

Physics at King's Academy Ringmer

End point	Knowledge acquired	Skills acquired
YEAR 7		
1 - Forces 1.1 - speed 1.2 - gravity	<ul style="list-style-type: none"> - Interaction pairs - Resultant forces - Balanced forces - The effects on motion of balanced and unbalanced forces - Relative motion - Interpretation of motion graphs (distance and velocity-time) - The difference between mass and weight <p style="text-align: center;">Top 5 Keywords speed, weight, mass, force, resultant force</p>	<ul style="list-style-type: none"> - Measuring forces - Calculating speed - Plotting distance-time and velocity-time graphs - Calculating speed, distance and acceleration from motion graphs - Calculating weight
2 - Energy 2.1 Energy costs 2.2 Energy transfers	<ul style="list-style-type: none"> - Unit of energy - Energy in food/energy of different activities - Renewable and non-renewable energy resources - Power - Energy stores and the conservation of energy - Dissipation <p style="text-align: center;">Top 5 Keywords energy, renewable, non-renewable, dissipation, power</p>	<ul style="list-style-type: none"> - Calculations involving energy (power, cost, efficiency) - Comparing energy resources
3 Electromagnets 3.1 potential difference and resistance 3.2 current	<ul style="list-style-type: none"> - What current is and what an ammeter is used for - What potential difference is and what a voltmeter is used for - What resistance is and how to calculate it - Series and parallel circuits (the difference between series and parallel circuits) - Attraction and repulsion of charges - The formation of charges - Electric field, lightning, electric shocks <p style="text-align: center;">Top 5 Keywords potential difference, current, resistance, charge, field</p>	<ul style="list-style-type: none"> - Calculating resistance, current and voltage (VIR) - Setting up a circuit (series and parallel) - Drawing a simple circuit diagram

<p>4 Waves 4.1 sound 4.2 light</p>	<ul style="list-style-type: none"> - What a vibration is - Vibrations, and sound waves travelling through solids, liquids, gases and a vacuum - The speed of sound - Parts of a wave - Longitudinal waves - Pitch and loudness of a sound - What frequency is and its unit - Parts of the ear and functions (effect of loud sounds) - Measuring loudness (Decibels) - Reflection, absorption, transmission of light - Transparent, translucent and opaque objects - Solar and lunar eclipses - Refraction, lenses - Parts of the eye - How we see images - Correcting short and long sightedness - Colour and the link to frequency - How we see objects of different colours - Filtering colours <p style="text-align: center;">Top 5 Keywords wave, frequency, reflection, absorption, transmission</p>	<ul style="list-style-type: none"> - Calculations involving the speed of sound - Analysing an oscilloscope trace for loudness and pitch
YEAR 8		
<p>1a Forces - Contact forces</p>	<ul style="list-style-type: none"> - Friction - Drag - Resultant forces in terms of motion - Hooke's law - Moments <p style="text-align: center;">Top 5 Keywords drag, equilibrium, Hooke's Law, moment, centre of gravity</p>	<ul style="list-style-type: none"> - Sketching the forces on an object - Graph the relationship between force and extension - Calculate the moment of a force
<p>1b Forces - Pressure</p>	<ul style="list-style-type: none"> - Pressure in gases (fluid pressure, atmospheric pressure) - Pressure in liquids (depth, floating and sinking) - Stress on solids <p style="text-align: center;">Top 5 Keywords pressure, upthrust, fluid, incompressible, atmospheric pressure</p>	<ul style="list-style-type: none"> Calculate fluid pressure Calculate pressure in liquids in a range of situations Calculating stress
<p>2 Electromagnets 2.3- Magnetism</p>	<ul style="list-style-type: none"> - Magnetic fields (incl. The Earths) - Magnetic field around a wire 	<ul style="list-style-type: none"> - Plotting a magnetic field with iron filings and a plotting compass

