

PHYSICS 'HEAD' - THE KNOWLEDGE YOU WILL COVER FROM YEAR 7-11



1	Physics	<p>Forces</p> <p>Forces: Speed to define speed, and measure it using the equation $speed = distance \div time$ to draw, and analyse distance time graphs to describe a journey to start defining scientific questions in a practical situation to describe the concept of relative motion to represent forces using arrows</p>	<p>Forces: Gravity; to describe contact and non contact forces including gravity to explain the difference between mass and weight to work out values of weight and gravity on other planets</p>	<p>Forces; - Analyse situations to identify the various forces that are acting, including equilibrium, friction and drag. - Investigate forces involved in compressing and stretching materials, and springs.</p>	<p>Forces/pressure; Explain how pressure can be applied on a solid surface, and be able to calculate it. - Describe how pressure acts in a liquid, and gases. - Explain pressure changes in relation to particles and gravity. - Explain why some objects float and others sink. - Relate floating and sinking to density, displacement and upthrust. - Explain the implications of these ideas.</p>	<p>Particle model and pressure Describe the motion of particles in a gas. Describe what gas pressure is and how volume, and temperature effect it. Describe how pressure, volume and temperature are linked.</p>	<p>Pressure differences in fluids Describe the pressure equation. Describe pressure in a column of liquid. Describe forces acting on a floating object/ Describe air pressure in the atmosphere.</p>	<p>Hazards and uses of Radiation Describe safety with radioactive material, in terms of Ionisation. Describe how properties of radioactive substances make them useful.</p>	<p>Nuclear fission and fusion Describe how Nuclear fission is the splitting of a large and unstable nucleus (eg uranium or plutonium). Describe its use in power stations. Describe the process of Nuclear Fusion</p>	<p>Forces and their interactions Describe scalars and vectors Describe weight as a force Describe vector and free body diagrams. Describe resolution of vector components.</p>	<p>Forces and elasticity Describe how objects such as springs are extended/ Hooke's law, and use the equations, to show extension of springs. Describe how objects such as springs are extended/ Hooke's law, and use the equations, to show extension of springs.</p>	<p>Forces and motion Describe distance and displacement, speed and velocity. Describe and use distance time graphs, including how to calculate speed. Calculate acceleration of objects, including SUVAT. Describe what happens when objects fall, including terminal velocity. Describe Newton's laws. Describe factors involved in stopping a car.</p>	<p>Momentum (HT only) Describe momentum and how to calculate it. Describe conservation of momentum. Describe equations to calculate force and momentum. Describe how cars are designed for safety.</p>	<p>Moments, Levers and gears (Physics only) Describe turning effects or moments, and calculate examples. Describe how levers are used/ Describe simple gear systems.</p>
		<p>Electromagnets</p> <p>Electromagnets: - Describe and draw circuit diagrams. - Describe what the terms mean, and how the current flows in different circuits. - Recognise the generation, and effects of static charge. - Explain how static charge can be generated.</p>	<p>voltage/resistance; Describe what the terms mean, and how the voltage, current and resistance are related in different circuits. - Understand the differences between a series and a parallel circuit, including how they work in homes</p>	<p>Magnetism; - Know the laws of magnetic attraction. - Explain how a magnetic field can be represented by field lines, and the shape of fields around combinations of magnets. - Describe key features of the Earth's magnetic field.</p>	<p>Electromagnets; - Describe what an electromagnet is. - Investigate the factors affecting the strength of electromagnets. - Describe different applications of electromagnets.</p>	<p>Current, potential difference and resistance Describe and use the equations for charge. use equation $V= I \times R$ to calculate each factor. how to investigate ohmic conductors Investigate and draw VI graphs for various components in circuits</p>	<p>Series and parallel circuits; Describe what happens to current and voltage in series and parallel circuits. Describe what happens to resistance in series and parallel circuits.</p>	<p>Domestic uses and safety Describe DC and AC systems Describe the wiring in appliances, and plugs. Describe the safety aspects of fuses, plugs and earth wires</p>	<p>Static electricity (Physics only) Describe how objects become charged by friction, due to the movement of electrons. Describe how repulsion and attraction is a non contact force. Describe the concepts of electric fields.</p>	<p>Permanent and induced magnetism forces and fields Describe the properties of magnets and magnetic fields. Describe the motor effect, and Fleming's left hand rule. Describe the size of force on a conductor Describe how motors work, and are used in applications.</p>	<p>Induced potential, transformers and the national grid (Physics only) Describe the national grid, including transformers, and efficiency. Use the transformer equations</p>			
