



Dallam School

Curriculum Overview

Department: Physics
Year Group: 10

Autumn		Spring		Summer	
Energy resources and static electricity (10 lessons)	Forces in balance (14 lessons)	Density and pressure (9 lessons)	Radioactivity (14 lessons)	Motion (7 lessons)	Forces and acceleration (11 lessons)
Explore the use of energy resources and the effects of static electricity	Analyse forces that keep objects at rest or in equilibrium	Apply the concept of density to explain why objects float and sink	Explore how nuclear reactions release radiation and energy	Use motion graphs to represent and interpret the journeys of athletes in races	Investigate factors affecting the acceleration and deceleration of cars
By the end of this topic pupils will know (<i>key knowledge, including tier 3 vocabulary</i>)					
<ul style="list-style-type: none"> ➤ Different types energy resource including fossil fuels, wind, solar, geothermal, biomass, and nuclear. ➤ The reliability, environmental effects, pollution, and waste associated with the use of energy resources. ➤ The names of significant greenhouse gases and the effects of climate change. ➤ The properties of the electrostatic force. <p>Keywords</p> <ul style="list-style-type: none"> ➤ renewable ➤ non-renewable ➤ finite ➤ carbon neutral ➤ static ➤ point charge ➤ electric field 	<ul style="list-style-type: none"> ➤ Different types of force. ➤ Scalar quantities have magnitude only. ➤ Vector quantities have magnitude and direction. ➤ The principle of moments. ➤ Newton's third law. ➤ Key features of third law force pairs. <p>Keywords</p> <ul style="list-style-type: none"> ➤ vector / scalar ➤ magnitude ➤ load ➤ moment ➤ displacement ➤ resultant ➤ parallelogram ➤ free body ➤ centre of mass ➤ gear 	<ul style="list-style-type: none"> ➤ Density is the mass per unit volume. ➤ Pressure is the force acting per unit area. ➤ The pressure in a gas is caused by random impacts of gas molecules with a surface. ➤ Pressure in liquids increases with depth. ➤ The upthrust on an object in a fluid is an upward force on and object due to pressure of the fluid. <p>Keywords</p> <ul style="list-style-type: none"> ➤ pressure ➤ density ➤ upthrust ➤ altitude ➤ random 	<ul style="list-style-type: none"> ➤ Different models of the atom (Thompson model, Rutherford model, Bohr model). ➤ The properties of alpha, beta, and gamma radiation. ➤ Uses of nuclear radiation in medicine and industry. ➤ The processes of nuclear fission and nuclear fusion. <p>Keywords</p> <ul style="list-style-type: none"> ➤ random ➤ spontaneous ➤ nucleus ➤ alpha / beta / gamma ➤ contamination ➤ irradiation ➤ isotope ➤ ionisation ➤ fission / fusion 	<ul style="list-style-type: none"> ➤ Typical speeds of everyday objects. ➤ The gradient of a distance-time graph represents speed. ➤ The area under a speed-time graph represents distance travelled. ➤ Acceleration is a change of speed or direction. <p>Keywords</p> <ul style="list-style-type: none"> ➤ acceleration ➤ deceleration ➤ gradient ➤ area ➤ speed ➤ velocity ➤ tangent 	<ul style="list-style-type: none"> ➤ The resultant force acting on an object is directly proportional to its acceleration. ➤ The terminal velocity of an object is the velocity it eventually reaches whilst falling. ➤ Stopping distance of a vehicle depend on the braking and thinking distance. ➤ The total momentum of a closed system is always conserved. <p>Keywords</p> <ul style="list-style-type: none"> ➤ acceleration ➤ mass ➤ inertia ➤ stopping / braking / thinking distance

