


| Topic | 1. <u>Energy and temperature</u> | 2. <u>The effects of forces</u> | 3. Electric charge and current |
|------------|---|---|---|
| Unit | Energy | Forces | Electricity |
| Skills | <ul style="list-style-type: none"> Name and use a wide range of scientific apparatus. Follow simple risk assessments. Can plan an investigation that will answer a question. Know what the word “variables” means. Can take measurements using a range of scientific equipment. | <ul style="list-style-type: none"> Can take measurements using a range of scientific equipment. Understand potential causes of random and systematic errors when collecting data. Can record data in tables. Can record data in bar charts. | <ul style="list-style-type: none"> Take measurements using a range of scientific equipment. Record data in tables and bar charts. Record data as a line graph on axis. Describe patterns shown by data. Spot anomalies Calculate averages and differences |
| Knowledge | <ul style="list-style-type: none"> Heating and thermal equilibrium, energy transfer by conduction or radiation; use of insulators Energy as a quantity Describing increases and decreases in the amounts of energy associated with temperatures Comparing energy values of different foods (from labels) (kJ) Fuels and energy resources | <ul style="list-style-type: none"> Forces as pushes or pulls, Using force arrows in diagrams 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 forces measured in Newtons, Hooke’s Law Non-contact forces | <ul style="list-style-type: none"> Separation of positive or negative charges The idea of electric field. Electric current, potential difference and resistance. Differences in resistance between conducting and insulating components |
| Anchor | Y6: some coverage of energy in food. Y5: thermal conductivity | Y5: forces as pushes and pulls, gears, levers, pulleys, air resistance, water resistance. | Y4: circuits, conductors, insulators, circuit symbols for common components. |
| Assessment | Self assessed differentiated plenary every lesson Assessment weeks – recall test based on year 6 and year 7 content Educake Homework set every month | | |
| Values | Through our teaching of investigations and use of CLEAPSS <ul style="list-style-type: none"> how to recognise and follow health and safety procedures Through our departmental feedback and marking policy <ul style="list-style-type: none"> to make effective use of constructive feedback to evaluate their own personal strengths and areas for development and to use this to inform goal setting https://www.pshe-association.org.uk/ | | |

| Topic | 1. <u>Waves</u> | 2. <u>Magnets</u> | 3. <u>Motion</u> | 4. <u>Space</u> |
|------------|---|---|--|---|
| Unit | Waves | Magnets and magnetism | Forces, energy and motion | Forces and space |
| Skills | <ul style="list-style-type: none"> Select measuring equipment based on precision and resolution. Evaluate the risks that are linked to different experiments. Identify dependent and independent variables. Understand the purpose of a “control” experiment. Make predictions that are supported by scientific facts. | <ul style="list-style-type: none"> Write and follow a simple risk assessment. Use continuous sampling techniques. Understand why repeat readings can improve accuracy | <ul style="list-style-type: none"> Write and follow a simple risk assessment. Use continuous sampling techniques. Understand why repeat readings can improve accuracy | <ul style="list-style-type: none"> Correctly construct line graphs. Link anomalies to specific random and systematic errors Calculate percentages. Present explanations for patterns in data Suggest how the accuracy and precision of data can be improved. |
