Curriculum Intent Mapping

To implement a seamless route of the delivery of the science provision, we approach Science as a 5 year curriculum from Year 7 to 11.

From year 7 to year 11, the curriculum has been mapped according to three Big Ideas for each subject. This shows how topics are interlinked and how they spiral throughout the programme of study. The Big Ideas are captured below:

Biology	Chemistry	Physics
Cells and cellular processes	Materials and their properties	Energy
Biological systems for life	Chemical Changes	Forces and fields
Organisms and their interactions with the environment	Our earth and its atmosphere	Matter and materials

These Big Ideas run through each key stage. The strands running through each Big Idea are

1. Prior knowledge
2. Knowledge
3. Working Scientifically (scientific thinking, using scientific models, analysing and evaluating data, applications and implications of science and the collaborative approach to work of scientists)
4. Literacy & Communication (use of key terminology, effective scientific communication and discussion of misconceptions).
5. Numeracy
6. Assessment

In Year 7 and 8 students learn science using the Exploring Science (Pearson) platform. Year 7 has 7 hours and Year 8 has 6 hours per fortnight, in mixed ability classes.

In year 9 we begin to students continue their science learning using the Edexcel GCSE Pearson provision as a basis, and are taught in mixed ability sets. In year 9, students are taught 9 hours per fortnight; 3 hours per science subject.

In years 10 and 11 students are set based on ability and year half, and are taught 11 hours per fortnight; 4 hours each for Biology and Chemistry, 3 hours for Physics. Students will either study the Combined Science GCSE award or the Single Science GCSE award and we will work with the students to decide which option is best for them as they progress through years 10 and 11.

The three individual science subjects; Biology, Chemistry and Physics are taught, wherever possible, by subject specialists who, we feel, are best able to demonstrate a true depth of subject knowledge and who can enthuse students through a passion for their subject.

Sixth Form

There are A-levels in each of the three individual science subjects: Biology, Chemistry and Physics as well as a BTec National Level 3 Extended Certificate in Applied Science with the following examination boards:

- Biology: AQA
- Chemistry: OCR Salters B
- Physics: OCR A
- BTec Applied Science National Level 3: Pearson

Curriculum Mapping – Skills and Knowledge –Combined Science – Physics

Big ideas	Year 7	Year 8	Year 9	Year 10	Year 11
			Throughout: Key Concepts, Spec: 1.1-1.4 (paper 1 & 2)		
Energy	*7I Energy* 7Ia, 7Ib, 7Ic, 7Id, 7Ie *7L Sound* 7La, 7Lb, 7Lc, 7Ld, 7Le	*8J Light* 8Ja, 8Jb, 8Jc, 8Jd, 8Je *8K Energy Transfers* 8Ka, 8Kb, 8Kc, 8Kd, 8Ke	**CP3 Conservation of Energy** CP3a, CP3b, CP3c, CP3d, CP3e, CP3f Spec: 3.1 – 3.14 (paper 1 & 2) **CP4 Waves** CP4a, CP4b, CP4c, Spec: 4.1 – 4.7, 4.11, 4.17 (paper 1) Core Prac: 4.17 (CP4b) **CP5Light and EM Spectrum** CP5a, CP5b, CP5c, CP5d, CP5e Spec: 5.7 – 5.14, 5.20-, 5.24 (paper 1) Core Prac: 4.17 (CP4b)		
Forces and Fields	*7J Current Electricity* 7Ja, 7Jb, 7Jc, 7Jd, 7Je *7K Forces* 7Ka, 7Kb, 7Kc, 7Kd, 7Ke	*8L Earth and Space* 8La, 8Lb, 8Lc, 8Ld, 8Le	**CP1 Motion** CP1a, CP1b, CP1c, CP1d Spec: 2.1 – 2.13 (paper 1) **CP2 Motion and Forces** CP2a, CP2b, CP2c, CP2d, CP2e, CP2f, Cp2g, Cp2h Spec: 2.13 – 2.31 (paper 1) Core Prac: 2.19 (CP2d)	**CP7 Forces doing Work** CP7 Spec: 8.5 – 8.7, 8.12 – 8.15 (paper 2) **CP8 Forces and their effects** CP8a, Cp8b Spec: 8.1 – 8.4, 8.7 8.12 – 8.15, 9.1 – 9.5, 9.10(paper 2) **CP9 Electricity** CP9a, CP9b, CP9c, CP9d, CP9e, CP9f, Cp9g, Cp9h, CP9i Spec: 10.1 – 10.42 (paper 2) Core Prac: 10.17 (CP10e)	**CP10 Magnetism and Motor Effect** CP10a, CP10b, CP10c Spec: 12.1 – 12.3 (paper 2) **CP11 Electromagnetic Induction** CP11a, CP11b, CP10c Spec: 13.2, 13.5,13.6, 13.8-13.10 (paper 2)
Matter and Materials		*8I Fluids* 8Ia, 8Ib, 8Ic, 8Id, 8Ie		**CP6 Radioactivity** CP6a, CP6b, CP6c, CP6d, CP6e, CP6f, Cp6g, Cp6h Spec: 6.1 – 6.32 (paper 1)	**CP12 Particle Model** CP12a, CP12b, CP12c, CP12d, Spec 14.1-14.15) (paper 2) Core Prac: 14.3 (CP12a) Core Prac: 14.11(CP12c) **CP13 Forces and Matter** CP13a, CP13b Spec (15.1-14.16) (paper 2) Core Prac: 15.6(CP13b)

