Physics at King's Academy Ringmer

End point	Knowledge acquired	Skills acquired
YEAR 7		
1 - Forces 1.1 - speed 1.2 - gravity	- 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 **Top 5 Keywords** speed, weight, mass, force, resultant force	- 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	- 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 **Top 5 Keywords** energy, renewable, non-renewable, dissipation, power	- Calculations involving energy (power, cost, efficiency) - Comparing energy resources
3 Electromagnets 3.1 potential difference and resistance 3.2 current	- 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 **Top 5 Keywords** potential difference, current, resistance, charge, field	- Calculating resistance, current and voltage (VIR) - Setting up a circuit (series and parallel) - Drawing a simple circuit diagram

4 Waves 4.1 sound 4.2 light	- 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 **Top 5 Keywords** wave, frequency, reflection, absorption, transmission	- Calculations involving the speed of sound - Analysing an oscilloscope trace for loudness and pitch
YEAR 8		
1a Forces - Contact forces	- Friction - Drag - Resultant forces in terms of motion - Hooke's law - Moments **Top 5 Keywords** drag, equilibrium, Hooke's Law, moment, centre of gravity	- Sketching the forces on an object - Graph the relationship between force and extension - Calculate the moment of a force
1b Forces - Pressure	- Pressure in gases (fluid pressure, atmospheric pressure) - Pressure in liquids (depth, floating and sinking) - Stress on solids **Top 5 Keywords** pressure, upthrust, fluid, incompressible, atmospheric pressure	- Calculate fluid pressure - Calculate pressure in liquids in a range of situations - Calculating stress

2 Electromagnets 2.3- Magnetism 2.4 electromagnets	- Magnetic fields (incl. The Earths) - Magnetic field around a wire - Solenoids and electromagnets - Making an electromagnet stronger - How electromagnets are used in devices **Top 5 Keywords** magnetic poles, solenoid, electromagnet, magnetic field lines, permanent magnet	- Plotting a magnetic field with iron filings and a plotting compass - Plotting the magnetic field around a current carrying wire - Making a solenoid and an electromagnet
3 Energy 3.3 Work 3.4 heating and cooling	- 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 **Top 5 Keywords** work, temperature, thermal conductor, radiation, insulation	- Calculating work done - Comparing insulators
4 Waves 4.3 - Wave effects 4.4 wave properties	- 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 **Top 5 Keywords** Electromagnetic spectrum, transverse, longitudinal, wavelength, amplitude	-
YEAR 9		
1 Electrical circuits	- Current, potential difference and resistance in series and parallel circuits - Using different components in a circuit and what they are used for (thermistors, LDRs, diode) - Interpreting current-potential difference graphs for different components **Top 5 Keywords** Series circuit, parallel circuit, diode, thermistor, light-dependent resistor (LDR)	- Making and drawing circuit diagrams - Measuring and calculating resistance

2 Molecules and matter	- Density - States of matter, changes of state and the particle model - The link between particle movement and temperature **Top 5 Keywords** Density, volume, physical change, melting point, boiling point	- Calculating volume and density - Determine the density of an irregular shaped object
3 Forces and energy	- Distance-time and velocity-time graphs - Forces and motion (acceleration/deceleration) - The link between forces and work done (energy) - The link between work done and energy transferred **Top 5 Keywords** Velocity, acceleration, work, gravitational potential energy (GPE), terminal velocity	- Plotting distance and velocity time graphs - Calculating work done and GPE - Calculating speed and acceleration
4 Waves	- Explaining the difference between transverse and longitudinal waves (with examples) - Properties of sound waves - The effects of waves on atoms - The dangers of highly ionising waves **Top 5 Keywords** Oscillate, emit, ionisation, vacuum, echo	- Calculating frequency and time period
YEAR 10 (GCSE course)		
1 - Conservation and dissipation of energy	- Energy stores - Energy transfers - Conservation of energy - Work in physics - GPE - Kinetic energy - Elastic potential energy - Energy dissipation - Energy efficiency - Power	- Calculating the following things: - Work done - GPE - Kinetic energy - Elastic potential energy - Efficiency - Power