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They will understand (<i>key concepts</i>)					
<ul style="list-style-type: none"> ➤ Why the supply and demand for energy varies according to daily and seasonal patterns. ➤ Possible solutions to future energy demands. ➤ How objects gain a static charge through charging or induction. ➤ Why sparks happen. 	<ul style="list-style-type: none"> ➤ How to identify third law force pairs in real world examples. ➤ How to calculate the moment of a force about a point. ➤ How levers act as force multipliers. ➤ Why cars and bikes use high and low gears. 	<ul style="list-style-type: none"> ➤ How Brownian motion is evidence of the random motion of particles in a gas. ➤ How to use kinetic theory to explain the relationship between gas temperature, pressure and volume. ➤ Why the pressure varies along a column of liquid or gas. 	<ul style="list-style-type: none"> ➤ How to represent alpha and beta emission using nuclear decay equations. ➤ The evidence which led to changes in the models used to represent the atom. ➤ How the properties of different types of ionising radiation explain their uses in medicine and industry. 	<ul style="list-style-type: none"> ➤ The difference between speed and velocity. ➤ How to represent the motion of objects using distance- and speed-time graphs. ➤ How to interpret speed-time and distance-time graphs. ➤ The difference between acceleration and deceleration. 	<ul style="list-style-type: none"> ➤ How to use free body force diagrams to explain the speed-time graph of a skydiver. ➤ How speed and other factors affect thinking distance and braking distance. ➤ How safety features reduce impact forces by decreasing the rate of change of momentum.
They will know how to (<i>key skills</i>)					
<ul style="list-style-type: none"> ➤ Interpret different sources of data to evaluate the advantages and disadvantages of using different energy resources. ➤ Consider the effects of climate change. ➤ Use the concept of a force field to explain the non-contact force between charged objects. 	<ul style="list-style-type: none"> ➤ Draw free body force diagram. ➤ Use scale drawings to find the resultant of two forces. ➤ Use scale drawings to resolve forces into components. ➤ Determine the centre of mass of an object. ➤ Solve balance beam problems. 	<ul style="list-style-type: none"> ➤ Measure the density of regular and irregular objects. ➤ Change the subject of an equation to calculate the density, mass, or volume of an object. ➤ Verify inverse proportion between two variables. 	<ul style="list-style-type: none"> ➤ Interpret experimental data to determine the types of radiation being emitted by a sample. ➤ Use an activity-time graph to determine the half-life of a radioactive substance. ➤ Evaluate the risks and benefits of using nuclear power as an energy resource. 	<ul style="list-style-type: none"> ➤ Calculate the speed from a distance-time graph. ➤ Calculate the distance travelled and acceleration from a speed-time graph. ➤ Calculate the area of rectangles, triangles, and trapeziums. ➤ Solve 1-dimension motion problems using SUVAT equations. ➤ Make unit conversions for distance and time units. 	<ul style="list-style-type: none"> ➤ Investigate the relationship between force and acceleration. ➤ Use the principle of conservation of momentum to predict the motion of objects after a collision or explosion.



Dallam School

Curriculum Overview

Department: Physics
Year Group: 11

Autumn		Spring			Summer	
Mechanical energy (7 lessons)	Electromagnetic fields (6 lessons)	Magnetic effects (9 lessons)	Mechanical waves (10 lessons)	The electromagnetic spectrum (9 lessons)	Properties of light (7 lessons)	Space (7 lessons)
Make predictions about a system using a mathematical model for energy stores	Explore how electromagnets constructed and used	Explain how motors, generators, and transformers work	Investigate how mechanical waves behave as they travel through media	Discover how the components of the EM spectrum are used in everyday life	Construct ray diagrams to explain the behaviour of light as it passes a lens	Examine the scientific theories about the past and future evolution the universe
By the end of this topic pupils will know (<i>key knowledge, including tier 3 vocabulary</i>)						
<ul style="list-style-type: none"> ➤ The gravitational potential energy store is determined an object's mass and position in a gravitational field. ➤ The kinetic energy store depends on the mass and speed of an object. ➤ Hooke's law for springs. <p>Keywords</p> <ul style="list-style-type: none"> ➤ elastic ➤ kinetic ➤ gravitational ➤ energy store ➤ energy shift ➤ mechanical work ➤ dissipate ➤ conservation of energy ➤ limit of proportionality 	<ul style="list-style-type: none"> ➤ Induced magnetism occurs when an unmagnetised magnetic material is placed in a magnetic field. ➤ A circular magnetic field is produced around a current carrying conductor. ➤ A range of different uses of electromagnets. <p>Keywords</p> <ul style="list-style-type: none"> ➤ induced ➤ magnetic field ➤ attract / repel ➤ pole ➤ solenoid ➤ uniform ➤ parallel 	<ul style="list-style-type: none"> ➤ The magnetic flux density of a magnetic field is the measure of its strength. ➤ When a conductor crosses through the lines of a magnetic field, a p.d. is induced. ➤ The direction of an induced current always opposes the change that caused it. ➤ Transformers can be used to step-up or step-down an alternating p.d. <p>Keywords</p> <ul style="list-style-type: none"> ➤ commutator ➤ alternator ➤ dynamo ➤ induction ➤ motor effect 	<ul style="list-style-type: none"> ➤ The difference between and examples of transverse and longitudinal waves. ➤ The speed of a wave is a property of the media in which the wave is travelling. ➤ Refraction occurs at the boundary between media when the speed and wavelength of a wave changes. <p>Keywords</p> <ul style="list-style-type: none"> ➤ oscillation ➤ parallel / perpendicular ➤ boundary ➤ refraction ➤ seismic ➤ amplitude ➤ wavelength ➤ frequency 	<ul style="list-style-type: none"> ➤ The 7 components of the EM spectrum in order of frequency. ➤ X-rays and gamma rays are used in medical diagnosis and treatment. ➤ Radio waves and microwaves are used in communication. ➤ The dangers posed by ultraviolet light. ➤ Black bodies are theoretical objects which are both perfect emitters and absorbers of light; the wavelength of peak emission is inversely proportional to its temperature. <p>Keywords</p> <ul style="list-style-type: none"> ➤ spectrum 	<ul style="list-style-type: none"> ➤ The difference between real and virtual images formed by a mirror. ➤ The primary and secondary colours of light. ➤ The rules governing the refraction of light at the boundary between media. ➤ The three principal rays which can be used to predict formation of images by a lens. <p>Keywords</p> <ul style="list-style-type: none"> ➤ reflection ➤ real / virtual / inverted ➤ refraction ➤ lens ➤ convex / concave 	<ul style="list-style-type: none"> ➤ The conditions needed for stable orbit. ➤ Energy is released in stars because of hydrogen nuclei fusing to form helium nuclei. ➤ The life cycle of stars. ➤ Light emitted from moving objects undergoes a wavelength shift. ➤ The expansion of the universe began at the Big Bang and continues at an accelerating rate. <p>Keywords</p> <ul style="list-style-type: none"> ➤ protostar ➤ red-shift ➤ black hole ➤ cosmology