| Knowledge | <ul style="list-style-type: none"> Waves on water, Light waves, Sound waves Transverse and longitudinal waves. Reflection, absorption, superposition. - transverse motion; Sound creation (by vibrations) and detection, including the ear drum. Lenses and the eye. | <ul style="list-style-type: none"> Magnetic poles, attraction and repulsion Magnetic fields by plotting with compass, representation by field lines Earth’s magnetism, compass and navigation the magnetic effect of a current, electromagnets, DC motors (principles only) | <ul style="list-style-type: none"> Calculating speed and average speed. Speed time graphs. The effect of unbalanced forces on motion. The turning effects of a force (moments) Work done. | <ul style="list-style-type: none"> Gravity as an example of a non-contact force. weight = mass x gravitational field strength Our sun as a star, other stars in our galaxy, other galaxies The seasons and the Earth’s tilt, day length at different times of year, in different hemispheres The light year as a unit of astronomical distance |
| Anchor | <ul style="list-style-type: none"> Y4: sound, vibrations, volume, pitch, detection by the ear. Y6: light, related to how we see objects. Y7: Energy and temperature. Biology: the eye and ear (nervous responses). | <ul style="list-style-type: none"> Y4: magnets and poles, repel and attract. Y7: different forces. | <ul style="list-style-type: none"> Y5: Forces that act between moving objects. Y7/8: Energy and forces. | <ul style="list-style-type: none"> Y5: Earth and space Y7/8: Forces (balanced and unbalanced). |
| Assessment | Self assessed differentiated plenary every lesson Assessment weeks – recall test based on year 6 and year 7 content Educake Homework set every month | | | |
| Values | Through our teaching of investigations and use of CLEAPSS <ul style="list-style-type: none"> how to recognise and follow health and safety procedures Through our departmental feedback and marking policy <ul style="list-style-type: none"> to make effective use of constructive feedback to evaluate their own personal strengths and areas for development and to use this to inform goal setting https://www.pshe-association.org.uk/ | | | |

| Unit of Learning | P2 ELECTRICITY | P3 PARTICULATE NATURE OF MATTER | P1 ENERGY | P1 ENERGY / P5 FORCES | P7 MAGNETISM | P2 ELECTRICITY | P3 PARTICULATE NATURE OF MATTER | P5 FORCES / P8 SPACE PHYSICS |
|------------------|---|---|--|--|---|---|---|---|
| Topic | ELECTRIC CHARGES | DENSITY | ENERGY CHANGES IN A SYSTEM | ELASTICITY AND WORK DONE | MAGNETIC FIELDS | ELECTRIC CIRCUITS AND RESISTANCE | CHANGES OF STATE | FORCES AND GRAVITY |
| Skills | Draw conclusions from given observations. | Describe a procedure for a specified purpose. Read measurements off a scale in a practical context. Record measurements appropriately. Use the appropriate SI values for quantities. Substitute numerical values into algebraic equations. Use an appropriate number of significant figures. Plot two variables from experimental or other data. Translate data between graphical and numeric form. Draw conclusions from given observations. | Identify the main hazards in specified practical contexts. Identify the dependent and independent variables in a given context. Read measurements off a scale in a practical context. Record measurements appropriately. Use the appropriate SI values for quantities. Find the arithmetic mean and range of a set of data. Substitute numerical values into algebraic equations. Use an appropriate number of significant figures. Plot two variables from experimental or other data. Translate data between graphical and numeric form. Recognise or describe patterns and trends in data. Draw conclusions from given observations. | | Recognise or describe patterns and trends in data. Draw conclusions from given observations. | Describe a procedure for a specified purpose. Identify the dependent and independent variables in a given context. Read measurements off a scale in a practical context. Record measurements appropriately. Use the appropriate SI values for quantities. Substitute numerical values into algebraic equations. Use an appropriate number of significant figures. Plot two variables from experimental or other data. Translate data between graphical and numeric form. Recognise or describe patterns and trends in data. Draw conclusions from given observations. | Identify the main hazards in specified practical contexts. Describe a procedure for a specified purpose. Read measurements off a scale in a practical context. Record measurements appropriately. Use the appropriate SI values for quantities. Substitute numerical values into algebraic equations. Use an appropriate number of significant figures. Plot