Character and Transferable Skills at KS4 Science (Unit: Biology)

Unit	Specification reference	Transferable skill/ BEST Habit/SMSC	Significance
B2	4.2.2.6 The effect of lifestyle on some non-communicable diseases	TS: Students should be able to translate information between graphical and numerical forms; and extract and interpret information from charts, graphs and tables in terms of risk factor, BH: Perseverance SMSC: Many diseases are caused by the interaction of a number of factors	Link to real-life examples: Current global pandemic-
B3	4.3.1.1 Communicable (infectious) diseases	TS: Students should be able to explain how diseases caused by viruses, bacteria, protists and fungi are spread in animals and plants. BH: Perseverance SMSC: Viruses live and reproduce inside cells, causing cell damage.	Link to real-life examples: Current global pandemic (Omicron)
B3	4.3.1.7 Vaccination	TS: Students do not need to know details of vaccination schedules and side effects associated with specific vaccines. BH: Perseverance SMSC: Evaluate the global use of vaccination in the prevention of disease	Evaluate the global use of vaccination in the prevention of disease.

B3	4.3.1.9 Discovery and development of drugs	TS: Students should be able to translate information between graphical and numerical forms; and extract and interpret information from charts, graphs and tables in terms of risk factor, BH: Perseverance SMSC: Students should be able to describe the process of discovery and development of potential new medicines, including preclinical and clinical testing	Understand that the results of testing and trials are published only after scrutiny by peer review- current pandemic vaccines (Pfizer and Astra Zeneca)

TOPIC	TRIPLE	COMBINED
4.5.2.1 NERVOUS SYSTEM	NEUROLOGY CAREER DRUGS EFFECT ON REACTION TIME-LINKS WITH DRINK DRIVING, MOTOR SKILLS	NEUROLOGY-CAREER DRUGS EFFECT ON REACTION TIME
4.5.3.2 Controlling blood glucose	Evaluate information around the relationship between obesity and diabetes, and make recommendations taking into account social and ethical issues. Links with risk factors to covid	Evaluate information around the relationship between obesity and diabetes, and make recommendations taking into account social and ethical issues.
4.5.3.3 Maintaining water and nitrogen balance	Everyone a donor except opt out. New law May 2020-donor cards obsolete. Importance of organ donations. Explore ideas around SMSC.	Everyone a donor except opt out. New law May 2020-donor cards obsolete. Importance of organ donations. Explore ideas around SMSC.
4.6.1.6 Inheritance, 4.6.2.1 variation, 4.6.2.2 evolution	Mutations driving evolution-antibiotic resistance MRSA, evolution of covid and variation SMSC-theory itself	

	4.6.2.4Designer babies-link STEM cells therapy. SMSC	
4.7 Ecology	Career- zoologists, climatologist, vets Climate change Biodiversity Waste management/land use Eco warriors	

Character and Transferable Skills at KS4 (Unit: Chemistry)

Unit	Specification reference	Transferable skill/ BEST Habit/SMSC	Significance
C1	4.1.1.3 The development of the model of the atom	TS: Adaptability/ leadership BH: Resilience	How models have evolved over time. Adapting to new evidence to form new theories.
C2	4.2.1.3 Ionic compounds 4.2.1.4 Covalent bonding	TS: Creativity/ Resilience/ adaptability	Using models to visualize topics, but there are limitations to these models (being adaptable to different visualisations, eg ball and stick/ dot and cross.
C2	4.2.4.1 Sizes of particles and their properties 4.2.4.2 Uses of nanoparticles	TS:Problem-solving	Be aware of size/ scale Uses in everyday industries. Importance of surface area: volume ratio
C3	4.3.1.3 Mass changes when a reactant or product is a gas 4.3.2.4 Limiting reactants (HT only) 4.3.4 Using concentrations of solutions in mol/dm3 (chemistry only) (HT only 4.3.3 Yield and atom economy of chemical reactions (chemistry only	TS: Problem solving/ aiming high. Resillience SMSC: Links to industry, everyday use of these calculations	Calculations involving molar ratio Maximising yield to maximising profit, very important to companies
C4	4.4.1.3 Extraction of metals and reduction	SMSC: Links to everyday use of metals	Why metal extraction is important. Uses of metals. Energy requirements/ costs