Curriculum Mapping – Skills and Knowledge –Combined Science – Physics

Big ideas	Year 7	Year 8	Year 9	Year 10	Year 11
			Throughout: Key Concepts, Spec: 1.1-1.4 (paper 1 & 2)		
Energy	*7I Energy* 7Ia, 7Ib, 7Ic, 7Id, 7Ie *7L Sound* 7La, 7Lb, 7Lc, 7Ld, 7Le	*8J Light* 8Ja, 8Jb, 8Jc, 8Jd, 8Je *8K Energy Transfers* 8Ka, 8Kb, 8Kc, 8Kd, 8Ke	**CP3 Conservation of Energy** CP3a, CP3b, CP3c, CP3d, CP3e, CP3f Spec: 3.1 – 3.14 (paper 1 & 2) **CP4 Waves** CP4a, CP4b, CP4c, Spec: 4.1 – 4.7, 4.11, 4.17 (paper 1) Core Prac: 4.17 (CP4b) **CP5Light and EM Spectrum** CP5a, CP5b, CP5c, CP5d, CP5e Spec: 5.7 – 5.14, 5.20-, 5.24 (paper 1) Core Prac: 4.17 (CP4b)		**SP4 Waves** SP4d, SP4e, SP4f,SP4g Spec: 4.8 – 4.9, 4.12-4.15 (paper 1) **SP5Light and EM Spectrum** SP5a, SP5b, SP5c,SP5g Spec: 5.1 – 5.6, 5.15-, 5.19, (paper 1) Core Prac: 5.19 (SP5a)
Forces and Fields	*7J Current Electricity* 7Ja, 7Jb, 7Jc, 7Jd, 7Je *7K Forces* 7Ka, 7Kb, 7Kc, 7Kd, 7Ke	*8L Earth and Space* 8La, 8Lb, 8Lc, 8Ld, 8Le	**CP1 Motion** CP1a, CP1b, CP1c, CP1d Spec: 2.1 – 2.13 (paper 1) **CP2 Motion and Forces** CP2a, CP2b, CP2c, CP2d, CP2e, CP2f, Cp2g, Cp2h Spec: 2.13 – 2.31 (paper 1) Core Prac: 2.19 (CP2d)	**CP7 Forces doing Work** CP7 Spec: 8.5 – 8.7, 8.12 – 8.15 (paper 2) **CP8 Forces and their effects** CP8a, Cp8b Spec: 8.1 – 8.4, 8.7 8.12 – 8.15, 9.1 – 9.5, 9.10(paper 2) **CP9 Electricity** CP9a, CP9b, CP9c, CP9d, CP9e, CP9f, Cp9g, Cp9h, CP9i Spec: 10.1 – 10.42 (paper 2) Core Prac: 10.17 (CP10e)	**CP10 Magnetism and Motor Effect** CP10a, CP10b, CP10c Spec: 12.1 – 12.3 (paper 2) **CP11 Electromagnetic Induction** CP11a, CP11b, CP10c Spec: 13.2, 13.5,13.6, 13.8-13.10 (paper 2) **SP2 Motion and Forces** SP2h Spec: 2.32 – 2.33 (paper 1) **SP7 Astronomy,** SP7a, SP7b, SP7c, SP7d, SP7e Spec7.1 – 7.19 (paper 1) **SP8 Forces and their effects** SP9c Spec: 9.6-9.9 (paper 2) **SP10 Static Electricity** SP11a, SP11b SP11c Spec 11.1 – 11.10 (paper 2) **SP13 Magnetism and Motor Effect** SP13b Spec: 12.14 (paper 2) **SP14Electromagnetic Induction** SP13b Spec: 13.1, 3.3-13.4, 13.7, 13.11p(paper 2)
Matter and Materials		8I Fluids 8Ia, 8Ib		**CP6 Radioactivity** CP6a, CP6b, CP6c, CP6d, CP6e, CP6f, Cp6g, Cp6h Spec: 6.1 – 6.32 (paper 1)	**CP12 Particle Model** CP12a, CP12b, CP12c, CP12d, Spec 14.1-14.15) (paper 2) Core Prac: 14.3 (CP12a) **&** 14.11(CP12c) **CP13 Forces and Matter,** CP13a, CP13b Spec (15.1-14.16) (paper 2) Core Prac: 15.6(CP13b) **SP6 Radioactivity** SP6h, SP6j, SP6k, SP6l, SP6m, Spec: 6.30, 6.33 – 6.46 (paper 1) **SP15 Forces and Matter** Spec 14.12-14.20 (paper 2)

Subject: Physics **Year group: 7**

Topic	7J Current and Electricity	7K Forces	7I Energy	7L Sound	8L Earth & Space
Prior KS2 knowledge	Most students will: ● construct simple circuits and use them to identify conductors or insulators ● draw circuit diagrams using symbols ● investigate the effect of changing components in a circuit ● the effects of changing the voltage of a battery and short circuits	Most students will: ● describe different kinds of forces and be able to classify these as contact or non-contact forces ● identify the effect of drag forces that act between moving surfaces ● describe why moving objects slow down	Most students will: ● Define and measure temperature ● Describe materials as thermal conductors or insulators Understand combustion is irreversible	Most students will: ● recall that sounds get fainter with distance ● explain that sounds vibrations ● link the size of an object with pitch ● link the volume of a sound with the size of the vibrations From previous units: ● animals attract mates (7A, 7D) ● ultrasound scans (7B), some animals are nocturnal (7D).	Most students will: ● describe the movement of the Earth and other planets relative to the Sun & Moon ● describe the Sun, Earth and Moon as approximately spherical bodies ● Explain day and night From previous units: ● describe the difference between weight and mass (7K) ● recall the direction in which gravity acts (7K)
Knowledge	● electric current is the flow of charge and is measured in amperes in series and parallel circuits ● voltage as potential difference, measured in volts ● resistance as the ratio of potential difference to current measured in ohms and describe the differences in resistance between conductors and insulators	● forces as pushes or pulls using force arrows in diagrams, ● balanced and unbalanced forces ● forces associated with deforming objects, friction and air resistance. ● forces are measured in Newtons, measurements and the force–extension linear relationship ● Forces being needed to cause objects change motion	● fuels and energy resources ● energy transfer processes ● comparing energy values of different foods (kJ) and amounts of energy transferred (J, kJ, kW hour) ● energy as a quantity that can be quantified and calculated • the total energy has the same value before and after a change.	● the meaning of: pitch, volume, frequency, amplitude, superposition, ultrasound and infrasound transverse wave and longitudinal wave. ● how sounds travel through different materials ● how sound gets from a source to our ears. ● Compare speed of sound & light. ● waves transfer energy and they do not transferring matter. ● sounds can be detected by microphones and sound meters ● functions of different parts of the ear.	• State the meanings of: Sun, Milky Way,star,galaxy, Universe, light year, Gravitational field strength, constellation, geocentric, heliocentric • the relative sizes and distances of objects in space. • factors that affect the strength of gravity & mass and distance affect the strength of gravity. • planets and natural satellites are kept in orbit by gravity • how a magnetic field interacts with materials, and recall the shape of the field of a bar magnet. • Describe the Earth's magnetic field. Explain why a compass points north. • differences in the seasons, moons phases and days using models
Working Scientifically (WS) **Literacy & Communication (L&C)** **Maths (M)**	● WS: using physical models to help to explain phenomena, ● L&C: presenting information ● M: the use of symbols	● WS: the need for using standard SI units ● taking notes from presentations and videos	● WS & M: using ratios ● L&C: summarising texts. ●	● WS: present observations and data using appropriate methods ● interpret observations and data, to draw conclusions. ● L&C: ways of recalling information. ● M: presenting data graphically.	● WS:apply mathematical concepts and calculate results. ● L&C:presenting arguments. ● M: using: ratios, fractions, equations, substitutions and graphs
Personal Development Spiritual (S) Moral (M) Social (S) Cultural (Cu)	**7Ja - Using electricity:** ● **H&W:** Discuss the importance of electrical safety in	**7Ka - Describing forces:** ● **Ca:** Highlight careers in physics,	**7Ia - Energy from food:** ● **H&W:** Discuss the importance of a balanced diet and how food provides	**7La - Sound and energy:** ● **H&W:** Understand how sound energy affects hearing and health.	● **8La - The night sky:** ○ **S:** Reflect on the wonder of the night sky and the universe.