two variables from experimental or other data. Translate data between graphical and numeric form. Recognise or describe patterns and trends in data. Draw conclusions from given observations. | Use the appropriate SI values for quantities. Find the arithmetic mean and range of a set of data. Substitute numerical values into algebraic equations. Use an appropriate number of significant figures. Make order of magnitude calculations. Construct frequency tables and diagrams, bar charts and histograms. Plot two variables from experimental or other data. Translate data between graphical and numeric form. Recognise or describe patterns and trends in data. Draw conclusions from given observations. |
| Knowledge | Static electricity and electric fields. | Density of materials Density Required Practical | Energy stores and systems Changes in energy (GPE, KE, EPE) Energy changes in systems Power Specific Heat Capacity Required Practical | Work done and energy transfer Forces and elasticity Hooke's Law Required Practical | Poles of a magnet Magnetic fields | Standard circuit diagram symbols Electrical charge and current Current, resistance and potential difference Series and parallel circuits | Changes of state Internal energy Temperature changes in a system and specific heat capacity Changes of heat and specific latent heat | Scalar and vector quantities Contact and non-contact forces Gravity Resultant forces Orbital motion , natural and artificial satellites |
| Assessment | Y7 – Charged particles Chemistry – atomic structure | Chemistry – Changes of state Y7 – energy and temperature changes KS3 – solids liquids and gases | Y7 and Y8 – the different effects of energy transfers | Y7 and Y8 – Energy transfers and the effects of forces | Y8 – Magnets and electro magnets | Y7 – electric circuits Y9 – static electricity and electric charges Chemistry – charges on sub atomic particles | Y7 – energy and temperature changes Y9 - Density and energy transfers Chemistry – state changes and particle arrangements | Y8 – Forces and space Y7 – Y9 – The different effects of forces |
| Assessment | | | | | | | | |

| Unit of Learning | P4 | P6 | P2 | P3 / P5 | P1 | P6 | P4 | P5 |
|--|--|--|--|--|---|--|--|--|
| Topic | ATOMIC STRUCTURE | INTRODUCTION TO WAVES | INVESTIGATING RESISTANCE | PRESSURE | ENERGY AND EFFICIENCY | ELECTROMAGNETIC WAVES | NUCLEAR DECAY | MOMENTS, GEARS AND LEVERS |
| Skills | Use data to make predictions. Identify which of two or more hypotheses provides a better explanation of data in a given context. | Change the subject of an equation Use data to make predictions. Comment on the extent to which data is consistent with a given hypothesis. Understand that measurements are precise if they cluster closely. Understand that an accurate measurement is one that is close to the true value. | Select the apparatus to be used for a specific technique or purpose. Explain the need to manipulate and control variables. Change the subject of an equation Understand that any anomalous values should be examined to try to identify the cause and, if a product of a poor measurement, ignored. Understand that systematic error is due to results differing from the true value by a consistent amount each time. | Change the subject of an equation Use data to make predictions. Identify which of two or more hypotheses provides a better explanation of data in a given context. | Select the apparatus to be used for a specific technique or purpose. Suggest and describe an appropriate sampling technique in a given context. Explain the need to manipulate and control variables. Assess whether sufficient measurements have been taken in an experiment. Identify which of two or more hypotheses provides a better explanation of data in a given context. Understand that any anomalous values should be examined to try to identify the cause and, if a product of a poor measurement, ignored. Understand that measurements are affected by random error due to results varying in unpredictable ways. Understand that systematic error is due to results differing from the true value by a consistent amount each time. | Comment on the extent to which data is consistent with a given hypothesis. Understand that any anomalous values