Dallam School

Curriculum Overview

Department: Physics
Year Group: 7

Autumn		Spring		Summer	
Speed (6 lessons)	**Gravity (5 lessons)**	**Voltage and resistance (5 lessons)**	**Current (5 lessons)**	**Energy costs (4 lessons)**	**Energy Transfer (6 lessons)**
Investigate variables on the speed of a toy car rolling down a slope	**Explain the way in which an astronaut's weight varies on a journey to the moon**	**Compare the voltage drop across resistors connected in series in a circuit**	**Compare and explain current flow in different parts of a parallel circuit**	**Compare the running costs of fluorescent and filament light bulbs**	**Explain the energy shifts in a hand-crank torch**
By the end of this topic pupils will know *(key knowledge, including tier 3 vocabulary)*					
If the overall, resultant force on an object is non-zero, its motion changes and it slows down, speeds up or changes direction. A straight line on a distance-time graph shows constant speed, a curving line shows acceleration. The higher the speed of an object, the shorter the time taken for a journey. ***Keywords*** ➢ Speed ➢ Average speed ➢ Relative motion ➢ Acceleration	Mass and weight are different but related. Mass is a property of the object; weight depends upon mass but also on gravitational field strength. Every object exerts a gravitational force on every other object. The force increases with mass and decreases with distance. Gravity holds planets and moons in orbit around larger bodies. ***Keywords*** ➢ Weight ➢ Non-contact force ➢ Mass ➢ Gravitational field strength ➢ Field	We can model voltage as an electrical push from the battery, or the amount of energy per unit of charge transferred through the electrical pathway. In a series circuit, voltage is shared between each component. In a parallel circuit, voltage is the same across each loop. Components with resistance reduce the current flowing. ***Keywords*** ➢ Potential difference ➢ Voltage ➢ Resistance ➢ Conductor ➢ Insulator	Current is a movement of charges and is the same everywhere in a series circuit. Current divides between loops in a parallel circuit, combines when loops meet. An electric field exists around charged objects and causes other charged objects, to be attracted or repelled. Like charges repel, and unlike charges attract. ***Keywords*** ➢ Negative / positive ➢ Electrons ➢ Charge ➢ Electrostatic force ➢ Current	We pay for our domestic electricity usage based on the amount of energy transferred. Electricity is generated by a combination of resources which each have advantages and disadvantages. Food labels list the energy content of food in kilojoules (kJ). ***Keywords*** ➢ Power ➢ Energy resource ➢ Non-renewable ➢ Renewable ➢ Fossil fuels	We can describe how jobs get done using an energy model where energy is shifted from one store at the start to another at the end. When energy is shifted, the total is conserved, but some energy is dissipated, reducing the useful energy. ***Keywords*** ➢ Energy store ➢ Thermal ➢ Chemical ➢ Kinetic ➢ Gravitational potential ➢ Elastic ➢ Dissipated
They will understand *(key concepts)*					

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Investigate variables on the speed of a toy car rolling down a slope	**Explain the way in which an astronaut's weight varies on a journey to the moon**	**Compare the voltage drop across resistors connected in series in a circuit**	**Compare and explain current flow in different parts of a parallel circuit**	**Compare the running costs of fluorescent and filament light bulbs**	**Explain the energy shifts in a hand-crank torch**
➢ How to illustrate a journey with changing speed on a distance-time graph, and label changes in motion. ➢ How the speed of an object varies when measured by observers who are not moving, or moving relative to the object.	➢ How to explain unfamiliar observations where weight changes. ➢ How to compare your weight on Earth with your weight on different planets using an equation.	➢ How voltage can be measured in a simple circuit. ➢ How an analogy like water in pipes can be used to explain why part of a circuit has higher resistance.	➢ How current changes in series and parallel circuits when components are changed. ➢ How to turn circuit diagrams into real series and parallel circuits, and vice versa.	➢ How to compare the amounts of energy transferred by different foods and activities. ➢ How to compare the energy usage and cost of running different home devices. ➢ The advantages and disadvantages of different energy resources. ➢ Actions a government or communities could take in response to rising energy demand	➢ How the energy stores of an object depend on its speed, temperature, height or whether it is stretched or compressed. ➢ How to calculate the useful energy and the amount dissipated, given values of input and output energy. ➢ How energy is dissipated in a range of situations.
They will know how to *(key skills)*					
➢ Identify a dependent variable. ➢ Identify an independent variable. ➢ Write a question linking variables in the form 'How does... affect...?' ➢ Calculate a mean from a set of data. ➢ Time events using stop clocks and how to select the best apparatus for measuring distances.	➢ Identify a pattern in data from a results table or bar chart. ➢ Suggest a scientific reason for your findings. ➢ Use clear language and well-formed sentences. ➢ Read your text and rewrite anything that is not clear. ➢ Use scientific vocabulary accurately, showing that you know its meaning.	➢ Set up simple circuits and use a voltmeter correctly. ➢ Decide how to vary the independent variable between planned values. ➢ Design a table for the data being gathered. ➢ Comment on whether there is a real difference between data. ➢ Give evidence to back up everything you claim to be true. ➢ Use diagrams to help make meaning clear.	➢ Set up simple circuits and use an ammeter correctly. ➢ Suggest a scientific idea that might explain the observation. ➢ Describe the evidence for your idea. ➢ Explain why the evidence supports your idea.	➢ Identify patterns in data. ➢ Illustrate ideas with real-life examples. ➢ State your opinion with enough detail to be clear. ➢ List all the facts, scientific ideas, data, or conclusions that support your opinion. ➢ Identify the most important piece of evidence, as well as one or two supporting pieces of evidence. ➢ Acknowledge other options.	➢ Suggest a scientific idea that might explain the observation. ➢ Use clear language and well-formed sentences. ➢ Use link words to help the reader connect sentences and paragraphs.

