier 2:**. temperature, insulation, payback, vacuum, particle.<br>**Tier 3:** Thermal conductivity.<br>***Conduction**, convection, radiation, infra-red |
| **Term 3a** | **8K Energy**<br>- Efficiency<br>- Sankey diagrams<br>- Energy usage calcs<br>- Paying for energy | Energy<br>Energy in matter<br>Calculations<br>Scientific attitudes<br>Experimental skills<br>Analysis and Evaluation<br>Measurement | 8K End of unit test | Add in extra details of daily charges from electricity companies and the factors effecting the cost of electricity and gas | **Tier 1:** Rate, heat, Sankey, wasted, useful, unit, time<br>**Tier 2:**.<br>*efficiency, payback, power |
| **Term 3b** | **8L Earth in space**<br>- Parts of the Solar System<br>- Day, night and years<br>- Seasons<br>- Seasons - Gravity<br>- Mass and weight | Space Physics<br>Forces<br>Scientific attitudes<br>Experimental skills<br>Analysis and Evaluation<br>Measurement | End of year 8 exams | Astronomy debate and question and answer sessions | **Tier 1:** Earth, moon, orbit, planet, star, galaxy, Sun Venus<br>**Tier 2:** satellite.<br>*Solar system, axis<br>**Tier 3:** Universe, rotation |

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| **YEAR 9** | | | | | |
| **Term** | **Programme of Learning** | **Links to the National Curriculum / Specification / Additional** | **Assessments** | **What extra learning opportunities are planned?** | **Disciplinary Literacy** |
| **Term 1a** | **RAAC CONSOLIDATION**<br>- Efficiency<br>- Sankey diagrams<br>- Energy usage calcs<br>- Paying for energy<br><br>**Usual year 9 starting point**<br><br>**8L Earth in space**<br>- Parts of the Solar System<br>- Day, night and years<br>- Seasons<br>- Gravity<br>- Mass and weight<br>- Beyond the Solar System<br>- Changing ideas | Energy<br>Energy in matter<br>Calculations<br>Scientific attitudes<br>Experimental skills<br>Analysis and Evaluation<br>Measurement<br><br>Magnetism<br>Static Electricity<br>Scientific thinking<br>Experimental skills<br>Analysis and Evaluation<br>Measurement | 8K End of Unit Test<br><br>8L End of Unit Test | Solving space travel problems and how the solutions benefit our everyday life Solar System extras<br>Investigate the factors impacting the speed a motor rotates | **Tier 1:** Rate, heat, Sankey, wasted, useful, Earth, moon, model, orbit, planet, solar system, star, *galaxy, gravity, sun, weight, milky way, Mercury, Venus, Mars<br>**Tier 2:** Artificial satellite, natural, *efficiency, payback, power<br>**Tier 3:** gravitational field strength, andromeda, light year. |

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| **Term 1b** | **9I Force Fields and electromagnets**<br>- Magnetic fields<br>- Magnetic Earth<br>- Electromagnets<br>- Investigating strength<br>- Using electromagnets<br>- Electric motors | Forces<br>Balanced Forces<br>Forces & motion<br>Scientific thinking<br>Experimental skills<br>Analysis and Evaluation<br>Measurement | 9I End of unit test<br><br>CPR Magnetism and fields | Make motors as pupils won't experience it at GCSE unless triple<br><br>Extend to speakers and microphones for most able<br><br>More able can link to a loudspeaker | **Tier 1:** iron, magnet, field, static, bell, motor, poles<br>**Tier 2:** *electromagnet, solenoid, compass<br>**Tier 3:** relay, electrostatic |

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| **Term 2a** | **9I Force Fields and electromagnets**<br>- Electric Fields<br>- Static Electricity<br><br>**9J Application of forces**<br>- Moments<br>- Moments in balance<br>- Levers | Forces & motion<br>Scientific thinking<br>Experimental skills<br>Analysis and Evaluation<br>Measurement | End of Year 9 exams start | Multiple item equilibrium questions<br><br>Work done | **Tier 1:** poles, friction, positive, force, mass, distance, moment, pivot, pulley, work<br>**Tier 2:** attraction, repulsion, induction, balanced, fulcrum<br>**Tier 3:** *equilibrium, conservation. lubrication |

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| **Term 2b** | **9J Application of forces**<br>- Pulleys and work<br>- Gears<br><br>**9K Forces and Motion & CP1 / SP 1 Motion**<br>- Vectors and scalars<br>- Speed<br>- Human Reaction times<br>- Common Speeds | Forces<br>Balanced Forces<br>Forces & motion<br>Scientific thinking<br>Experimental skills<br>Analysis and Evaluation<br>Measurement | End of Year 9 exams<br><br>9J End of Unit test | Impact of human reactions on timing and how we can eliminate these. Limit to increasing the distance so longer time period and the use of light gates.<br><br>Most able speed cameras | **Tier 1:** pulley, work, distance, time, speed, energy, weight, average speed.<br>**Tier 2**fulcrum, Accelerate, acceleration,<br>**Tier 3:** *Vector, quantity, scalar, gradient. |

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| **Term 3a** | **9K Forces and Motion & CP1 / SP 1 Motion**<br>- Distance/time graphs<br>- Speed/time graphs<br>- Acceleration<br><br>**CP2 / SP2 Forces & Motion**<br>- Resultant forces<br>- Force diagrams | Forces<br>Balanced Forces<br>Forces & motion<br>Scientific thinking<br>Experimental skills<br>Analysis and Evaluation<br>Measurement | 9K Forces and motion Test | Working out tangents on speed/time graphs<br><br>Working out distance travelled in multi-step journeys | **Tier 1:** distance, mass, weight, force, gravity, Newton<br>**Tier 2:** *acceleration, ratio, friction, light gate<br>**Tier 3:** independent, dependent, controlled, compensated |

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| **Term 3b** | **CP2 / SP2 Forces & Motion**<br>- Newton's first law<br>- Mass and weight<br>- Gravity<br>- Newton's Second Law | Forces & motion<br>Forces<br>Energy<br>Changes & transfers<br>Changes in systems<br>Scientific attitudes<br>Experimental Skills<br>Analysis and Evaluation | CPR – Newton's 2nd Law | Develop usage of light gates and datalogging software Investigating "g" in class. | **Tier 1:** force, mass, gravity<br>**Tier 2:** equal, opposite, balanced, *stationary<br>**Tier 3:** impulse, conservation, compensated |