Relationships (R) Health and Welbeing (H&W) Careers (Ca)	the home and everyday life. ● **Ca:** Highlight careers in electrical engineering and energy management. **7Jb - Current:** ● **H&W:** Understand the effects of electric currents on the human body. ● **Ca:** Introduce careers in electronics and circuit design. **7Jc - Models for circuits:** ● **S:** Collaborate on building and testing simple circuits. ● **Ca:** Discuss careers in electrical engineering and robotics. **7Jd - Series and parallel:** ● **S:** Work in groups to construct and analyze series and parallel circuits. ● **Ca:** Highlight careers in systems engineering and industrial automation. **7Je - Conductors and insulators:** ● **H&W:** Learn about the importance of	engineering, and mechanics. ● **S:** Reflect on the fundamental nature of forces and their impact on the physical world. **7Kb - Balanced and unbalanced:** ● **H&W:** Discuss the importance of balanced forces in everyday activities, such as posture and movement. ● **S:** Collaborate on experiments demonstrating balanced and unbalanced forces. **7Kc - Friction:** ● **H&W:** Understand the role of friction in preventing accidents and ensuring safety. ● **Ca:** Introduce careers in automotive design and materials engineering. **7Kd - Pressure:** ● **H&W:** Learn about the effects of pressure on	energy for the body. ● **Ca:** Highlight careers in nutrition and dietetics. **7Ib - Energy transfers and stores:** ● **S:** Collaborate on projects that explore different forms of energy and their transfers. ● **Ca:** Introduce careers in energy management and environmental science. **7Ic - Fuels:** ● **M:** Debate the ethical considerations of fossil fuel use and alternative energy sources. ● **Ca:** Discuss careers in renewable energy and sustainability. **7Id - Other energy resources:** ● **S:** Work on projects investigating renewable energy sources like solar and wind power. ● **Ca:** Highlight careers in green technology and	● **Ca:** Highlight careers in acoustics and audio engineering. **7Lb - Detecting sound:** ● **H&W:** Learn about the human ear and the importance of protecting hearing. ● **Ca:** Introduce careers in audiology and hearing technology. **7Lc - Using sound:** ● **S:** Collaborate on projects that explore the use of sound in communication and technology. ● **Ca:** Discuss careers in music production and telecommunications. **7Ld - Comparing waves:** ● **H&W:** Understand the effects of different types of waves on health, such as ultrasound. ● **Ca:** Highlight careers in medical imaging and wave technology.	○ **Ca:** Highlight careers in astronomy and astrophysics. ● **8Lb - The Solar System:** ○ **Cu:** Explore cultural stories and historical perspectives on the Solar System. ○ **Ca:** Discuss careers in space exploration and planetary science. ● **8Lc - The Earth:** ○ **S:** Collaborate on projects investigating Earth's structure and natural phenomena. ○ **Ca:** Highlight careers in geology and environmental science. ● **8Ld - The Moon:** ○ **S:** Reflect on the significance of the Moon in different cultures and its impact on Earth. ○ **Ca:** Introduce careers in space science and lunar research. ● **8Le - Beyond the Solar System:** ○ **S:** Explore the vastness of the universe and our place within it. ○ **Ca:** Discuss careers in cosmology and space technology.

	using proper conductors and insulators to ensure electrical safety. ● **Ca:** Introduce careers in materials science and safety engineering.	the human body, such as blood pressure. ● **Ca:** Highlight careers in medicine and fluid dynamics. **7Ke - Speed:** ● **H&W:** Discuss the impact of speed on road safety and personal wellbeing. ● **Ca:** Introduce careers in transportation engineering and sports science.	environmental engineering. **7Ie - Using resources:** ● **M:** Explore the moral responsibility of using resources sustainably. ● **H&W:** Discuss the impact of energy use on health and the environment.		
Assessment Pattern	7I and 7J are assessed together in one 35 mark assessment.		7K and 7L are assessed together in one 35 mark assessment.		8L is assessed in one 35 mark assessment.

Subject: Physics **Year group: 8**

Topic	**8I Fluids**	**8J Light**	**8K Energy Transfers**
Prior knowledge	Most students will: ● classify substances as solids, liquids or gases and name changes of state ● identify the effects of air resistance and water resistance. From previous units, most students may be able to: ● use the particle model to explain the properties of solids, liquids and gases (7G) ● understand how particles in a gas cause pressure (7G) ● identify differences between chemical and physical changes (7H) ● describe the effects of balanced and unbalanced forces on objects (7K).	Most students will: •understand that light travels in straight lines and use this idea to explain how objects are seen. ● explain why shadows have the same shape as the objects that cast them (Year 6). From previous units, most students may be able to: ● recall that energy is transferred by waves (7L) ● describe different kinds of wave (7L) ● recall that waves travel at different speeds indifferent materials (7L).	Most students will: ● use the particle model of matter to explain the properties of solids, liquids and gases (7G) ● recall some ways in which energy is transferred and stored (7I) ● recall the law of conservation of energy, and that the effciency of a machine tells us how much energy is transferred as wasted energy (7I).
Knowledge	● forces: associated with deforming objects; ● stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water ● atmospheric pressure, decreases with increase of height as weight of air above decreases with height ● pressure in liquids, upthrust effects, floating and sinking	● the similarities and differences between light waves and waves in matter ● light waves travelling through a vacuum; ● the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface ● use of ray model to explain imaging in mirrors,	● comparing power ratings of appliances in watts ● comparing amounts of energy transferred ● domestic fuel bills, fuel use and costs ● heating and thermal equilibrium: temperature ● difference between two objects leading to energy transfer from the hotter to the cooler ● use of insulators

	● pressure measured by ratio of force over area ● conservation of material and mass, reversibility changes of state ● similarities and differences, including density ● differences, between solids, liquids and gas ● the difference between chemical and physical changes ● the differences in arrangements, in motion and in closeness of particles explaining changes of state ● atoms and molecules as particles	● the pinhole camera and the human eye ● light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras ● colours and the different frequencies of light ● differential colour effects in absorption and ● diffuse reflection.	● energy as a quantity that can be quantifed and calculated; the total energy has the same value before and after a change ● comparing the starting with the final conditions of a system ● using physical processes and mechanisms,rather than energy, to explain the intermediate steps that bring about such changes
Working Scientifically (WS) **Literacy & Communication (L&C)** **Maths (M)**	● WS; apply mathematical concepts and calculate results. ● L&C: use of prepositional phrases. ● M: apply mathematical concepts and calculate results.	● WS; the use of conventions in scientific communication. ● L&C: preparing effective presentations. ● M: measuring angles	● WS;:pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility ● L&C: using language appropriate to the audience. ● M: substituting values in simple formulae and solving resulting equations, percentages ● drawing and interpreting scale drawings
Personal Development Spiritual (S) Moral (M) Social (S) Cultural (Cu) Relationships (R) Health and Welbeing (H&W) Careers (Ca)	● **8Ia - The particle model:** ○ **Ca:** Highlight careers in physics and engineering. ○ **S:** Reflect on the changes in states of matter and their applications. ● **8Ib - Changing state:** ○ **S:** Reflect on the principles and implications of phase changes in matter. ○ **Ca:** Discuss careers in materials science and engineering. ● **8Ic - Pressure in fluids:** ○ **H&W:** Discuss the implications of fluid pressure on human health, such as blood pressure. ○ **Ca:** Highlight careers in hydrodynamics and medical research. ● **8Id - Floating and sinking:** ○ **Cu:** Explore cultural stories and practices related to buoyancy and water. ○ **Ca:** Introduce careers in naval engineering and marine biology. ● **8Ie - Drag:** ○ **H&W:** Learn about the impact of drag on human activities like swimming and cycling. ○ **Ca:** Discuss careers in aerodynamics and sports science.	● **8Ja - Properties of light:** ○ **Ca:** Highlight careers in optics and visual sciences. ○ **S:** Reflect on the fundamental properties of light and its importance in the natural world. ● **8Jb - Reflection:** ○ **S:** Collaborate on experiments demonstrating the principles of reflection. ○ **Ca:** Discuss careers in optical engineering and photography. ● **8Jc - Refraction:** ○ **H&W:** Understand the importance of refraction in vision and corrective lenses. ○ **Ca:** Highlight careers in optometry and lens manufacturing. ● **8Jd - The eye:** ○ **H&W:** Learn about the structure and function of the human eye and eye health. ○ **Ca:** Introduce careers in ophthalmology and visual sciences. ● **8Je - Colour:** ○ **Cu:** Explore the cultural significance of colour and its perception in different societies.	● **8Ka - Energy transfer:** ○ **Ca:** Highlight careers in renewable energy and engineering. ○ **S:** Reflect on the importance of energy transfers in daily life and technology. ● **8Kb - Temperature changes:** ○ **H&W:** Discuss the effects of temperature on human health and comfort. ○ **Ca:** Introduce careers in climate science and HVAC engineering. ● **8Kc - Energy resources:** ○ **M:** Debate the ethical considerations of using different energy resources. ○ **Ca:** Highlight careers in environmental science and sustainable development. ● **8Kd - Energy and power:** ○ **H&W:** Understand the importance of energy efficiency for health and the environment. ○ **Ca:** Discuss careers in energy management and power engineering. ● **8Ke - Work and energy:** ○ **S:** Collaborate on projects related to energy conservation and sustainability. ○ **Ca:** Introduce careers in mechanical engineering and physics.