should be examined to try to identify the cause and, if a product of a poor measurement, ignored. Understand that measurements are affected by random error due to results varying in unpredictable ways. Understand that systematic error is due to results differing from the true value by a consistent amount each time. Understand that measurements are precise if they cluster closely. Understand that an accurate measurement is one that is close to the true value. | Suggest methods of reducing harm in practical contexts. Use data to make predictions. Comment on the extent to which data is consistent with a given hypothesis. | Change the subject of an equation |
| Knowledge | The structure of an atom <u>Mass number, atomic number and isotopes</u> The development of the model of the atom | <u>Transverse and longitudinal waves</u> Properties of waves <i>Visible light (physics only)</i> <i>Sound Waves (physics only HT)</i> <u>Reflection of waves (physics only)</u> <i>Lenses (physics only)</i> Observing Waves Required Practical <i>Reflection and Refraction Required Practical</i> <i>Waves for detection and exploration (physics only HT)</i> | <u>Resistors</u> Resistance in Components Required Practical | Particle motion in gases <i>Pressure in gases (physics only)</i> <i>Increasing the pressure of a gas (physics only) (HT only)</i> Atmospheric pressure | Energy transfers in a system Efficiency Investigating <u>Insulation</u> Required Practical | Types of <u>electromagnetic waves</u> Properties of electromagnetic waves Uses and applications of electromagnetic waves <u>Emission and absorption</u> of infrared radiation Perfect black bodies and radiation <i>Red-shift (physics only)</i> Investigating <u>absorption</u> and emission Required Practical | Radioactive <u>decay</u> and nuclear radiation Nuclear equations Half-lives and the random nature of radioactive decay Radioactive <u>contamination</u> | <i>Moments, levers and gears (physics only)</i> |
|  | Y9 (Chemistry) – atomic structure and the history of the atom. | Y8 – transverse and longitudinal waves, reflection and lenses | Y9 – circuits and $V=IR$, static electricity and charges Y7 – simple circuits, resistance, current and potential difference | Y10 Chemistry – moles and gas laws Y9 Chemistry – how states of matter link to properties Y9 Density – Pressure in fluids | Y10 – waves as energy transfers Y9 – specific heat capacity, energy stores and systems Y7 – insulators and energy transfers | Y10 – transverse waves and wave properties Y8 – transverse and longitudinal waves | Y10 – Atomic Structure Y9 (Chemistry) – atomic structure and the history of the atom. | Y9 – scalars and vectors, resultant forces Y8 – Moments and work done |
| Assessment | RECALL QUIZZES | RECALL QUIZZES WAVE BASICS ABSORPTION AND REFLECTION | RECALL QUIZZES ELECTRICITY BASICS | RECALL QUIZZES CHANGING STATES AND DENSITY (Y9) STATIC AND GAS PRESSURE GAS PRESSURE | RECALL QUIZZES ENERGY STORES AND SYSTEMS (Y9) POWER AND EFFICIENCY | RECALL QUIZZES WAVE BASICS (Y10) USES OF EM WAVES FT USES OF EM WAVES HT | RECALL QUIZZES ALPHA AND BETA PARTICLES PROPERTIES OF RADIATION AND HALF LIFE | RECALL QUIZZES PRESSURE AND MOMENTS |
| Ecco Values | | | | Particle model Properties of substances | Energy Transfer Energy Changes | | Fusion Nuclear power | |

| Unit of Learning | P5 | P4 | P7 | P1 / P2 | P4 | P8 | |
|------------------|---|---|---|--|---|--|--|
| Topic | FORCES AND MOTION | APPLICATIONS OF RADIATION | ELECTROMAGNETISM | GENERATING ELECTRICITY | FISSION AND FUSION (Triple only) | SPACE PHYSICS (triple only) | |
| Skills | <p>Select and justify the apparatus to be used for a specific technique or purpose.</p> <p>Apply understanding of apparatus and techniques to suggest a procedure.</p> <p>Explain why a given practical procedure is well designed for its specified purpose.</p> <p>Assess the precision of measurements taken in an experiment.</p> <p>Draw and use the slope of a tangent to a curve as a measure of rate of change.</p> <p>Determine the slope and intercept of a linear graph</p> <p>Understand the physical significance of area between a curve and the x-axis and measure it by counting squares as appropriate.