		<p>Energy</p> <p>Energy: Costs - Explain that fuels are energy stores and that the amount stored can be measured. - Explain that energy can be neither created nor destroyed. - Describe the information a typical fuel bill provides, including units. - Describe ways of generating electricity, including advantages and disadvantages. - Critique claims made for the running costs of fluorescent light bulbs. - Evaluate actions that could be taken in response to rising energy demand.</p>	<p>Energy: transfers Describe energy stores and transfers - Recognise what energy is and its unit. - Describe a range of energy transfers using simple diagrams, including falling objects. - Use a Sankey diagram as a model to represent simple energy changes. - Describe different situations that use the energy stored in compressing and stretching elastic materials, and how it is transferred.</p>	<p>Energy: Work done - Recognise situations where work is done. Be able to calculate work done in everyday situations. - Describe the relationship $work\ done = force \times distance$ - Apply the equation for work done to different situations. - Understand what simple machines are, and why they are useful. - Compare and contrast different machines</p>	<p>Energy: heating and cooling; - Describe how temperature differences lead to energy transfer. - Explain how heat can travel by conduction, convection and radiation, and give examples - Explain the difference between conductors and insulators. - Explain how insulation works and applications. - Describe the warming and cooling of objects.</p>	<p>Energy stores and systems; Describe, for common situations, the changes involved in the way energy is stored when a system changes. Calculate how energy is redistributed in a system when it changes. gravitational energy, kinetic energy, gravitational effects Describe how Work is done when charge flows in a circuit. power specific heat capacity</p>	<p>Conservation and dissipation of energy; Describe how Energy can be transferred usefully, stored or dissipated, but cannot be created or destroyed. Total energy is conserved Describe how only part of the energy is usefully transferred. The rest of the energy is dissipated Describe thermal conductivity in the home. Describe and calculate efficiency.</p>	<p>National and global energy; Describe the main energy resources available for use on Earth. Distinguish between energy resources that are renewable and those that are non-renewable. Compare the ways that different energy resources are used, including transport, electricity generation and heating. Describe reliability of resources</p>	<p>Changes of state and the particle model Describe and calculate density. Describe the particle model in states of matter, and changes of state. Describe internal energy Describe and calculate specific heat capacity and latent heat.</p>	<p>Atoms and Isotopes Describe the structure of atoms in terms of size, sub atomic particles. Describe how isotopes are different. Describe mass number and atomic number. Describe ions. Describe how scientific investigation has led to our understanding of atomic structure.</p>	<p>Atoms and Nuclear Radiation Describe Some atoms, nuclei are unstable. The nucleus gives out ionising radiation Describe properties, nuclear equations and uses of Alpha, Beta and Gamma radiation. Describe and calculate half life</p>			
		<p>Waves</p> <p>Waves: - Identify how sounds are made, and that they transfer energy. - Understand frequency, wavelength and amplitude, and see them on an oscilloscope. - Explain what is meant by audible range. - Understand how the ear detects sounds, and ear defects. - Recognise how the speed of sound changes in different substances. - Analyse the effect of different materials on sound waves. - Use ideas about energy transfer to explain how soundproofing works.</p>	<p>Waves: Light - Describe how light passes through different materials. - Explain how shadows are formed in eclipses. - Describe how a mirror reflects light, and the difference between specular and diffuse reflection. - Apply the law of reflection. - Describe how light is refracted when it enters a different medium, and that it changes direction, and how this is used in lenses. - Describe how the human eye works. - Describe how a spectrum can be produced from white light. - Compare the properties of light at different frequencies.</p>	<p>Wave effects: - Understand how sound waves vary in frequency. - Apply ideas about frequency to understand ultrasound. - Understand practical applications of ultrasound. - Understand the function of microphones and loudspeakers. - Understand how audio equipment responds to different frequencies.</p>	<p>Wave Properties; - Understanding light can vary in frequency. - Describe UV light and its risks. - Explain the uses of UV light. - Use water waves to model wave behaviour. - Understand and apply the processes of reflection and absorption. - Understanding longitudinal waves. - Understanding transverse waves. - Comparing types of wave</p>	<p>Waves in air fluids and solids; Describe the types of waves. Describe properties and uses of waves and how to calculate periods, speed, wavelength and frequency. Describe how waves can be reflected and refracted. Describe sound waves and their uses. Describe seismic waves and what they tell us.</p>	<p>Electromagnetic waves; Describe electromagnetic waves, including properties, use including communication, and dangers. Describe reflection and refraction and draw ray diagrams. Describe how fibre optics work. Describe types of lenses, and draw ray diagrams for each.</p>	<p>Space Physics (Physics only) Describe the solar system and objects in it. Describe processes in the sun. Describe the life cycle of stars. Describe the orbits of planets due to gravity.</p>	<p>Black Body Radiation (Physics only) Describe how all objects emit and absorb infra red. Describe what perfect black bodies are. Describe thermal equilibrium.</p>	<p>Red shift (ysics only) Describe red shift to show the movement of stars. Describe the how red shift is evidence of the big bang theory. Describe the big bang theory.</p>				