<p>2.4 electromagnets</p>	<ul style="list-style-type: none"> - Solenoids and electromagnets - Making an electromagnet stronger - How electromagnets are used in devices <p style="text-align: center;">Top 5 Keywords</p> <p style="text-align: center;">magnetic poles, solenoid, electromagnet, magnetic field lines, permanent magnet</p>	<ul style="list-style-type: none"> - Plotting the magnetic field around a current carrying wire - Making a solenoid and an electromagnet
<p>3 Energy 3.3 Work 3.4 heating and cooling</p>	<ul style="list-style-type: none"> - The meaning of the word 'work' in physics - Simple machines (levers/pulleys) - The difference between heat and temperature - The effect of heating on particles - Conduction and convection - Radiation - Insulation <p style="text-align: center;">Top 5 Keywords</p> <p style="text-align: center;">work, temperature, thermal conductor, radiation, insulation</p>	<ul style="list-style-type: none"> - Calculating work done - Comparing insulators
<p>4 Waves 4.3 - Wave effects 4.4 wave properties</p>	<ul style="list-style-type: none"> - Sound waves (how they are produced, longitudinal waves) - Ultrasound (what it is and used for) - The EM spectrum (parts, uses, dangers) - Transverse and longitudinal waves - Properties of waves <p style="text-align: center;">Top 5 Keywords</p> <p style="text-align: center;">Electromagnetic spectrum, transverse, longitudinal, wavelength, amplitude</p>	
<p>YEAR 9</p>		
<p>3,1.1 forces and motion</p>	<ul style="list-style-type: none"> ● Use Newton's Third Law to explain how forces arise, and change motion. ● Describe the link between forces and fields, and then do calculations. ● Make estimates about everyday speed, and use a distance- time graph to calculate speed. ● Explain equilibrium and circular motion in terms of forces. Describe what is meant by a resultant force. ● Describe what is meant by a vector and a scalar. ● Calculate resultant forces. ● calculate acceleration and describe motion using a speed-time graph. <p style="text-align: center;">Top Keywords</p>	<ul style="list-style-type: none"> ● Compare systematic and random errors. ● calculations about speed and resultant forces and acceleration. ● Draw and interpret graphs.

	Interaction, magnitude, upthrust, gravitational, proportional, systematic, accelerating, equilibrium, velocity, centripetal force, displacement	
3,1.2 Energy	<ul style="list-style-type: none"> Analyse situations in terms of energy stores. Analyse situations in terms of energy transfers. Explain different rates of thermal energy transfer and how to investigate them. Describe electricity generation. Describe the effect of using electrical devices on energy resources. Use energy conservation and dissipation in energy analyses Describe methods to reduce dissipation. Analyse situations and do calculations involving work and power. Describe what is meant by 'efficient' and calculate 'efficiency'. Describe what elastic energy depends on. Calculate elastic energy using an equation or a graph. <p style="text-align: center;">Top Keywords gravitational potential energy, conductivity, infrared radiation, resource, dissipation, insulation, efficiency, proportionality</p>	<ul style="list-style-type: none"> Know how ideas about energy have changed over time. Plan and investigate thermal energy transfers. Interpret and evaluate results. calculate a range of energy calculations. Plan and carry out an investigation. Draw appropriate graphs and interpret data.
3,3.1 waves, sound and light.	<ul style="list-style-type: none"> Compare properties of waves, including those of seismic waves. Describe how waves are used to investigate structures that cannot be observed. Use ray diagrams to explain illusions caused by reflection and refraction. Use reflection and refraction to explain how telescopes and curved mirrors work. Describe how ideas about light have changed. Explain the link between the colours of the spectrum, primary colours and secondary colours. Name the waves of the electromagnetic spectrum Describe how and why some of them are dangerous. Describe some uses of the waves of the electromagnetic spectrum, and reasons for those uses. <p style="text-align: center;">Top Keywords</p>	<ul style="list-style-type: none"> Describe how ideas in science develop over time. Relate scientific investigation to practical work carried out in lessons. Make observations from practical work. Interpret data and evaluate methods. Make links between properties of

