



# 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.

**Academic Year: 2023-2024**

**Review Date: July 2024**

**Author: Mr A Powell – Head of Science**

## YEAR 7

Term	Programme of Learning	Links to the National Curriculum / Specification / Additional	Assessments	What extra learning opportunities are planned?	Disciplinary Literacy
<b>Term 1a</b>	<b>Science Intro lesson</b>  <b>7I Energy</b> <ul style="list-style-type: none"> <li>- Energy stores &amp; transfers</li> <li>- Generating electricity</li> <li>- Non-renewable resources</li> <li>- Environmental Issues</li> <li>- Renewable resources</li> </ul>	Energy Changes & transfers Changes in systems Scientific attitudes Experimental Skills Analysis and Evaluation Units	7I End of topic test	Demonstrate steam engines as power station  Literacy and development of presentation skills	<b>Tier 1:</b> Energy, fuel, light, heat energy, sound. <b>Tier 2:</b> Energy transfer, energy resources, *renewable, non-renewable, <b>Tier 3:</b> Joule (J), kilojoule (kJ), kinetic, nuclear, electricity, gravitational potential energy,
<b>Term 1b</b>	<b>7I Energy</b> <ul style="list-style-type: none"> <li>- Energy in food</li> <li>- Food requirements</li> </ul> <b>7J Electricity</b> <ul style="list-style-type: none"> <li>- Conductors</li> <li>- Insulators</li> <li>- Circuit symbols</li> <li>- Switches</li> </ul>	Electricity Current electricity Analysis and Evaluation Measurement	CPR – Modelling electrical circuits	Test variety of foods  Investigation – “Do some conductors conduct better than others?”  Use PHET - Circuit builder	<b>Tier 1:</b> Current, circuit, lamp, charge, switch, cells. <b>Tier 2:</b> Series, parallel, *conductor, insulator, model. <b>Tier 3:</b> Ammeter, ampere.

<p><b>Term 2a</b></p>	<p><b>7J Electricity</b></p> <ul style="list-style-type: none"> <li>- Series circuits</li> <li>- Parallel circuits</li> <li>- Voltage &amp; resistance</li> <li>- Modelling electric current</li> <li>- Electrical dangers</li> <li>- Electrical safety</li> </ul> <p><b>7K Forces</b></p> <ul style="list-style-type: none"> <li>- Types of forces</li> <li>- Density</li> </ul>	<p>Electricity Current Electricity Experimental Skills Analysis and Evaluation Measurement</p> <p>Forces Balanced forces Experimental skills Measurement</p>	<p>7J End of topic test</p>	<p>High voltage dangers video</p> <p>Demo Wire wool &amp; fuses</p> <p>Investigate wire length and resistance</p>	<p><b>Tier 1:</b> Current, circuit, lamp, *charge, switch, cells. <b>Tier 2:</b> Series, parallel, conductor, insulator, model. *density <b>Tier 3:</b> Ammeter, ampere.</p>
<p><b>Term 2b</b></p>	<p><b>7K Forces</b></p> <ul style="list-style-type: none"> <li>- Forces on elastic objects</li> <li>- Friction and its effects</li> <li>- Pressure on solid surfaces</li> </ul>	<p>Electricity Forces Balanced forces Forces &amp; motion Particle model Experimental skills Measurement</p>	<p>CPR - Springs</p>	<p>Explore the link between density and the particle nature of matter.</p> <p>Using Focus software to model Hooke's Law</p>	<p><b>Tier 1:</b> Force, area, depth. <b>Tier 2:</b> altitude, fluid, elastic, *pressure</p>