	4.4.1.4 Oxidation and reduction in terms of electrons (HT only 4.4.2.2 Neutralisation of acids and salt production 4.4.3.3 Using electrolysis to extract metals 4.4.3.4 Electrolysis of aqueous solutions	Problem solving TS: Problem solving SMSC: Links to everyday life SMSC: Links to importance of Aluminum SMSC: Links to different products made from brine TS: Problem solving/ creativity	Write ionic and half equations. Choosing the correct acid/ base for salt production Everyday uses of Aluminium Be able to identify ion that discharges in ionic solutions at each electrode
C5	4.5.1.1 Exothermic and endothermic reactions 4.5.2.2 Fuel cells	TS: Problem solving, BH: Perseverance SMSC: Everyday uses of Exothermic and Endothermic reactions BH: Bravery TS: Leadership/ problem solving (Half equations and explanations) SMSC – Link to how Hydrogen fuel cells are better for the environment – fuel for the future?	Link to real-life examples: self-heating can, hand warmers, sports injury packs How can we generate electricity without polluting the atmosphere? Links to COP26 Present a case of why the issue is important and how an argument is presented/ stand up for own beliefs

C6	4.6.1	TS: Calculations, graph skills data interpretation and manipulation. BH: Team BA- Practical	

		SMSC: Catalysts, cooking	
C6	4.6.2	TS: Weighing up a compromise answer. BH: Team BA- Practical SMSC: Moral ambiguity of Fritz Haber.	
C7	4.7.1	TS- Flowcharts BH: Self discipline- personal responsibility for climate change. SMSC: Climate change, Geopolitics, energy supply, pollution.	Link to real life petrochemistry/ supply and demand of commodities
C7	4.7.2	TS: BH: Teamwork- Practical Skills SMSC: Sustainability in the production of ethanol. Alcohol consumption alcohol poisoning.	Link to real life: Solvents, paints, glue
C7	4.7.3	TS: Weighing up a compromise answer. BH: Bravery, Excellence - Franklin SMSC: Pollution waste, recyclability/ landfill.	
C8	4.8 (1 and 2)	TS: Maths skills- Ratio and Rf BH: Teamwork - practical skills SMSC: pollution analysis, exploration of space.	Link to real life forensic science, analysis of pollution, fireworks,
C9		TS: Geography formation of the earth, Comprehension longer texts and extended answers. Interpreting data- graphs and pie charts	Link to real life climate change, air pollution, acid rain, sustainability of energy production.

		BH: Self Discipline- Personal responsibility for climate change Bravery/resilience: the climate change movement- Greta Thunberg- Al Gore. SMSC: Climate Change, pollution, Ozone hole, acid rain, car pollution	
C10		TS: Sustainability. Pros and cons of a material. D&T evaluating the suitability of materials. Research and reporting. BH: Self Discipline- Personal responsibility for recycling SMSC: Life cycle assessments, drinking water supply, Moral ambiguity of Fritz Haber.	Link to real life goods that need to be weather resistant, construction materials- Alloys, recycling.

Character and Transferable Skills at KS4 (Unit: Physics)

Unit	Specification reference	Transferable skill/ BEST Habit/SMSC	Significance
P1 Energy	4.1.2 Conservation and dissipation of energy	Problem solving	Use the principle of conservation of energy
P2 Electricity	4.2.1 Current, potential difference and resistance	Critical thinking	Understand why a current in a resistor results in the electrical transfer of energy and an increase in temperature, and how this can be used in a variety of domestic contexts
	4.2.1 Current, potential difference and resistance	Problem solving	Calculate the currents, voltages and resistances of two resistive components connected in a series circuit
	4.2.2 Series and parallel circuits	Analysis	Explain why a series or parallel circuit is more appropriate for particular applications, including domestic lighting
	4.2.1 Current, potential difference and resistance	Interpretation	Understand why current is conserved at a junction in a circuit
	4.2.3 Domestic uses and safety	Decision making	Selection of various safety precautions in domestic electricity
	4.2.3 Domestic uses and safety	Decision making	Understand how the uses of insulation, double insulation, earthing, fuses and circuit breakers protect the device or user in a

