Transferable Skills International GCSE Subject Mapping: Science Double Award

Transferable skills will help students cope with the different demands of degree study and provide a solid skills base that enables them to adapt and thrive in different environments across educational stages; and ultimately into employment. A good international education should enable students to start developing transferable skills as early as possible. Developing these transferable skills where they naturally occur as part of the International GCSE curriculum can help build learner confidence and embed the importance of this well-rounded development.

Our approach to enhancing transferable skills in our International GCSEs ensures that it is not only the academic and cognitive skills that are developed, but those broader elements that universities highlight as being essential for success. Skills such as self-directed study, independent research, self-awareness of own strengths and weaknesses and time-management are skills that students cannot learn from a textbook but have to be developed through the teaching and learning experience that can be provided through an international curriculum.

In the tables below, we have taken a framework of skills and provided mapping to suggest where each skill can be assessed, and where each skill could be developed for this subject. This will enable teachers and learners to understand where they are developing each skill, and examples of how they can develop each skill through this International GCSE.

NRC framework skill	Skill interpretation in this subject	Where the skill is covered in content	Where the skill is explicitly assessed in examination	Opportunity for the skill to be developed through teaching and learning approach
Cognitive skills				
Cognitive Processes and Strategies				
Critical thinking	Using many different pieces of information from the three sciences and synthesise this information to make judgements.	Examples in several parts of the specification including: Biology 2.15 - 2.16 Movement of substances into and out of cells 4.12 Understand the biological consequences of pollution of air by sulfur dioxide and by carbon monoxide j. Co-ordination and response Understand how organisms are able to respond to changes in their environment Chemistry 1.22 Understand how the electronic configuration of a main group element is related to its position in the Periodic Table 1.31 Understand how the formulae of simple compounds can be obtained experimentally, including metal oxides, water and salts containing water of crystallisation **4.46** Understand how to deduce the structure of a monomer from the repeat unit of an addition polymer and vice versa. Physics 2.3 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. 6.12Understand why a force is exerted on a current-carrying wire in a magnetic field, and how this effect is applied in simple d.c. electric motors and loudspeakers	e.g. Biology SAM Paper 1 Qu 6(c) SAM Paper 1 Qu 7(c) SAM Paper 1 Qu 11 Chemistry SAM Paper 1 Qu 6 Physics SAM Paper 1 Qu 8(d) SAM Paper 1 Qu12 a(iv)	Yes

Problem solving	Apply the principles and concepts of three sciences, including those related to the applications of physics, chemistry and biology in different contexts	Examples in several parts of the specification including: Biology 3.2 Understand that fertilisation involves the fusion of a male and female gamete to produce a zygote that undergoes cell division and develops into an embryo. Chemistry 1.22 Understand how the electronic configuration of a main group element is related to its position in the Periodic Table 1.31 Understand how the formulae of simple compounds can be obtained experimentally, including metal oxides, water and salts containing water of crystallisation **4.46** Understand how to deduce the structure of a monomer from the repeat unit of an addition polymer and vice versa. Physics 1.8 Determine acceleration from the gradient of a velocity-time graph 1.9 Determine the distance travelled from the area between a velocity-time graph and the time axis. 2.19 Calculate the currents, voltages and resistances of two resistive components connected in a series circuit 3.15 Use the law of reflection (the angle of incidence equals the angle of reflection) 4.3 Use the principle of conservation of energy 5.2 Use the relationship between the pressure and volume of a fixed mass of gas at constant temperature. 7.13 Use the concept of half-life to carry out simple calculations on activity including graphical methods.	e.g. Biology SAM Paper 1 Qu 9 Chemistry SAM Paper 1 Qu 6 Physics SAM Paper 1 Qu 2 SAM Paper 1 Qu 2 SAM Paper 1 Qu 7(c) SAM Paper 1 Qu 10(a) SAM Paper 1 Qu 2(c) SAM Paper 1 Qu 4(b)	Yes
Analysis	Analyse and interpret data and experimental methods, drawing conclusions, which are consistent with evidence from experimental activities.	Examples in several parts of the specification including: Biology 2.34 Understand how the process of respiration produces ATP in living organisms 3.39 Understand how resistance to antibiotics can increase in bacterial populations, and appreciate how such an increase can lead to infections	e.g. Biology SAM Paper 1 Qu 3 SAM Paper 1 Qu 8 Chemistry SAM Paper 1 Qu 2	Yes