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

## YEAR 8

Term	Programme of Learning	Links to the National Curriculum / Specification / Additional	Assessments	What extra learning opportunities are planned?	Disciplinary Literacy
<b>Term 1a</b>	<p><b>7L Sound</b></p> <ul style="list-style-type: none"> <li>- Recap basics of sound</li> <li>- Speed of sound</li> <li>- Hearing range</li> <li>- Detecting sounds</li> <li>- Ultrasound and its uses</li> <li>- Transverse waves</li> <li>- Longitudinal waves</li> </ul> <p><b>8I Fluids</b></p> <ul style="list-style-type: none"> <li>- Particle Model</li> <li>- Heating and cooling</li> <li>- Changing state</li> <li>- Density</li> </ul>	<p>Waves</p> <p>Observed waves</p> <p>Sound waves</p> <p>Matter</p> <p>Physical changes</p> <p>Energy in matter</p> <p>Particle model</p> <p>Forces</p> <p>Pressure in fluids</p> <p>Experimental skills</p> <p>Analysis and Evaluation</p> <p>Measurement</p>	<p>CPR - Sound</p> <p>7L End of unit test</p>	<p>Extend to GCSE uses of ultrasound</p> <p>Interference of waves and the uses of this</p> <p>Why do we have a hearing range?</p> <p>Expansion &amp; contraction</p> <p>Anomaly of water to link to freeze thaw</p>	<p><b>Tier 1:</b> Wave, volume, speed, ultrasound, reflect, echo.</p> <p><b>Tier 2:</b> *Vibration, pitch, frequency, velocity.</p> <p><b>Tier 3:</b> Amplitude, hertz, infrasound</p> <p><b>Tier 1:</b> Particle, atom, solid, liquid, gas, melt, freeze, boil, temperature, volume.</p> <p><b>Tier 2:</b> Evaporate, condense, density, compressible, incompressible.</p> <p><b>Tier 3:</b> *State, kinetic.</p>

<p><b>Term 1b</b></p>	<p><b>8I Fluids</b></p> <ul style="list-style-type: none"> <li>- Floating and sinking</li> <li>- Pressure in fluids</li> <li>- Drag and streamlining</li> </ul> <p><b>8J Light</b></p> <ul style="list-style-type: none"> <li>- Key definitions</li> <li>- Specular reflection</li> <li>- Diffuse reflection</li> </ul>	<p>Particle model Forces Pressure in fluids</p> <p>Observed waves Light waves Experimental skills Analysis and Evaluation Measurement</p>	<p>CPR - Heating</p> <p>8I End of unit test</p>	<p>Boat design competition for LA</p> <p><b>Galileo</b> - invented the thermoscope on which the Galileo thermometer is based.</p> <p>Use PHET for modelling and speed data</p>	<p><b>Tier 1:</b> drag, float, sink, light, shadow, wave, ray. <b>Tier 2:</b> friction, resistance, *pressure, transparent, opaque, translucent, beam, diffuse, specular, filter, absorption, transmission, *reflection. <b>Tier 3:</b> equilibrium, balanced, Incident ray, reflected ray.</p>
<p><b>Term 2a</b></p>	<p><b>8J Light</b></p> <ul style="list-style-type: none"> <li>- Refraction</li> <li>- Convex Lenses</li> <li>- Camera and eyes</li> <li>- TIR</li> <li>- Dispersion</li> <li>- Colour and surfaces</li> <li>- Colour and filters</li> <li>- Eyes and colour</li> </ul> <p><b>8K Energy</b></p> <ul style="list-style-type: none"> <li>- Heat &amp; temperature</li> <li>- Conduction</li> <li>- Convection</li> </ul>	<p>Waves Observed waves Light waves Energy Physical changes Calculations Changes &amp; transformations Scientific attitudes Experimental skills Analysis and Evaluation Measurement</p>	<p>CPR – Periscope</p> <p>8J End of unit test</p>	<p>Lenses and inverted images</p> <p>Use LED and colours</p> <p>Cones and rod cells and link to colour blindness</p> <p>Miner chimney, beach breezes, PHET prep for GCSE core practical skill development</p>	<p><b>Tier 1:</b> mirror, camera, eye, image, , lens. Heat, energy <b>Tier 2:</b> Beam, inverted, virtual, converge, diverge, temperature, <b>Tier 3:</b> Incident ray, reflected ray, *refracted ray, normal, focal point, conduction, convection, insulator</p>