	Dallam School Curriculum Overview	**Department: Physics** **Year Group: 8**

Autumn		Spring		Summer	
Sound (6 lessons)	**Light (5 lessons)**	**Contact forces (5 lessons)**	**Pressure (5 lessons)**	**Magnetism and electromagnetism (6 lessons)**	**Work, heating and cooling (7 lessons)**
Relate changes in the shape of an oscilloscope trace to changes in pitch and volume	**Use ray diagrams to model how light passes through lenses**	**Investigate factors that affect the size of frictional or drag forces**	**Investigate how pressure from your foot onto the ground varies with different footwear**	**Explore the magnetic field patterns and investigate ways of varying the strength of an electromagnet**	**Investigate how to reduce heat loss by conduction, convection and radiation**
By the end of this topic pupils will know *(key knowledge, including tier 3 vocabulary)*					
Energy is transferred by sound in the form of waves. Sounds can be represented by waveforms, showing wavelength, frequency and amplitude. Sound is transmitted, reflected or absorbed by different types of surface. ***Keywords*** ➢ Vibration ➢ Longitudinal wave ➢ Volume ➢ Pitch ➢ Amplitude ➢ Wavelength ➢ Frequency ➢ Vacuum ➢ Oscilloscope ➢ Absorption	Light travels as transverse waves that carry energy. White light can be split into a spectrum of colours. Light waves can travel through a vacuum and can be reflected, absorbed or refracted. ***Keywords*** ➢ Incident ray ➢ Reflected ray ➢ Normal line ➢ Angle of reflection ➢ Angle of incidence ➢ Refraction ➢ Absorption ➢ Scattering ➢ Transparent ➢ Translucent ➢ Opaque	When the resultant force on an object is zero, it is in equilibrium and does not move, or remains at constant speed in a straight line. One effect of a force is to change an object's form, causing it to be stretched or compressed. In some materials, the change is proportional to the force applied. ***Keywords*** ➢ Equilibrium ➢ Deformation ➢ Linear relationship ➢ Newton ➢ Resultant force ➢ Friction ➢ Tension ➢ Compression	Pressure acts in a fluid in all directions. It increases with depth due to the increased weight of fluid, and causes upthrust. Objects sink or float depending on whether the weight of the object is bigger or smaller than the upthrust. Different stresses on a solid object can be used to explain observations where objects scratch, sink into or break surfaces. ***Keywords*** ➢ Fluid ➢ Pressure ➢ Upthrust ➢ Atmospheric pressure	Magnetic materials, electromagnets and the Earth create magnetic fields. Fields can be modelled using field lines to show the strength and direction An electromagnet uses the principle that a current through a wire causes a magnetic field. Its strength depends on the current, the core and the number of coils in the solenoid. ***Keywords*** ➢ Magnetic force ➢ Permanent magnet ➢ Magnetic poles ➢ Electromagnet ➢ Solenoid ➢ Core	Work is done and energy shifted when a force moves an object. The thermal energy store of an object depends upon its mass, temperature and what it's made of. Energy is transferred through different pathways, by particles in conduction and convection, and by radiation. ***Keywords*** ➢ Lever ➢ Displacement ➢ Deformation ➢ Conductor (insulator) ➢ Temperature ➢ Thermal energy store ➢ Conduction ➢ Convection ➢ Radiation