		2.67 Understand how factors may increase the risk of developing coronary heart disease 4.5 Understand how abiotic and biotic factors affect the population size and distribution of organisms Chemistry 1.22 Understand how the electronic configuration of a main group element is related to its position in the Periodic Table 2.16 Understand how metals can be arranged in a reactivity series based on their displacement reactions Physics 1.7 Plot and explain velocity-time graphs 1.12 Identify different types of force such as gravitational or electrostatic 1.20 Describe the factors affecting vehicle stopping distance including speed, mass, road condition and reaction time **2.7** Explain why a series or parallel circuit is more appropriate for particular applications, including domestic lighting	SAM Paper 1 Qu 11 (a), 11(b), 11(c) SAM Paper 1 Qu 5 Physics SAM Paper 1 Qu 6 SAM Paper 1 Qu 12 (a) SAM Paper 2 Qu 2 (c) SAM Paper 2 Qu 3 (a)	
Reasoning	Evaluate information related to physics, chemistry and biology, making judgements on the basis of this information. .	Examples in several parts of the specification including: Biology 1.4 Understand that viruses are not living organisms 2.11 Understand how the functioning of enzymes can be affected by changes in temperature, including changes due to change in active site A. Food production 5.2 Understand the effects on crop yield of increased carbon dioxide and increased temperature in glasshouses 5.3 Understand how the use of fertiliser can increase crop yield 5.4 Understand the reasons for pest control and the advantages and disadvantages of using pesticides and biological control with crop plants Chemistry	e.g. Chemistry SAM Paper 1 Qu3(c) Physics SAM Paper 1 Qu 6 (c) SAM Paper 1 Qu 12(b)	Yes

		2.3 Use knowledge of the properties of potassium, lithium and sodium to predict the properties of other alkali metals Physics 8.6 Understand how stars can be classified according to their colour		
Interpretation	Select, organise and present relevant information clearly and logically using appropriate vocabulary, definitions and conventions.	Examples in several parts of the specification including: Biology 2.36 Describe the differences between aerobic and anaerobic respiration 2.47 Understand the role of the intercostal muscles and the diaphragm in ventilation Chemistry .3 Understand how the results of experiments involving the dilution of coloured solutions and diffusion of gases can be explained 4.25 Explain why alkenes are classified as unsaturated hydrocarbons Physics 2.17 Understand why current is conserved at a junction in a circuit 3.8 Explain why there is a change in the observed frequency and wavelength of a wave when its source is moving relative to an observer, and that this is known as the Doppler Effect	e.g. Chemistry SAM Paper 1 Qu 2(b) SAM Paper 1 Qu 7(a) Physics SAM Paper 1 Qu 8(d) SAM Paper 1 Qu 9 SAM Paper 2 Qu 2(a), 2(b)	Yes
Decision Making	Evaluate data and experimental methods, drawing conclusions, which are consistent with evidence from secondary sources and experimental activities. Suggest possible improvements and further investigations.	Examples in several parts of the specification including: Biology 2.9 *Embedded Practical: Investigate food samples for the presence of glucose, starch, protein and fat.* Chemistry Selection of appropriate separation method 1.10 Describe these experimental techniques for the separation of mixtures: • simple distillation • fractional distillation • filtration • crystallisation	e.g. Biology SAM Paper 1 Qu 8 Chemistry SAM Paper 1 Qu4(c) SAM Paper 1 Qu5(a) SAM Paper 1 Qu 10(a) Physics	

		paper chromatography. Physics Selection of appropriate safety precautions in domestic electricity 2.2 Understand how the uses of insulation, double insulation, earthing, fuses and circuit breakers protect the device or user in a range of domestic appliances	SAM Paper 1 Qu 3(c) SAM Paper 1 Qu 4 (b) SAM Paper 1 Qu 12 (a) (iii)	
Adaptive learning	Learn about unifying patterns and themes in the three sciences and use them in new and changing situations.	Examples in several parts of the specification including: Biology 2.15 Understand how the functioning of enzymes can be affected by changes in temperature, including changes due to change in active site 3.25 Predict probabilities of outcomes from monohybrid crosses Chemistry 1.1 Understand the three states of matter in terms of the arrangement, movement and energy of the particles 1.19 Understand how the electronic configurations of the first 20 elements can be deduced from their positions in the Periodic Table 1.23 Understand why elements in the same group of the Periodic Table have similar chemical properties Physics 2.9 Describe how current varies with voltage in wires, resistors, metal filament lamps and diodes, and how this can be investigated experimentally 3.4 Know that waves transfer energy and information without transferring matter 4.7 Explain the role of convection in everyday phenomena	e.g. Biology SAM Paper 1 Qu 9 (c), 9(d) Chemistry SAM Paper 1 Qu 1 SAM Paper 1 Qu 6 Physics SAM Paper 1 Qu 5 (a)(ii), (b) SAM Paper 1 Qu 11	Yes
Executive function	Use experimental and investigative skills based on correct and safe laboratory techniques. Evaluate the effectiveness of an investigation in terms of accuracy, validity and reliability.	Use the embedded practicals to develop investigative skills. Evaluate their effectiveness. Plan investigations using the skills developed in the embedded practicals.e. “plan”?)		