		○ **Ca:** Discuss careers in art, design, and visual communication.	
Assessment Pattern	8I and 8J are assessed together in one 35 mark assessment.	8K is assessed in one 35 mark assessment.	

Curriculum Intent Mapping – Skills and Knowledge

Subject: COMBINED Physics **Year group: 9**

Topic	Key Concepts	CP1 Motion	CP2 Motion and Forces	CP3 Conservation of Energy	CP4 Waves	CP5Light and EM Spectrum
Prior Knowledge	● Recall units for various quantities.	● Calculations to convert units and substitute numerical values into equations ● Relate changes and differences in motion to graphs, and interpret lines, areas and slopes ● Calculate speed and acceleration	● Students should be familiar with the definition of speed and acceleration and kinetic energy. (These were covered in CP1 Describing Motion)	● Content to be delivered in this topic was introduced in year 7 (P7.4) ● Students should be familiar with the idea of energy transfers between energy stores.	● Describe longitudinal and transverse waves ● Describe basic wave behaviours such as reflection and refraction.	● Describe and know the order of the EM spectrum.
Knowledge	● Recall and use the SI unit for physical quantities, ● Recall and use multiples and sub-multiples of units. ● Be able to convert between different units. ● Use significant figures and standard form where appropriate	● Explain the difference between vectors and scalars ● Define the terms: acceleration, force, momentum, energy. ● Recall and use equations for speed and acceleration. ● Describe how speed can be measured in a school laboratory. ● Recall typical speeds. ● Interpret and represent distance/time graphs ● Recall the acceleration in free fall.	● Use arrows to represent and calculate resultant forces. ● Explain balanced or unbalanced forces. ● Describe centripetal force(H) ● Describe the difference between mass and weight. ● Recall formula for force & weight. ● Explain what an acceleration is. ● Explain what inertial mass means. H) ● Describe Newton's Laws. ● Describe and calculate momentum (H) ● Describe how different factors affect stopping distances.	● Represent energy transfers using diagrams. ● Explain energy conservation. ● Describe what happens to wasted energy in energy transfers. ● Define, explain and calculate efficiency ● Define the meaning of thermal conductivity. ● Describe and calculate GPE and KE. ● List and Compare non-renewable and renewable energy resources.	● Recall that waves transfer energy and information but do not transfer matter. ● Describe frequency, wavelength, amplitude, period and velocity. ● Describe and give examples of longitudinal and transverse waves. ● Calculate wave speed, wavelength and frequency. ● Describe how to measure the velocity of sound. ● Describe what refraction is.	● Describe common features, production, effect, dangers and uses of electromagnetic waves. ● Recall the groups of waves in the electromagnetic spectrum in order. ● Recall the colours of the visible spectrum in order. ● Describe how radio waves are produced and detected by electrical circuits.
Disciplinary		Measuring speed Graph plotting Tangent drawing	Method writing Results recording Analysis		Method writing Results recording Analysis	
Literacy		Tier 2 Keywords (AWL) Tier 3 Keywords	Tier 3 Keywords Extended writing task	Tier 3 Keywords Graph literacy Summarising	Tier 3 Keywords	Tier 2 Keywords (AWL) Tier 3 Keywords Reading comprehension/research tasks
Numeracy	M: 1b, 1c, 3c	M: 1a , 1c, 2b, 3c, 4a, 4b, 4c, 4d, 4f	M:1a,1c,1d,2a,2b,2c,2d,2f,2h, 3a,3b,3c,3d,4a,4b,4c,4d,4e, 4f, 5b, 5c	M:1a, 1c, 1d, 2a, 2c, 2g 3a, 3b, 3c, 3d	M:1a, 1c, 1d, 2a, 2c, 2g 3a, 3b, 3c, 3d, 5b	M:1a, 1c, 1d, 2a, 2c, 2g 3a, 3b, 3c, 3d, 5b

Personal Development		Career links	Career links	Career links The socioeconomic and environmental impacts of energy resources	Career links	Career links
Assessment Pattern	Assessed within each topic	40 mark end of topic test		40 mark end of topic test	40 mark end of topic test	
50 mark end of year test						