	<p>Transverse, wavelength, amplitude, longitudinal, seismic, frequency, seismometers, seismograph, magnified, refracting telescope, reflecting, concave, convex, spectrum, electromagnetic, ionisation, mutation.</p>	
<p>YEAR 10 (GCSE course)</p>		
<p>1 - Conservation and dissipation of energy</p>	<ul style="list-style-type: none"> - Energy stores - Energy transfers - Conservation of energy - Work in physics - GPE - Kinetic energy - Elastic potential energy - Energy dissipation - Energy efficiency - Power <p style="text-align: center;">Top 5 Keywords</p> <p>Energy conservation, work, dissipation, efficiency, power</p>	<ul style="list-style-type: none"> - Calculating the following things: - Work done - GPE - Kinetic energy - Elastic potential energy - Efficiency - Power
<p>2 - Energy transfer by heating</p>	<ul style="list-style-type: none"> - Conduction, thermal conductivity and insulation - Infrared radiation (surface temperature, absorption, emission and the Earth's temperature) (TS only) - Specific heat capacity <p style="text-align: center;">Top 5 Keywords</p> <p>Thermal conductivity, insulation, specific heat capacity</p>	<ul style="list-style-type: none"> - Calculating specific heat capacity
<p>3 - Energy resources</p>	<p>How our energy demands are met Renewable and non-renewable energy resources - pros and cons and how they are used to generate electricity The ways that different resources affect the environment</p> <p style="text-align: center;">Top 5 Keywords</p> <p>Renewable, non-renewable, carbon-neutral, carbon dioxide, national grid</p>	<p>Comparing different energy resources (including using data to draw conclusions)</p>
<p>4 - Electric circuits</p>	<p>Atomic structure, charging by friction, electrostatic force (TS only) Circuit symbols Electric current Potential difference Resistance</p>	<p>Calculating electric current (and charge) $Q=It$ Drawing circuit diagrams Calculating potential difference ($V = E/Q$) Drawing and analysing current-potential difference graphs for different components Calculating resistance ($V=IR$)</p>

	<p>Current-potential difference graphs, including Ohm's law Series and parallel circuits</p> <p style="text-align: center;">Top 5 Keywords</p> <p>Current, potential difference, resistance, charge, Ohm's law,</p>	
5 - Electricity in the home	<p>Alternating current vs. direct current Plugs, cables, sockets, mains circuit Short circuits Electrical power ($P = Et$, $P = IV$, $P = I^2R$) Fuses</p> <p style="text-align: center;">Top 5 Keywords</p> <p>Alternating current, direct current, oscilloscope, earth wire, 3-pin plug</p>	<p>Analysing an oscilloscope trace Calculating electrical power ($P = Et$) Calculating charge ($Q = It$)</p>
6 - Molecules and matter	<p>Density Particle model of matter Key differences in the three states of matter Changes of state Conservation of mass The kinetic theory of matter Latent heat (fusion and vaporisation) Internal energy Brownian motion Gas pressure and the link with temperature Boyle's law (TS only)</p> <p style="text-align: center;">Top 5 Keywords</p> <p>Density, internal energy, latent heat of fusion, latent heat of vaporisation, pressure</p>	<p>Calculating density (m/V) Determining the density of regular and irregular shaped objects Drawing particle diagrams Drawing and analysing heating and cooling curves Calculating latent heat ($E = mL$) Determining the latent heat of fusion and the latent heat of vaporisation</p>
7 - Radioactivity	<p>The discovery of the nucleus (developments from the plum pudding model) and developing into Bohr's model The alpha particle scattering experiment Atomic number, mass number and isotopes Alpha, beta and gamma (what they are and properties) Contamination and irradiation Uses of radiation (general and (in medicine - TS only) Half life Nuclear fission and fusion (TS only) The dangers of nuclear radiation (TS only)</p> <p style="text-align: center;">Top 5 Keywords</p>	<p>Completing nuclear equations Plotting and analysing half life graphs</p>

	Isotopes, contamination, irradiation, nuclear fission, nuclear fusion	
YEAR 11 (GCSE course)		
1 - Forces in balance	<ul style="list-style-type: none"> - Scalars and vectors - Newton's laws of motion (1 and 3) - Moments (TS only) - Levers and gears (force multipliers) (TS only) - Centre of mass - The parallelogram of forces (HT only) - Resolving forces into parallel and perpendicular components (HT only) <p style="text-align: center;">Top 5 Keywords Scalar, vector, moment, centre of mass, magnitude</p>	<ul style="list-style-type: none"> Drawing scale diagrams Calculating moments ($M = Fd$) (TS only) Applying the principle of moments to calculations (TS only) Finding the centre of mass of an irregular shaped object Drawing the parallelogram of forces (HT only) Drawing force diagrams to resolve a force into parallel and perpendicular components (HT only)
2 - Motion	<p style="text-align: center;">Top 5 Keywords Velocity, acceleration, deceleration, gradient, displacement</p>	<ul style="list-style-type: none"> Drawing distance-time graphs Using a distance-time graph to calculate speed Use speed = distance/time - Drawing velocity-time graphs - Using a velocity-time graph to calculate acceleration - Use acceleration = change in speed/time - Using a velocity-time graph to determine distance (HT only) - Using a distance-time graph to determine the speed for an object either accelerating or decelerating (tangent)
3 - Force and motion	<ul style="list-style-type: none"> Newton's 2nd law of motion ($F=ma$) Inertia (HT only) The difference between mass and weight Terminal velocity Stopping distances Momentum (conservation of). (HT only) - Collisions and explosions (TS/HT only) - Impact forces and links to safety devices (TS/HT only) - Elasticity, Hooke's law, limit of proportionality <p style="text-align: center;">Top 5 Keywords Terminal velocity, momentum, elasticity, Hooke's law, stopping distance</p>	<ul style="list-style-type: none"> Use $F=ma$ Calculating weight (mg) Using v/t graphs to determine terminal velocity Calculating deceleration from $v^2-u^2/2s$ Calculating momentum (mv) (HT only) - Calculations involving collisions and explosions (TS/HT only) - Plotting and analysing force-extension graphs - Using $F=ke$
4- Force and pressure (TS only)	<ul style="list-style-type: none"> Pressure on surfaces Pressure in a liquid (HT only) Atmospheric pressure and altitude 	<ul style="list-style-type: none"> Using F/A Using $p = h \times \rho \times g$ (HT only) Analysing a graph of atmospheric pressure against altitude