Creativity				
Creativity	Apply existing knowledge of scientific processes to situations set in an unfamiliar context.	Command words such as 'show that' and 'comment on' require candidates to use ideas developed within the specification to answer questions set in an unusual context.	e.g. SAM Paper 2 6(d)	Yes May be evidenced in homework tasks
Innovation	Using a novel strategy to apply existing knowledge of scientific concepts in unaccustomed situations.	Questions involving a critical analysis of unfamiliar data in tabular or graphical form.		Yes

NRC framework skill	**Skill interpretation in this subject**	**Where the skill is covered in content**	**Where the skill is explicitly assessed in examination**	**Opportunity for the skill to be developed through teaching and learning approach**
Intrapersonal skills				
Intellectual openness				
Adaptability	Ability to select and apply knowledge and understanding of scientific processes, which is not prompted or provided to scientific problems.	Many questions would assess this		Yes
Personal and social responsibility	Appreciate ethical issues in science.	Biology 2.49 Understand the biological consequences of smoking in relation to the lungs and the circulatory system, including coronary heart disease Chemistry 2.13 Know that carbon dioxide is a greenhouse gas and that increasing amounts in the atmosphere may contribute to climate change 4.13 Understand why carbon monoxide is poisonous, in terms of its effect on the capacity of blood to transport oxygen 4.16 Understand how sulfur dioxide and oxides of nitrogen oxides contribute to acid rain Physics 3.13 Explain the detrimental effects of excessive exposure of the human body to electromagnetic waves 7.16 Describe the dangers of ionising radiations		Yes
Continuous learning	Planning and reflecting on own learning- setting goals and meeting them regularly			Yes Students identify areas where they need extra help or practice.
Intellectual interest and curiosity	Identifying a problem under own initiative, planning a solution and carrying this out.			Yes in sections like astronomy
Work ethic/conscientiousness				
Initiative	Using scientific knowledge, independently (without guided learning), to further own understanding.			Yes Reading New Scientist
Self-direction	Planning and carrying out science based problem solving under own direction.			Yes

Responsibility	Taking responsibility for any errors or omissions in own work and creating a plan to improve.			Yes
Perseverance	Actively seeking new ways to continue and improve own learning despite setbacks.			Yes
Productivity	Develop a fluency in technical language so sophisticated answers of depth are produced in extended answers to scientific questions.	Some of the longer questions that require several steps would assess this.	e.g. Biology SAM Paper 1 Qu 6(c) Chemistry SAM Paper 1 Qu 7(c) Physics SAM Paper 1 Qu 11	Yes
Self regulation (metacognition, forethought, reflection)	Developing and refining a strategy over time for applications of science, to different contexts reflecting on the success or otherwise of the strategy			Yes
Ethics	Producing output with a specific moral purpose for which one is accountable.			Yes
Integrity	Taking ownership for own work and willingly responds to questions and challenges.			Yes
Positive Core Self Evaluation				
Self monitoring/self evaluation/self reinforcement	Planning and reviewing own work as a matter of habit.			Yes

NRC framework skill	**Skill interpretation in this subject**	**Where the skill is covered in content**	**Where the skill is explicitly assessed in examination**	**Opportunity for the skill to be developed through teaching and learning approach**
Interpersonal skills				
Teamwork and collaboration				
Communication	Able to communicate a scientific process or technique (verbally or written) to peers and teachers and answer questions from others.			Yes e.g. in group discussion
Collaboration	Carrying out a peer review to provide supportive feedback to another.			Yes
Teamwork	Working with other students in a science based problem-solving exercise.	Numerous opportunities for collaborative practical work.		Yes
Co-operation	Sharing own resources and own learning techniques with other students.			Yes
Interpersonal skills	Using verbal and non-verbal communication skills in a dialogue about science.			Yes
Leadership				
Leadership	Leading others in a group activity to effectively solve a scientific problem			Yes
Responsibility	Taking responsibility for the outcomes of a team			Yes

	exercise even if one is not solely responsible for the output.			
Assertive communication	Chairing a debate, allowing representations and directing the conversation to a conclusion.			Yes
Self presentation	Presenting a scientific problem or idea to an audience to seek solutions.			Yes