Curriculum Implementation Mapping – Skills and Knowledge

Subject: COMBINED Physics **Year group: 10**

Topic	CP6 Radioactivity	CP7 Forces doing Work/ CP8 Forces and their Effects	CP9 Electricity	CP10 Magnetism and Motor Effect & CP11 Electromagnetic Induction
Prior Knowledge	● Describe what an atom is. ● Know with the particle model of matter ● Describe the structure of solids, liquids and gases. ● Be familiar with Brownian motion.	● Define and calculate Speed, Velocity, acceleration, Kinetic Energy and Gravitational Potential Energy ● Use arrows to represent and calculate resultant forces. ● Explain balanced or unbalanced forces. ● Describe Newton's Laws.	● Represent circuits using standard symbols and the effects of adding bulbs to series circuits. ● Describe the measurement of current, potential difference and Resistance. ● Describe the differences between series and parallel circuits.	● Know magnets can exert non-contact forces on magnetic materials and other magnets. ● Know that an electric current can produce a magnetic field.
Knowledge	● Describe the structure of an atom ● Describe how atomic models have changed over time. ● State what is meant by an isotope. ● Recall the charges and relative masses of the three subatomic particles. ● Describe how ionisation occurs. ● Explain what background radiation is and list sources. ● Describe the 5 different forms of radioactivity including, dangers, detection, precaution and their nature. ● State how half-life can be used to describe the changing activity of a substance. ● Carry out calculations involving half-life. ● Describe the differences between contamination and irradiation effects.	● Describe some ways in which the energy of a system can be changed. ● Measure the work done by a force. ● Recall and use the equation linking work done, force and distance. ● Explain what power means. ● Recall and use the equation linking power, work done and time. ● Describe the effect of a gravitational field on objects. ● Describe the effects of magnetic and electrostatic fields on objects. ● Describe the forces that can occur when objects are in contact with each other. ● Describe how pairs of forces occur when objects affect each other. ● Describe how to resolve forces using scale drawings.(H) ● Draw free body diagrams to represent the forces on an object. ● Explain what happens in situations where several forces are acting on an object.	● Recognise circuit symbols and draw diagrams for circuits. ● Describe and explain the differences in current and potential difference in series and parallel circuits ● Describe how to measure voltage and current. ● Describe and Calculate Electrical Energy, Potential Difference, Current, Charge, Resistance and Power in parallel and series circuits. ● Describe the uses and how the resistance varies for thermistors, diodes and LDR's ● Use the electron and ion model and the idea of electrical work to explain the energy transfer in a resistor and how unwanted energy transfers in wires can be avoided. ● Recall the advantages and disadvantages of the heating effect of an electric current. ● Explain the difference between direct and alternating voltage. ● Recall the frequency and voltage of the UK supply. ● Describe how a UK plug is used and safety features of mains electricity.	● Describe how magnets affect each other. ● Explain the differences, uses and fields of permanent and induced magnets. ● Describe how the shape of magnetic fields is shown using compasses. ● Explain how a magnetic compass is evidence for the Earth's magnetic core. ● Recall that a current can create a magnetic effect and a force.(H) ● Relate the shape and direction of the magnetic field around a straight wire to the direction of the current. ● Recall factors that affect the strength of the magnetic field around a wire. ● Describe the magnetic field in/outside a coil carrying a current and solenoid. ● Explain why forces are produced when a current flows in a magnetic field. ● Use Fleming's left-hand rule.(H) ● Use the formula relating force, magnetic field strength, current and length.(H) ● Explain how a transformer works and use the formula relating the input and output current and voltage for a transformer. ● Recall the factors that affect the size and direction of an induced potential difference.(H) ● Describe how the national grid transmits electricity around the country.
Disciplinary	Graph plotting	Vector diagrams	Circuit diagrams and set up Graph plotting	
Literacy	Tier 3 Keywords	Tier 3 Keywords	Tier 3 Keywords	Tier 3 Keywords

Numeracy	M: 1a,1b,1c,2a,2g 1c 3a,3b, 3c,3d,4c, 5b	1a,1b,1c, 1d, 1a,2a, 2c, 3a, 3b, 3c, 3d4a, 5a, 5b	1a,1b,1c, 1d, 1a,2a, 2b 2c,2g, 3a, 3b, 3c, 3d, 4a, 4b, 4c 4d, 4e, 5b	M: 1a, 1c, 1d, 2a, 3a, 3b, 3c, 3d, 5b,
Personal Development	Career Links	Career Links Dangers of radioactivity - careers	Career Links	Career Links
Assessment Pattern	40 mark end of topic test	CP7/8 40 mark end of topic test	40 mark end of topic test	40 mark end of topic test
60 mark end of year test				

Curriculum Implementation Mapping – Skills and Knowledge

Subject: COMBINED Physics **Year group: 11**

Topic	CP10 Magnetism and Motor Effect & CP11 Electromagnetic Induction	CP13 Forces and Matter & CP12 Particle Model
Prior Knowledge	● Know magnets can exert non-contact forces on magnetic materials and other magnets. ● Know that an electric current can produce a magnetic field.	● Understand the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice-water transition ● Describe atoms and molecules as particles and changes with temperature in motion and spacing of particles
Knowledge	● Describe how magnets affect each other. ● Explain the differences, uses and fields of permanent and induced magnets. ● Describe how the shape of magnetic fields can be shown using plotting compasses. ● Explain how a magnetic compass is used as evidence for Earth's magnetic core. ● Recall that a current can create a magnetic effect and a force.(H) ● Relate the shape and direction of the magnetic field around a straight wire to the direction of the current. ● Recall the factors that affect the strength of the magnetic field around a wire. ● Describe the magnetic field inside and outside a coil of wire carrying a current and a solenoid. ● Explain what causes the forces produced when a current flows in a magnetic field. ● Recall and use Fleming's left-hand rule.(H) ● Use the formula relating force, magnetic field strength, current and length.(H) ● Explain how a transformer works and use the formula relating the input and output current and voltage for a transformer. ● Recall the factors that affect the size and direction of an induced potential difference.(H) ● Describe how the national grid transmits electricity around the country.	● Use the particle model to explain the properties of solids, liquids& gases. ● Calculate Density. ● Describe what happens to the mass of a substance when it changes state. ● Explain how heating affects the particles in a substance or object, including changes of state. ● Describe how the temperature of an object changes with time while being heated or cooled to make it change state. ● Define and explain the terms SHC and specific latent heat. ● Explain ways of reducing unwanted energy transfer through thermal insulation. ● Explain how the movement of particles causes gas pressure. ● Explain the significance of absolute zero and convert temperatures between the Kelvin and Celsius.. ● Explain that more than one force is needed to distort an object and explain the difference between elastic and inelastic distortion ● Describe the relationship between force and extension for a springs and rubber band ● Calculate the spring constant of a material. ● Recall that work has to be done to stretch a spring.
Disciplinary		Tabulating Significant Figures Graph Plotting
Literacy	Tier 3 Keywords	Tier 2 Keywords (AWL) Tier 3 Keywords
Numeracy	M: 1a, 1c, 1d, 2a, 3a, 3b, 3c, 3d, 5b,	M: 1a, 1c, 1d, 2a, 3a, 3b, 3c, 3d, 5b,
Personal Development	Career Links	Career Links

Assessment	40 mark end of topic test	40 mark end of topic test
Spring term revision assessments: CP1-2 Revision Assessment (40 marks)/CP3-6 Revision Assessment (40 marks) Paper 1 & Paper 2 mocks in November/December (60 marks) Paper 2 mock March (60 marks)		

Subject: SINGLE Physics **Year group: 11**

Topic	SP2 Motion and Forces	SP4 Waves	SP5Light and EM Spectrum	SP6 Radioactivity	Sp7 Astronomy
Prior Knowledge	● **CP2 Motion and Forces**	● **CP4 Waves**	**CP5Light and EM Spectrum**	● **CP6 Radioactivity**	● KS3: Space
Knowledge	● Estimate how the distance required for a road vehicle to stop in an emergency varies over a range of typical speeds ● Carry out calculations on work done to show the dependence of braking distance for a vehicle on initial velocity squared	● Know how to define ultrasound and infrasound in terms of frequency ● Understand how sound reflections are used in applications such as, sonar, radar and foetal scanning. ● Describe how the human ear transfers sound energy into electrical energy.	● Describe how changes, if any, in velocity, frequency and wavelength, in the transmission of sound waves ● Explain, with the aid of ray diagrams, reflection, refraction, TIR, and critical angle. ● Understand the difference between specular and diffuse reflection. ● Know that white light is a mixture of different colours of light. ● Understand how filters make coloured light. ● Understand the effect of viewing coloured objects in different colours of light. ● Understand that coloured surfaces and filters absorb some of the colours that are present in white light. ● Understand the factors that affect the power of a lens ● Know how different shaped lens refract light ● Understand how lens produce real and virtual images	● Understand the processes of fission & fusion. ● Understand that nuclear fission and fusion release energy that can be used to generate electricity. ● Understand the advantages and disadvantages of using nuclear energy ● Know that nuclear fission can lead to a chain reaction which is controlled in a nuclear reactor. ● Know that fusion is the energy source of stars such as our Sun. ● Understand that the conditions needed for fusion make it difficult to produce a practical and economic power station. ● Describe the dangers of ionising radiation in terms of tissue damage and possible mutations ● Explain how the dangers of ionising radiation depend on half-life a ● Explain the precautions taken to ensure the safety of people exposed to radiation, ● Compare and contrast the treatment of tumours using radiation applied internally or externally ● Explain some of the uses of radioactive substances in diagnosis of medical conditions, including PET scanners and tracers	● Know what objects make up our Solar System ● Understand how ideas about the Solar System have changed over time ● Understand how the force of gravity is responsible for keeping things like satellites and comets in orbit ● Understand how the speed of a satellite affects its radius of orbit ● Know how stars with masses similar to the Sun evolve over time ● Know how stars with masses greater than the Sun evolve over time ● Understand how the balance between thermal expansion and gravity affects stars. ● Know about the Doppler effect and red shift ● Understand how the red shift of stars varies with their distance ● Know of the steady state and big bang theories ● Understand how the red shift of stars provides evidence for the Big Bang
Disciplinary					
Literacy	Tier 3 Keywords	Tier 3 Keywords	Tier 3 Keywords	Tier 3 Keywords	Tier 3 Keywords