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Relate changes in the shape of an oscilloscope trace to changes in pitch and volume	**Use ray diagrams to model how light passes through lenses**	**Investigate factors that affect the size of frictional or drag forces**	**Investigate how pressure from your foot onto the ground varies with different footwear**	**Explore the magnetic field patterns and investigate ways of varying the strength of an electromagnet**	**Investigate how to reduce heat loss by conduction, convection and radiation**
They will understand *(key concepts)*					
➢ That sound consists of vibrations which travel as a longitudinal wave through substances. The denser the medium, the faster sound travels. ➢ The greater the amplitude of the waveform, the louder the sound. The greater the frequency (and therefore the shorter the wavelength), the higher the pitch.	➢ When a light ray meets a different medium, some of it is absorbed and some reflected. ➢ For a mirror, the angle of incidence equals the angle of reflection. The ray model can describe the formation of an image in a mirror and how objects appear different colours.	➢ How different factors affect the size of frictional and drag forces. ➢ How materials behave as they are stretched or squashed. ➢ How the length of a spring when the force on it changes.	➢ Why objects either sink or float depending upon their weight and the upthrust acting on them. ➢ How to explain observations where the effects of forces are different because of differences in the area over which they apply. ➢ How to us a formula to calculate fluid pressure or stress on a surface in unfamiliar situations.	➢ How to use the idea of field lines to show how the direction or strength of the field around a magnet varies. ➢ Explain observations about navigation using Earth's magnetic field. ➢ How to build and changes the strength of electromagnets. ➢ How to explain the choice of electromagnets or permanent magnets for a device in terms of their properties.	➢ How to use diagrams to explain how a lever makes a job easier. ➢ How to compare the work needed to move objects different distances. ➢ How to explain observations about changing temperature in terms of energy shifts ➢ How an object's temperature changes over time when heated or cooled. ➢ How a method of thermal insulation works in terms of conduction, convection and radiation.
They will know how to *(key skills)*					
➢ Describe the amplitude and frequency of a wave from a diagram or oscilloscope picture. ➢ Use drawings of waves to describe how sound waves change with volume or pitch.	➢ Explain observations where coloured lights are mixed or objects are viewed in different lights. ➢ Use ray diagrams to describe how light passes through lenses and transparent materials. ➢ Describe how lenses may be used to correct vision.	➢ Identify variables that could not be controlled properly. ➢ Suggest reasons for differences in repeat readings. ➢ Justify whether anomalous results can be explained or ignored. ➢ Draw line graphs to display relationships.	➢ Prepare a table with space to record all measurements. ➢ Gather sufficient data for an investigation and repeat if appropriate. ➢ Record observations using scientific words. ➢ Communicate ideas, using evidence and reasoning.	➢ Use diagrams to help make a scientific explanation. ➢ Write a question linking variables in the form 'How does... affect...?' ➢ How to vary an independent variable between planned values. ➢ Select important control variables and identify how to control each one. ➢ Check you can detect differences in the dependent variable.	➢ Identify the variables from information about an investigation. ➢ Identify a pattern in data from a results table or bar chart. ➢ Compare result with others. ➢ Suggest better ways to control variables and improve methods. ➢ Suggest possible conclusions that could be drawn from data.