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They will understand (<i>key concepts</i>)						
<ul style="list-style-type: none"> ➤ How to calculate changes in the gravitational, kinetic, and, elastic energy stores of a system. ➤ How to apply the principle of conservation of energy to predict the behaviour of a system. ➤ How to describe the behaviour of elastic objects. 	<ul style="list-style-type: none"> ➤ How to use domain theory to explain permanent and induced magnetism. ➤ How to use the 'right-hand grip rule' to determine the direction of the magnetic field around a current carrying conductor. ➤ How the Earth's magnetic field can be modelled. 	<ul style="list-style-type: none"> ➤ How to use Fleming's left-hand rule to predict the direction of force on a current carrying conductor in a magnetic field. ➤ How electric motors and generators work. ➤ How transformers work and their role in increasing the efficiency of grid systems. 	<ul style="list-style-type: none"> ➤ How to use the wave equation. ➤ How models can be used to demonstrate wave behaviour. ➤ How ultrasound is used in medical imaging and industry. ➤ How an analysis of seismic waves produced by earthquakes can be used to infer the structure of the Earth. 	<ul style="list-style-type: none"> ➤ How the properties of different parts of the EM spectrum relate to their every day uses in communication and medicine. ➤ Advantages of using optical fibres for data transfer. 	<ul style="list-style-type: none"> ➤ How the perceived colour of an object can change under different lighting conditions. ➤ Why some objects appear transparent or translucent. ➤ Why light changes wavelength and speed in materials of different optical densities. ➤ How convex lenses are used in magnifying glasses, cameras, and vision correction. 	<ul style="list-style-type: none"> ➤ A theory for the formation of the solar system. ➤ How the cosmic microwave background radiation and red-shift provides evidence of the Big Bang. ➤ That scientists do not (yet) understand why the universe is expanding in the way observed.
They will know how to (<i>key skills</i>)						
<ul style="list-style-type: none"> ➤ Solve quantitative problems involving energy conservation. ➤ Use experimental means to test the validity of Hooke's law for a spring and other elastic objects. 	<ul style="list-style-type: none"> ➤ Describe and carry out a method of plotting the shape of a magnetic field. ➤ Interpret diagrams of simple electromagnetic devices to explain how they work. 	<ul style="list-style-type: none"> ➤ Calculate the force on a current carrying conductor at right angles to the lines of a magnetic field. ➤ Determine the direction of induced current when a magnet is moved in / out of a solenoid. ➤ Solve problems using the transformer equation. 	<ul style="list-style-type: none"> ➤ Investigate the relationship between frequency and wavelength of waves on a string. ➤ Interpret data on the timings of reflected waves to calculate distances. 	<ul style="list-style-type: none"> ➤ Investigate the absorption and emission of infrared radiation by different materials and surfaces. ➤ Interpret intensity-wavelength graphs for a black body. 	<ul style="list-style-type: none"> ➤ Investigate the relationship between the angle of incidence and angle of refraction. ➤ Use ray diagrams and principal rays to demonstrate image formation in convex and concave lenses. ➤ Calculate the magnification produced by a lens. 	<ul style="list-style-type: none"> ➤ Interpret graphs on recessional velocities of galaxies against distance and use this to make an estimate for the age of the universe.