<p><b>Term 2b</b></p>	<p><b>8K Energy</b></p> <ul style="list-style-type: none"> <li>- Radiation</li> <li>- How Insulation works</li> <li>- Insulation at home</li> <li>- Payback time</li> </ul>	<p>Energy Energy in matter Calculations Changes &amp; transformations Scientific attitudes Experimental skills Analysis and Evaluation Measurement</p>	<p>CPR – Heat transfers</p>	<p>Thermal cameras and images</p> <p>Calculating energy supplied if given the output and efficiency as a percentage</p>	<p><b>Tier 1:</b> Rate, heat, Sankey, wasted, useful <b>Tier 2:</b> temperature, insulation, payback, vacuum, particle. <b>Tier 3:</b> Thermal conductivity. <b>*Conduction,</b> convection, radiation, infra-red</p>
<p><b>Term 3a</b></p>	<p><b>8K Energy</b></p> <ul style="list-style-type: none"> <li>- Efficiency</li> <li>- Sankey diagrams</li> <li>- Energy usage calcs</li> <li>- Paying for energy</li> </ul>	<p>Energy Energy in matter Calculations Scientific attitudes Experimental skills Analysis and Evaluation Measurement</p>	<p>8K End of unit test</p>	<p>Add in extra details of daily charges from electricity companies and the factors effecting the cost of electricity and gas</p>	<p><b>Tier 1:</b> Rate, heat, Sankey, wasted, useful, unit, time <b>Tier 2:</b> temperature, insulation, <b>*efficiency,</b> payback, power <b>Tier 3:</b> Thermal conductivity.</p>
<p><b>Term 3b</b></p>	<p><b>8L Earth in space</b></p> <ul style="list-style-type: none"> <li>- Parts of the Solar System</li> <li>- Day, night and years</li> <li>- Seasons</li> <li>- Seasons - Gravity</li> <li>- Mass and weight</li> </ul>	<p>Space Physics Forces Scientific attitudes Experimental skills Analysis and Evaluation Measurement</p>	<p>End of year 8 exams</p>	<p>Astronomy debate and question and answer sessions</p>	<p><b>Tier 1:</b> Earth, moon, , orbit, planet, , star, galaxy, Sun Venus <b>Tier 2:</b> satellite. <b>*Solar system,</b> axis <b>Tier 3:</b> Universe, rotation</p>



## YEAR 9

Term	Programme of Learning	Links to the National Curriculum / Specification / Additional	Assessments	What extra learning opportunities are planned?	Disciplinary Literacy
<b>Term 1a</b>	<p><b>8L Earth in space</b></p> <ul style="list-style-type: none"> <li>- Parts of the Solar System</li> <li>- Day, night and years</li> <li>- Seasons - Gravity</li> <li>- Mass and weight</li> <li>- Beyond the Solar System</li> <li>- Changing ideas</li> </ul> <p><b>9I Force Fields and electromagnets</b></p> <ul style="list-style-type: none"> <li>- Magnets</li> <li>- Magnetic materials</li> </ul>	Magnetism Static Electricity Scientific thinking Experimental skills Analysis and Evaluation Measurement	8L End of Unit Test	Solving space travel problems and how the solutions benefit our everyday life Solar System extras Investigate the factors impacting the speed a motor rotates  More able can link to a loudspeaker	<p><b>Tier 1:</b> Earth, moon, model, orbit, planet, solar system, star, *galaxy, gravity, sun, weight, milky way, Mercury, Venus, Mars</p> <p><b>Tier 2:</b> Artificial satellite, natural</p> <p><b>Tier 3:</b> gravitational field strength, andromeda, light year.</p>
<b>Term 1b</b>	<p><b>9I Force Fields and electromagnets</b></p> <ul style="list-style-type: none"> <li>- Magnetic fields</li> <li>- Magnetic Earth</li> <li>- Electromagnets</li> <li>- Investigating strength</li> <li>- Using electromagnets</li> <li>- Electric motors</li> </ul>	Forces Balanced Forces Forces & motion Scientific thinking Experimental skills Analysis and Evaluation Measurement	9I End of unit test  CPR Magnetism and fields	Make motors as pupils won't experience it at GCSE unless triple  Extend to speakers and microphones for most able	<p><b>Tier 1:</b> iron, magnet, field, static, bell, motor, poles</p> <p><b>Tier 2:</b> *electromagnet, solenoid, compass</p>