Numeracy	M: 1a,1c,1d,2a, 2b,2h,3a,3b,3c, 3d	M: 1a , 1c, 2a, 3a,3b,3c,3d,5b	M:5a,5b	M:1b,1c,3c,5b	M:2g, 5b
Personal Development	Career Links	Career Links		Career Links	Career Links
Assessment Pattern		40 mark end of topic test		40 mark end of topic test	40 mark end of topic test

Topic	**SP9 Forces and their Effects**	**SP11 Static Electricity**	**SP13 Electromagnetic Induction**	**SP15 Forces and Matter**
Prior Knowledge	● CP9 Forces and their Effects	● CP9 Electricity	● CP10 Electromagnetic Induction	● CP1 Forces ● CP2 Forces and Motion
Knowledge	● Describe situations where forces can cause rotation. ● Recall and use the equation: moment of a force.	● Explain how insulators can be charged by friction. ● Explain how electron transfer causes static electricity. ● Know that like charges repel. ● Describe dangers and uses of static electricity. ● Define an electric field as the region where an electric charge experiences a force ● Describe the shape and direction of the electric field around a point charge and between parallel plates ● Explain how the concept of an electric field helps to explain static electricity	● Use arrows to represent and calculate resultant forces. ● Explain how an alternating current in one circuit can induce a current in another circuit in a transformer ● Recall that a transformer can change the size of an alternating voltage ● Use the turns ratio equation for transformers to calculate either the missing voltage or the missing number of turns: ●	● Explain why the pressure in liquids varies with density and depth ● Use the equation to calculate the magnitude of the pressure in liquids and calculate the differences in pressure at different depths in a liquid: $P = h \times \rho \times g$ ● Explain why an object in a fluid is subject to an upwards force (upthrust) and relate this to examples including objects that are fully immersed in a fluid (liquid or gas) or partially immersed in a liquid ● Recall that the upthrust is equal to the weight of fluid displaced ● Explain how the factors (upthrust, weight, density of fluid) influence whether an object will float or sink
Disciplinary				
Literacy	Tier 3 Keywords	Tier 3 Keywords	Tier 3 Keywords	Tier 3 Keywords

Skills	M: 1a,1c,1d, 2a, 3a, 3b, 3c, 3d, 5b	M: 15b	M: 1a,1c,1d, 2a, 3a, 3b, 3c, 3d, 5b	M:1a,1b, 1c, 1d, 2a, 3a, 3b, 3c, 3d, 5b
Personal Development	Career Links	Career Links	Career Links	Career Links
Assessment Pattern	Paper 1 & 2 mock March (80 marks)			

Mathematical skills

Details of the mathematical skills in other science subjects are given for reference.

1	**Arithmetic and Numerical Computation**
a	Recognise and use expressions in decimal form
b	Recognise and use expressions in standard form
c	Use ratios, fractions and percentages
d	Make estimates of the results of simple calculations
2	**Handling Data**
a	Use an appropriate number of significant figures
b	Find arithmetic means
c	Construct and interpret frequency tables and diagrams, bar charts and histograms
d	Understand the principles of sampling as applied to scientific data
e	Understand simple probability
f	Understand the terms mean, mode and median
g	Use a scatter diagram to identify a correlation between two variables
h	Make order of magnitude calculations
3	**Algebra**
a	Understand and use the symbols: =, <, <<, >>,>, ∝, ~
b	Change the subject of an equation
c	Substitute numerical values into algebraic equations using appropriate units for physical quantities
d	Solve simple algebraic equations

4	**Graphs**
a	Translate information between graphical and numeric form
b	Understand that $y = mx + c$ represents a linear relationship
c	Plot two variables from experimental or other data
d	Determine the slope and intercept of a linear graph
e	Draw and use the slope of a tangent to a curve as a measure of rate of change
f	Understand the physical significance of area between a curve and the x-axis and measure it by counting squares as appropriate
5	**Geometry and Trigonometry**
a	Use angular measures in degrees
b	Visualise and represent 2D and 3D forms, including two dimensional representations of 3D objects
c	Calculate areas of triangles and rectangles, surface areas and volumes of cubes

Working Scientifically

The GCSE in Physics requires students to develop the skills, knowledge and understanding of working scientifically. Working scientifically will be assessed through examination and the completion of the core practical tasks.

1 Development of scientific thinking a Understand how scientific methods and theories develop over time. b Use a variety of models, such as representational, spatial, descriptive, computational and mathematical, to solve problems, make predictions and to develop scientific explanations and an understanding of familiar and unfamiliar facts. c Appreciate the power and limitations of science, and consider any ethical issues that may arise. d Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. e Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences. f Recognise the importance of peer review of results and of communicating results to a range of audiences. **2 Experimental skills and strategies** a Use scientific theories and explanations to develop hypotheses. b Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena.	**3 Analysis and evaluation** Apply the cycle of collecting, presenting and analysing data, including: a presenting observations and other data using appropriate methods. b translating data from one form to another. c carrying out and representing mathematical and statistical analysis. d representing distributions of results and making estimations of uncertainty. e interpreting observations and other data (presented in verbal, diagrammatic, graphical, symbolic or numerical form), including identifying patterns and trends, making inferences and drawing conclusions. f presenting reasoned explanations, including relating data to hypotheses. g being objective, evaluating data in terms of accuracy, precision, repeatability and reproducibility and identifying potential sources of random and systematic error. h communicating the scientific rationale for investigations, methods used, findings and reasoned conclusions through paper-based and electronic reports and presentations using verbal, diagrammatic, graphical, numerical and symbolic forms. **4 Scientific vocabulary, quantities, units, symbols and nomenclature** a Use scientific vocabulary, terminology and definitions. b Recognise the importance of scientific quantities and understand how they are

c Apply a knowledge of a range of techniques, instruments, apparatus and materials to select those appropriate to the experiment. d Carry out experiments appropriately, having due regard to the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. e Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative. f Make and record observations and measurements using a range of apparatus and methods. g Evaluate methods and suggest possible improvements and further investigations.	determined. c Use SI units (e.g. kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate. d Use prefixes and powers of ten for orders of magnitude (e.g. tera, giga, mega, kilo, centi, milli, micro and nano). e Interconvert units. f Use an appropriate number of significant figures in calculation.