	4.2.1 Current, potential difference and resistance	Adaptive learning	range of domestic appliances Describe how current varies with voltage in wires, resistors, metal filament lamps and diodes, and how this can be investigated experimentally
P4 Atomic Structure	4.4.2 Atoms and nuclear radiation 4.4.2 Atoms and nuclear radiation	Problem solving Personal and social responsibility	Use the concept of half-life to carry out simple calculations on activity including graphical methods Describe the dangers of ionizing radiation

Unit	Specification reference	Transferable skill	Significance
5. Forces	4.5.1.1 Scalar and vector quantities 4.5.6.1.1 Distance and displacement	TS: Mathematical skills in how vectors come into play in everyday life (e.g., journey to school) BH: Self Discipline & Excellence	Journey to school – quickest method; to be on time (Punctual)
5. Forces	4.5.6.1.3 Velocity 4.5.6.1.5 Acceleration	TS: Mathematical skills – analyse graphs and do calculations BH: Motivations and consistency (Team BA)	Students to become better analysts – to understand sports and how to improve as athletes
5. Forces	4.5.6.3.2 Reaction time	TS: explain methods to measure human reaction times and recall typical results Numerical skills: interpret and evaluate	Students' development of a skill to improve on standards and performance. Self-Discipline

		measurements from simple methods BH: Excellence	
6. Waves	4.6.1.1 Transverse and longitudinal waves 4.6.1.4 Sound waves (HT only) 4.6.2.1 Types of electromagnetic waves	TS: Recall of waves and interpreting wave diagrams to real work appliances. Know the difference between water waves and sound waves. And the mode of vibrations BH: Excellence	Students understand how their Bluetooth/Wi-Fi works for them. Students also will distinguish difference between water waves and sound waves. They know the use of ultrasound. Know what happens in earthquakes and tsunami
6. Waves	4.6.2.5 Lenses	TS: Optical defects, drawing (ray diagrams for convex and concave lenses) and observation skills. Calculation skills BH: Excellence	Students know what long sight and short is. Understand why it happens and how lenses work to correct it (e.g., spectacles, contact lenses).
6. Waves	4.6.2.2 Properties of electromagnetic waves 1 & 2	TS: Understand different frequencies for different applications (e.g., microwave, Bluetooth) BH: Excellence	Students recognize how their mobile phones work, microwave, heater etc.
7. Magnetism and electromagnetism	4.7.3.2 Uses of the generator effect	TS: Application of the generator effect, understanding of alternating current BH: Excellence	Students understand how wind turbines work. They see these all the time and understand how they generate electricity (eco reasons)
7. Magnetism and electromagnetism	4.7.3.4 Transformers (HT only)	TS: Transmitting electricity from power stations to user; UK Mains specifications	Students understand how transmission of electricity takes place in their home, including

		and Wiring of a plug (fuses, etc.) BH: Bravery, Excellence & Self Discipline	electrical safety and uses. They know how to change a plug fuse and know the colours of the wiring in a British standard plug
8. Space physics	4.8.1.3 Orbital motion, natural and artificial satellites	TS: Identifying how space orbit and uses of satellites for weather forecasts, broadcasting (e.g., Sky TV) space exploration. BH: Excellence and Team BA	Students understand what the international space station is. They recall recent news on Bezoz's Spaceship and Elon Musk's Space X adventures
8. Space physics	4.8.2 Redshift	TS: Bringing knowledge on the solar system and possible discussions regarding religion in terms of creation BH: Bravery and Team BA	Students want to learn more about our universe and how it has developed (Spiritual area of SMSC) – Idea of Creation (Big bang) and origins of the universe