	<ul style="list-style-type: none"> <li>- Electric Fields</li> <li>- Static Electricity</li> </ul>				<b>Tier 3:</b> relay, electrostatic
<b>Term 2a</b>	<b>9J Application of forces</b> <ul style="list-style-type: none"> <li>- Moments</li> <li>- Moments in balance</li> <li>- Levers</li> </ul>	Forces & motion Scientific thinking Experimental skills Analysis and Evaluation Measurement	End of Year 9 exams start	Multiple item equilibrium questions  Work done	<b>Tier 1:</b> force, mass, distance, moment, pivot, pulley, work <b>Tier 2:</b> balanced, fulcrum <b>Tier 3:</b> *equilibrium, conservation. lubrication
<b>Term 2b</b>	<b>9J Application of forces</b> <ul style="list-style-type: none"> <li>- Pulleys and work</li> <li>- Gears</li> </ul> <b>9K Forces and Motion &amp; CP1 / SP 1 Motion</b> <ul style="list-style-type: none"> <li>- Vectors and scalars</li> <li>- Speed</li> <li>- Human Reaction times</li> <li>- Common Speeds</li> </ul>	Forces Balanced Forces Forces & motion Scientific thinking Experimental skills Analysis and Evaluation Measurement	End of Year 9 exams  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.  Most able speed cameras	<b>Tier 1:</b> pulley, work, distance, time, speed, energy, weight, average speed. <b>Tier 2:</b> fulcrum, Accelerate, acceleration, <b>Tier 3:</b> *Vector, quantity, scalar, gradient.

<p><b>Term 3a</b></p>	<p><b>9K Forces and Motion &amp; CP1 / SP 1 Motion</b>                  - Distance/time graphs                  - Speed/time graphs                  - Acceleration</p> <p><b>CP2 / SP2 Forces &amp; Motion</b>                  - Resultant forces                  - Force diagrams                  - Newton's first law</p>	<p>Forces                  Balanced Forces                  Forces &amp; motion                  Scientific thinking                  Experimental skills                  Analysis and Evaluation                  Measurement</p>	<p>9K Forces and motion Test</p>	<p>Working out tangents on speed/time graphs</p> <p>Working out distance travelled in multi-step journeys</p>	<p><b>Tier 1:</b> distance, mass, weight, force, gravity, Newton  <b>Tier 2:</b> *acceleration, ratio, friction, light gate  <b>Tier 3:</b> independent, dependant, controlled, compensated</p>
<p><b>Term 3b</b></p>	<p><b>CP2 / SP2 Forces &amp; Motion</b>                  - Mass and weight                  - Gravity                  - Newton's Second Law                  - Acc. Core practical                  - Newton's third Law</p>	<p>Forces &amp; motion                  Forces                  Energy                  Changes &amp; transfers                  Changes in systems                  Scientific attitudes                  Experimental Skills                  Analysis and Evaluation</p>	<p>CPR – Core Practical</p>	<p>Develop usage of light gates and datalogging software Investigating "g" in class.</p> <p>Introduce idea of friction compensated ramps</p> <p>Air track collisions for objects moving in different directions</p>	<p><b>Tier 1:</b> force, mass, gravity  <b>Tier 2:</b> equal, opposite, balanced, *stationary  <b>Tier 3:</b> impulse, conservation, compensated</p>