	<p>Upthrust and flotation (HT only)</p> <p>Top 5 Keywords atmospheric pressure, upthrust, pascal, altitude, displace</p>	
5 - Wave properties	<p>Different types of wave (mechanical/EM, longitudinal, transverse) and their properties Reflection and refraction of waves in a ripple tank (HT only) Sound waves How you hear sounds (TS/HT only) The uses of ultrasound (TS/HT only) Seismic waves (TS/HT only)</p> <p>Top 5 Keywords Compression, rarefaction, mechanical waves, longitudinal waves, transverse waves</p>	<p>Calculating frequency and time period of a wave ($f=1/T$) Using the wave speed equation ($v=f\lambda$) Calculating the distance sound waves travel from an echo ($d = (s \times t) / 2$) Measuring the speed of waves in a ripple tank</p>
6 - Electromagnetic waves	<p>The parts of the EM spectrum and their uses Radio communications Signals and carrier waves (HT only) The use of X rays in medicine</p> <p>Top 5 Keywords Electromagnetic spectrum, wave speed, white light, ionisation, radiation dose</p>	<p>Calculating wavelength, frequency or speed of an EM wave ($v=f\lambda$) Investigating the absorption and emission of IR radiation</p>
7 - Light (TS only)	<p>Reflection of light (the law of reflection, forming images on plane mirrors, real and virtual images and specular and diffuse reflection) Refraction of light Colour Transparent, translucent and opaque Convex and concave lenses</p> <p>Top 5 Keywords Real image, virtual image, convex lens, concave lens, normal</p>	<p>Using a ray box to demonstrate reflection and refraction Testing different surfaces with light from a raybox (reflective, rough/smooth, different colours) Draw lens diagrams for concave and convex lenses (forming real and virtual images) Calculate magnification produced by a lens (image height/object height)</p>
8 - Electromagnetism	<p>Magnets, magnetic fields, induced magnetism Magnetic fields around current-carrying wires Solenoids and electromagnets Electromagnets in devices (TS only) The motor effect (Fleming's left hand rule) (HT only)</p>	<p>Demonstrate how bar magnets can attract and repel each other Plot magnetic fields Demonstrate that there is a magnetic field around a current-carrying wire</p>

	<p>Magnetic flux density (HT only) How an electric motor works (HT only) The generator effect (TS/HT only) The alternating current generator (an alternator) (TS/HT only) How a direct current dynamo works (TS/HT only) Moving coil sound devices (loudspeaker/microphone) (TS/HT only) Transformers (TS/HT only)</p> <p style="text-align: center;">Top 5 Keywords</p> <p>Magnetic field, solenoid, electromagnet, motor effect, magnetic flux density</p>	<p>Investigating the strength of an electromagnet Calculating magnetic flux density ($F = BIl$) (HT only) Demonstrate how a simple generator works (TS/HT only) Using the transformer equation</p>
<p>9 - Space (TS only)</p>	<p>Formation of the solar system Life cycle of a star Orbits and satellites Red shift The Big Bang and evidence for Predictions on the future of our Universe</p> <p style="text-align: center;">Top 5 Keywords</p> <p>red shift, satellite, main sequence star, black hole, supernova</p>	