Working scientifically skill areas 1 and 4 will be developed throughout the course and integrated with content. Skill areas 2 and 3 will be developed through teaching of core practical tasks. The details of provision for skill areas 2 and 3 are evidenced within the core practical task schemes of learning. Scientific literacy is subsumed within working scientifically. Schemes of Learning are detailed with key terminology and support the development of effective scientific communication.

Curriculum Implementation Mapping – Skills and Knowledge –Combined Science – Physics

Big ideas	Year 12	Year 12 Continued	Year 13	Year 13 Continued
Energy	**5 Work Energy Power** • Work, energy and power motion (Spec: 3.3) **11 Waves 1** • Wave motion (Spec: 4.4.1) • Electromagnetic waves (Spec: 4.4.2) 12 Waves 2 • Superposition (Spec: 4.4.3) • Stationary waves (Spec: 4.4.4)	**13 Quantum Physics** • Photons (Spec: 4.5.1) • The photoelectric effect (Spec: 4.5.2) • Wave particle duality (Spec: 4.5.3)	**27 Medical Physics** • Using X rays (Spec: 6.5.1) • Diagnostic methods in medicine (Spec: 6.5.2) • Using ultrasound (Spec: 6.5.3)	
Forces and Fields	**3 Motion** • Kinematics and dynamics (Spec: 3.1.1) • Linear motion (Spec: 3.1.2) • Projectile motion (Spec: 3.1.3) • Motion with non-uniform acceleration motion (Spec: 3.2.2) **4 Forces in Action** • Equilibrium motion (Spec: 3.2) • Density [and pressure] motion (Spec: 3.2.3, 3.2.4) **7 Laws of Motion and Momentum** • Newton's laws of motion (Spec: 3.5) • Momentum motion (Spec: 3.5.2)	**8 Charge and Current** • Charge and current motion (Spec: 4.1) **9 Energy, Power and Resistance** • E.m.f. and p.d. motion (Spec: 4.2.2) • Resistivity and resistance motion (Spec: 4.2.3, 4.2.4) • Power motion (Spec: 410 Electrical Circuits • Series and parallel circuits motion (Spec: 4.3.1) • Internal resistance motion (Spec: 4.3.2) • Potential dividers (Spec: 4.3.3)	**16 Circular Motion** • Circular motion (Spec: 5.2.1) • Centripetal force (Spec: 5.2.2) **17 Oscillations** • Simple harmonic oscillations (Spec: 5.3.1) • Energy of a simple harmonic oscillator (Spec: 5.3.2) • Damping (Spec: 5.3.3) **18 Gravitational Fields** • Point and spherical masses (Spec: 5.4.1) • Newton's law of gravitation (Spec: 5.4.2) • Planetary motion (Spec: 5.4.3) • Gravitational potential and energy (Spec: 5.4.4) **19 Stars** • Stars (Spec: 5.5.1) • Electromagnetic radiation from stars (Spec: 5.5.2) **20 Cosmology** • Cosmology (Spec: 5.5.3)	**21 Capacitance** • Capacitors (Spec: 6.1.1) • Energy stored by a capacitor (Spec: 6.1.2) • Charging and discharging capacitors (Spec: 6.1.3) **22 Electric Fields** • Point and spherical charges (Spec: 6.2.1) • Coulomb's law (Spec: 6.2.2) • Uniform electric field (Spec: 6.2.3) **23 Magnetic Fields** • Electric potential energy fields (Spec: 6.3.1) • Magnetic fields (Spec: 6.3.1) • Motion of charged particles (Spec: 6.3.3) • Electromagnetism (Spec: 6.3.3)
Matter and Materials	**6 Materials** • Springs motion (Spec: 3.4.1) • Mechanical properties of materials motion (Spec: 3.4.2)		**14 Thermal Physics** • Temperature (Spec: 5.1.1) • Solid, liquid and gas (Spec: 5.1.2) • Thermal properties of materials (Spec: 5.1.3) **15 Ideal Gases** • Ideal gases (Spec: 5.1.4)	**24 Particle Physics** • The nuclear atom fields (Spec: 6.4.1) • Fundamental particles fields (Spec: 6.4.2) **25 Radioactivity** • Radioactivity fields (Spec: 6.4.3) **26 Nuclear Physics**

				• Nuclear fission and fusion fields (Spec: 6.4.4)

Subject: Physics Year group: 12

Topic	Practical Skills and Foundation	Motion & Forces in Action	Work, Energy, Power & Materials	Current, Energy, Power, Resistance & Electrical Circuits	Waves and Quantum Physics
Prior Knowledge	**KS4 prior learning** ● CP1 Motion ● CP2 Forces and Motion ● CP7 Forces doing work ● Cp8 Forces and their effects	**KS4 prior learning** ● CP1 Motion ● CP2 Forces and Motion ● CP3 Conservation of Energy ● CP7 Forces doing work ● Cp8 Forces and their effects	**KS4 prior learning** ● CP2 Forces and Motion ● CP13 Forces and Matter	**KS4 prior learning** ● CP4 Waves ● CP5 Light and the EM Spectrum ● CP9 Electricity	**KS4 prior learning** ● CP4 Waves
Knowledge	**• Physical quantities (Spec: 1.1)** • S.I. units (Spec:2.1) • Measurements and uncertainties (Spec: 2.2) • Scalars and vectors (Spec: 2.3.1) • Planning, implementing, analysis and evaluation (Spec: 1.2.1)	**3 Motion** • Kinematics and dynamics (Spec: 3.1.1) • Linear motion (Spec: 3.1.2) • Projectile motion (Spec: 3.1.3) • Motion with non-uniform acceleration motion (Spec: 3.2.2) **4 Forces in Action** • Equilibrium motion (Spec: 3.2) • Density [and pressure] motion (Spec: 3.2.3, 3.2.4)	**5 Work Energy Power** • Work, energy and power motion (Spec: 3.3) **6 Materials** • Springs motion (Spec: 3.4.1) • Mechanical properties of materials motion (Spec: 3.4.2) **7 Laws of Motion and Momentum** • Newton's laws of motion (Spec: 3.5) • Momentum motion (Spec: 3.5.2)	**8 Charge and Current** • Charge and current motion (Spec: 4.1) **9 Energy, Power and Resistance** • E.m.f. and p.d. motion (Spec: 4.2.2) • Resistivity and resistance motion (Spec: 4.2.3, 4.2.4) • Power motion (Spec: 4**10 Electrical Circuits** • Series and parallel circuits motion (Spec: 4.3.1) • Internal resistance motion (Spec: 4.3.2) • Potential dividers (Spec: 4.3.3)	**11 Waves 1** • Wave motion (Spec: 4.4.1) • Electromagnetic waves (Spec: 4.4.2) **12 Waves 2** • Superposition (Spec: 4.4.3) • Stationary waves (Spec: 4.4.4) **13 Quantum Physics** • Photons (Spec: 4.5.1) • The photoelectric effect (Spec: 4.5.2) • Wave particle duality (Spec: 4.5.3)
Math Skills	M: 0.1, 1.1 1.5, 3.1,3.2, 3.3,3.4,3.5	M: 0.1, 0.3, 0.4,0.5, 0.6,1.1, 1.4 1.5,2.2,2.4,3.1,3.2,3.3,3.4,3.5,3.7,3.9, 4.1, 4.2,4.3, 4.4	M: 0.5,2.1,3.1 3.2,3.8, 3.9 3.12, 4.3	M: 0.2,2.2,2.3, 3.12,4.6	M:2.3,4.6
Assessment Pattern		1 x test Motion (50 marks) 1 x test Forces in Action (50 marks)	1 x test Work, Energy, Power & Materials (50 marks) 1 x test Laws of Motion & Momentum (50 marks)	1 x test Current, Energy, Power & Resistance (50 marks) 1 x test Electrical Circuits (50 marks)	1 x test Waves 2 (50 marks) 1 x test Quantum Physics and Waves 1 (50 marks)