	Top 5 Keywords Energy conservation, work, dissipation, efficiency, power	
2 - Energy transfer by heating	- Conduction, thermal conductivity and insulation - Infrared radiation (surface temperature, absorption, emission and the Earth's temperature) (TS only) - Specific heat capacity **Top 5 Keywords** Thermal conductivity, insulation, specific heat capacity	- Calculating specific heat capacity
3 - Energy resources	- 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 **Top 5 Keywords** Renewable, non-renewable, carbon-neutral, carbon dioxide, national grid	- Comparing different energy resources (including using data to draw conclusions)
4 - Electric circuits	- Atomic structure, charging by friction, electrostatic force (TS only) - Circuit symbols - Electric current - Potential difference - Resistance - Current-potential difference graphs, including Ohm's law - Series and parallel circuits **Top 5 Keywords** Current, potential difference, resistance, charge, Ohm's law,	- 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 ($V=IR$)
5 - Electricity in the home	- Alternating current vs. direct current - Plugs, cables, sockets, mains circuit - Short circuits - Electrical power ($P = Et$, $P = IV$, $P = I^2R$) - Fuses **Top 5 Keywords** Alternating current, direct current, oscilloscope, earth wire, 3-pin plug	- Analysing an oscilloscope trace - Calculating electrical power ($P = Et$) - Calculating charge ($Q = It$)
6 - Molecules and	- Density	- Calculating density (m/V)

matter	- 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) **Top 5 Keywords** Density, internal energy, latent heat of fusion, latent heat of vaporisation, pressure	- 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 latest heat of vaporisation
7 - Radioactivity	- 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) **Top 5 Keywords** Isotopes, contamination, irradiation, nuclear fission, nuclear fusion	- Completing nuclear equations - Plotting and analysing half life graphs
YEAR 11 (GCSE course)		
1 - Forces in balance	- 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) **Top 5 Keywords**	- 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)

	Scalar, vector, moment, centre of mass, magnitude	
2 - Motion	**Top 5 Keywords** Velocity, acceleration, deceleration, gradient, displacement	- 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	- 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 **Top 5 Keywords** Terminal velocity, momentum, elasticity, Hooke's law, stopping distance	- 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)	- Pressure on surfaces - Pressure in a liquid (HT only) - Atmospheric pressure and altitude - Upthrust and flotation (HT only) **Top 5 Keywords** atmospheric pressure, upthrust, pascal, altitude, displace	- Using F/A - Using p = h x p x g (HT only) - Analysing a graph of atmospheric pressure against altitude
5 - Wave properties	- 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) **Top 5 Keywords**	- Calculating frequency and time period of a wave (f=1/T) - Using the wave speed equation (v=fλ) - Calculating the distance sound waves travel from an echo (d = (s x t) /2) - Measuring the speed of waves in a ripple tank

	Compression, rarefaction, mechanical waves, longitudinal waves, transverse waves	
6 - Electromagnetic waves	- The parts of the EM spectrum and their uses - Radio communications - Signals and carrier waves (HT only) - The use of X rays in medicine **Top 5 Keywords** Electromagnetic spectrum, wave speed, white light, ionisation, radiation dose	- Calculating wavelength, frequency or speed of an EM wave ($v=f\lambda$) - Investigating the absorption and emission of IR radiation
7 - Light (TS only)	- 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 **Top 5 Keywords** Real image, virtual image, convex lens, concave lens, normal	- 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)
8 - Electromagnetism	- 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) - 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) **Top 5 Keywords** Magnetic field, solenoid, electromagnet, motor effect, magnetic flux density	- 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 - 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

| 9 - Space (TS only) | - 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

Top 5 Keywords
red shift, satellite, main sequence star, black hole, supernova | - |