</p> <p>Understand that measurements are repeatable when repetition, under the same conditions by the same investigator, gives similar results.</p> <p>Understand that measurements are reproducible if similar results are obtained by different investigators with different equipment.</p> | <p>Draw and use the slope of a tangent to a curve as a measure of rate of change.</p> | <p>Select and justify the apparatus to be used for a specific technique or purpose.</p> <p>Apply understanding of apparatus and techniques to suggest a procedure.</p> <p>Explain why a given practical procedure is well designed for its specified purpose.</p> | <p>Assess the precision of measurements taken in an experiment.</p> | <p>Draw and use the slope of a tangent to a curve as a measure of rate of change.</p> | <p>Understand that measurements are repeatable when repetition, under the same conditions by the same investigator, gives similar results.</p> <p>Understand that measurements are reproducible if similar results are obtained by different investigators with different equipment.</p> | |
| Knowledge | <p>Distance and <u>displacement</u></p> <p><u>Speed vs Velocity</u></p> <p>The distance–time relationship</p> <p><u>Acceleration</u></p> <p><u>Velocity - time graphs</u></p> <p><u>Terminal Velocity</u></p> <p>Newton’s Laws of motion</p> <p>Stopping distance and reaction time</p> <p>Factors affecting braking distance</p> <p>Conservation of <u>momentum</u></p> <p><i>Changes in momentum (physics only)</i></p> <p>Investigate the effect of varying the force on the acceleration of an object of constant mass</p> | <p>Background radiation</p> <p>Different half-lives of radioactive <u>isotopes</u></p> <p><i>Uses of nuclear radiation</i></p> | <p><u>Electromagnetism</u></p> <p>Fleming’s left-hand rule (HT only)</p> <p>Content</p> <p><u>Electric motors</u> (HT only) Content</p> <p><i>Loudspeakers (physics only) (HT only)</i></p> <p><i>Induced potential (physics only) (HT only)</i></p> <p><i>Uses of the generator effect (physics only) (HT only)</i></p> <p><i>Microphones (physics only) (HT only)</i></p> <p><i>Transformers (physics only) (HT only)</i></p> | <p>Power</p> <p>Energy transfers in everyday appliances</p> <p>The <u>National Grid</u></p> <p>Direct and alternating <u>potential difference</u></p> <p>Mains electricity</p> <p>National and global energy resources</p> | <p><i>Nuclear <u>fission</u> (Physics only)</i></p> <p><i>Nuclear <u>fusion</u> (Physics only)</i></p> | <p><i>Our solar system (Physics only)</i></p> <p><i>The life cycle of a star (Physics only)</i></p> <p><i>Red Shift (Physics only)</i></p> | |
| | <p>Y9 – vectors and scalars, resultant forces</p> <p>Y8 – Speed, average speed, speed-time graphs</p> | <p>Y10 – decay and types of radiation, atomic structure (Chemistry) atomic structure</p> | <p>Y10 – longitudinal and electromagnetic waves</p> <p>Y9 – Magnets and poles</p> <p>Y8 – Magnets and electromagnets</p> | <p>Y11 – <i>generator effect and transformers</i></p> <p>Y10 – energy transfers</p> | <p>Y10 – decay and types of radiation, atomic structure</p> <p>Y11 – uses of radiation and half life</p> | <p>Y11 – <i>nuclear fusion</i></p> <p>Y9 – orbital motion and satellites</p> <p>Y8 – the sun as a star, galaxies</p> | |
| Assessment | <p>RECALL QUIZZES</p> <p>VECTORS, SCALARS, SPEED, VELOCITY</p> <p>STOPPING DISTANCE AND UNITS</p> <p>FORCES AND MOMENTUM (HT)</p> | <p>RECALL QUIZZES</p> <p>ATOMIC STRUCTURE (Y9)</p> <p>ALPHA AND BETA PARTICLES (Y10)</p> <p>USES OF RADIATION</p> | <p>RECALL QUIZZES</p> <p>MAGNETS AND ELECTROMAGNETS</p> <p>(MAGNETS FROM Y9)</p> <p>ALTERNATORS, DYNAMOS AND TRANSFORMERS</p> | <p>RECALL QUIZZES</p> <p>ELECTRICITY BASICS (Y10)</p> <p>CIRCUITS AND DOMESTIC ELECTRICITY</p> <p>POWER AND RESISTANCE</p> | <p>RECALL QUIZZES</p> <p>ALPHA AND BETA PARTICLES (Y10)</p> <p>PROPERTIES OF RADIATION, HALF LIFE (Y10)</p> | <p>RECALL QUIZZES</p> <p>SPACE</p> | |
| Ecco Values | <p>Momentum</p> <p>Forces and their interactions</p> <p>Forces and their interactions P2</p> <p>Forces and their interactions P3</p> <p>Forces and motion</p> | <p>Nuclear power</p> <p>Carbon dating</p> | | <p>Energy resources</p> <p>Hydroelectric</p> | <p>Fusion</p> | <p>Moon</p> <p>Life on other planets</p> <p>Big bang</p> <p>Asteroids</p> | |