	September Assessment (50 marks) End of year Exam (70 marks)

Subject: Physics **Year group: 13**

Topic	Thermal Physics and Gases	Circular Motion, Gravity and Oscillations	Stars and Cosmology	Capacitance, Electric Fields, Magnetism and Particles	Radioactivity, Nuclear Physics and Medical Physics
Prior Knowledge	**KS4 prior learning** ● CP2 Forces and Motion ● CP12 Particle Model	**KS4 prior learning** ● CP2 Forces and Motion ● SP7 Astronomy	**KS4 prior learning** SP7 Astronomy	**KS4 prior learning** ● CP6 Radioactivity ● CP9 Electricity ● CP10 Magnetism and Motor Effect ● CP11 Electromagnetic Induction	**KS4 prior learning** ● CP6 Radioactivity ● CP5 Light and the EM Spectrum
Knowledge	**14 Thermal Physics** • Temperature (Spec: 5.1.1) • Solid, liquid and gas (Spec: 5.1.2) • Thermal properties of materials (Spec: 5.1.3) **15 Ideal Gases** • Ideal gases (Spec: 5.1.4)	**16 Circular Motion** • Circular motion (Spec: 5.2.1) • Centripetal force (Spec: 5.2.2) **17 Oscillations** • Simple harmonic oscillations (Spec: 5.3.1) • Energy of a simple harmonic oscillator (Spec: 5.3.2) • Damping (Spec: 5.3.3) **18 Gravitational Fields** • Point and spherical masses (Spec: 5.4.1) • Newton's law of gravitation (Spec: 5.4.2) • Planetary motion (Spec: 5.4.3) • Gravitational potential and energy (Spec: 5.4.4)	**19 Stars** • Stars (Spec: 5.5.1) • Electromagnetic radiation from stars (Spec: 5.5.2) **20 Cosmology** • Cosmology (Spec: 5.5.3)	**21 Capacitance** • Capacitors (Spec: 6.1.1) • Energy stored by a capacitor (Spec: 6.1.2) • Charging and discharging capacitors (Spec: 6.1.3) **22 Electric Fields** • Point and spherical charges (Spec: 6.2.1) • Coulomb's law (Spec: 6.2.2) • Uniform electric field (Spec: 6.2.3) **23 Magnetic Fields** • Electric potential energy fields (Spec: 6.3.1) • Magnetic fields (Spec: 6.3.1) • Motion of charged particles (Spec: 6.3.3) • Electromagnetism (Spec: 6.3.3) **24 Particle Physics** • The nuclear atom fields (Spec: 6.4.1) • Fundamental particles fields (Spec: 6.4.2)	**25 Radioactivity** • Radioactivity fields (Spec: 6.4.3) **26 Nuclear Physics** • Nuclear fission and fusion fields (Spec: 6.4.4) **27 Medical Physics** • Using X rays (Spec: 6.5.1) • Diagnostic methods in medicine (Spec: 6.5.2) • Using ultrasound (Spec: 6.5.3)
Math Skills	M: 2.2, 2.4, 3.9, 3.12,4.7,	M:0.4, 1.4, 2.3, 4.6		M: 0.3,0.4,0.5, 1.4,2.5, 3.1, 3.2, 3.3,3.8,3.9 3.10,3.11, 3.12,	M:0.3 0.4,0.5, 1.3, 1.4,2.5, 3.9, 3.11,3.12,
Assessment Pattern	1 x test Thermal Physics & Ideal Gases (50 marks)	1 x test Circular Motion and Gravity (50 marks) 1 x test Oscillations (50 marks)	1 x test Stars & Cosmology (50 marks)	1 x test Capacitance & Electric Fields (50 marks)	1 x test Radioactivity & Nuclear Physics (50 marks)

				1 x test Magnetism & Particles (50 marks)	1 x test Medical Imaging (50 marks)
Start of Year 13: AS paper (70 marks) End of year Exam (2 x 100 marks, 1x70 marks)					

Practical skills 1 and 4 will be developed throughout the course and integrated with content. Skill areas 2 and 3 will be developed through teaching of core practical tasks. The details of provision for skill areas 2 and 3 are evidenced within the core practical task schemes of learning.

Mathematical Requirements:

M0.1	Recognise and make use of appropriate units in calculations
M0.2	Recognise and use expressions in decimal and standard form.
M0.3	Use ratios, fractions and percentages
M0.4	Estimate Results
M0.5	Use a calculator to use power, exponential and logarithm functions
M0.6	Use calculators to handle sin x, cos x and tan x when x is expressed in radians or degrees
M1.1	Use an appropriate amount of significant figures
M1.2	Find arithmetic means
M1.3	Understand simple probability
M1.4	Make order of magnitude calculations
M1.5	Identify uncertainties in measurements and use simple techniques to determine uncertainty when data are combined by addition, subtraction, multiplication, division and raising to powers
M2.1	Understand and use the symbols = < ≪ > ≫ ∝ ≈ Δ
M2.2	Change the subject of the equation, including non
M2.3	Substitute numerical values into algebraic equations using appropriate units for physical quantities
M2.4	Solve algebraic equations, including quadratics
M2.5	Use logarithms in context with quantities that range over several orders of magnitude
M3.1	Translate information between graphical, numerical and algebraic forms
M3.2	Plot two variables from experimental or other data
M3.3	Understand that y=mx+c represents a linear relationship
M3.4	Determine the slope and intercept of a linear graph
M3.5	Calculate rate of change from a linear graph
M3.6	Draw and use the slope of a tangent as a measure of a rate of change
M3.7	Distinguish between instantaneous and average rate of change
M3.8	Understand the possible physical significance of the area between the curve and the x axis and be able to calculate or estimate it by graphical methods as appropriate
M3.9	Apply the contexts underlying calculus (but without using the explicit use of derivatives and integrals) by solving equations involving rates of change using a graphical or spreadsheet approach

M3.10	Interpret logarithmic plots
M3.11	Use logarithmic plots to determine exponential and power law relationships
M3.12	Sketch relationships
M4.1	Use angles in regular 2D and 3D structures
M4.2	Visualise and represent 2D and 3D forms including 2D representations of 3D objects
M4.3	Calculate areas of triangles, circumferences and areas of circles, surface areas and volumes of rectangular blocks, cylinders and spheres
M4.4	Use Pythagoras's Theorem and the angle sum of a triangle
M4.5	Use sin, cos and tan in physical problems
M4.6	Use of small angle approximations for sin, cos and tan
M4.7	Understand the relationship between degrees and radians and translate from one to another