	Dallam School Curriculum Overview	**Department: Physics** **Year Group: 9**

Autumn		Spring	Summer
Energy concepts (4 lessons)	**Heating (13 lessons)**	**Electricity in circuits (12 lessons)**	**Mains electricity (8 lessons)**
Use a model to describe changes in energy stores in different systems	**Measure the specific heat capacity of different metals**	**Determine the current voltage characteristics of common circuit components**	**Examine the benefits and risks of using electricity in the home**
By the end of this topic pupils will know *(key knowledge, including tier 3 vocabulary)*			
The 9 energy stores. The 4 pathways by which energy is shifted between stores. The Principle of Conservation of Energy; that energy can be shifted usefully, stored or dissipated, but cannot be created or destroyed. ***Keywords*** ➢ elastic ➢ kinetic ➢ chemical ➢ thermal ➢ gravitational ➢ heating by particles ➢ heating by radiation ➢ mechanical work ➢ electrical work	Energy is shifted through solids by heating by particles. Trapped air is an effective insulator which reduces the rate of energy transfer by heating by particles. Heating is a process in which energy is shifted between stores; it can result in changes of state or changes of temperature, but not both at the same time. The equations used to quantify the amount of energy needed to change the temperature or state of a substance. ***Keywords*** ➢ conductor (insulator) ➢ melting (freezing) ➢ boiling (condensing) ➢ specific heat capacity ➢ thermal conductivity ➢ internal energy ➢ latent heat of vaporisation ➢ latent heat of fusion ➢ conduction ➢ convection	The names and symbols of common circuit components. Current is the rate of flow of electric charge. Ohms Law for fixed resistors. The component characteristics of resistors, filament lamps, diodes, thermistors, and light dependent resistors. Rules for combining cells and components in series. Rules for combining cells and components in parallel. ***Keywords*** ➢ current ➢ electron ➢ charge ➢ potential difference ➢ series / parallel ➢ ohmic ➢ diode ➢ thermistor	The UK mains uses alternating current at an average voltage of 230 V and frequency of 50 Hz. The basic structure of the National Grid system and the role of transformers in minimising energy losses. The wiring colour conventions used in UK mains plugs. Fuses are safety devices which protect devices from too much current flow. The earth wire is a safety device which protects users if loose wiring causes exposed metal surfaces to become live. Copper is used in electrical cables due to its flexibility and electrical conductivity. ***Keywords*** ➢ alternating ➢ live ➢ neutral fuse plug socket double insulated
They will understand *(key concepts)*			

Autumn		Spring	Summer
Energy concepts (4 lessons)	**Heating (13 lessons)**	**Electricity in circuits (12 lessons)**	**Mains electricity (8 lessons)**
Use a model to describe changes in energy stores in different systems	**Measure the specific heat capacity of different metals**	**Determine the current voltage characteristics of common circuit components**	**Examine the benefits and risks of using electricity in the home**
➢ How to describe a system as an object or group of objects. ➢ How to describe the changes in the way energy is stored when a system changes. ➢ How to apply the principle of conservation of energy including in systems where it appears that energy has been lost. ➢ How to distinguish between useful energy shifts and those that are less useful.	➢ How to evaluate the effectiveness of different methods of home insulation. ➢ How to explain changes of state in terms of energy being shifted to the potential energy stores of particles in a substance. ➢ How to explain temperature changes in terms of energy being shifted to the kinetic energy stores of particles in a substance.	➢ How to calculate the charge flow in an electric circuit. ➢ How to work out the resistance and potential difference in an electric circuit. ➢ How to use a model to explain electrical resistance. ➢ How combining resistors in series and parallel affects the overall circuit resistance.	➢ How mains electricity differs from electricity supplied from batteries or solar cells. ➢ How to calculate the power of an electrical appliance. ➢ How to calculate the efficiency of an electrical appliance. ➢ How to evaluate claims about the energy efficiency of electrical appliances in the home. ➢ How to determine a suitable fuse value to use in an electrical appliance.
They will know how to *(key skills)*			
➢ Identify the energy stores in familiar and unfamiliar systems. ➢ Use scientific vocabulary accurately when describing energy shifts.	➢ Investigate how the thickness or type of insulating material affects the rate of energy shift by conduction. ➢ Determine the specific heat capacity of a metal block using experimental methods. ➢ Use equations to make quantitative determinations of the energy required to change the temperature and state of substances. ➢ Use SI units and unit prefixes. ➢ Substitute numerical values into algebraic equations using appropriate units for physical quantities. ➢ Solve simple algebraic equations. ➢ Change the subject of an equation. ➢ Determine the slope of a linear graph.	➢ Investigate how the resistance of a wire depends on its length or cross-sectional area. ➢ Investigate the current-voltage characteristics of common circuit components. ➢ Make accurate and repeatable measurements of current and voltage. ➢ Find the arithmetic mean and range from a set of data. ➢ Plot two variables from experimental data. ➢ Identify and test whether two variables are directly proportional. ➢ Evaluate methods to determine whether or not they are valid.	➢ Select the most appropriate equation to use to solve a problem given initial conditions. ➢ Solve simple algebraic equations. ➢ Change the subject of an equation, including equations containing squared values.