Transition Work for Prospective A Level Science Students

'A' Levels are much more intellectually challenging than GCSEs and even students with top GCSE grades sometimes struggle with this adjustment. The Sciences at 'A' Level are viewed as especially hard, as there is a vast increase in content and the depth. There is also a different emphasis in the type of learning involved, with more time spent on independent research tasks in order to follow-up and build-upon classwork. Some students find the change from GCSE to 'A' Level Sciences very difficult.

To help you make this transition smoothly and to give you the best possible start, your A-level teachers have prepared these induction tasks. They are designed to give you background knowledge and a flavour of what you can expect in the subject at A Level. The tasks will help you review your existing knowledge of the topics and prepare you for the increased demands of Level 3 Learning as there are several learning outcomes that require you to research a topic so that you become familiar with new vocabulary and concepts.

The tasks are based on the CGP Head Start to A-Level Sciences – Bridging the gap between GCSE and A-Level.

You will need a subject – specific book;

New Head Start to A-level Biology (Product Code: BBR71 - ISBN: 978 1 78294 279 5)

New Head Start to A-level Chemistry (Product Code: CBR71 - ISBN: 978 1 78294 280 1)

New Head Start to A-level Physics (Product Code: PBR71 - ISBN: 978 1 78294 281 8)

The books retail at £4.95 on Amazon or through School they can be bought for £2:50. **If you wish to buy the books at the reduced price, you will need to bring £2.50 for each Science subject that you will be studying, to the Science Prep Room at the latest by Wednesday July 8th. We will order the books and they can be collected from the Prep Room by Monday 13th June.** You will also need to collect an A4 exercise book to complete the tasks in.

It is important that you read through the relevant pages of the Headstart book and then complete the tasks before you start the course in September. It is our requirement that you complete **all the induction tasks** for each AS subject you have chosen and bring them to your first lesson in September.

At the beginning of the course you will be given a test to check how well you have understood the topics. If you do not pass this test, you will be put into an intervention class. This class will help you to bring your knowledge and understanding up to the required standard.

If you need any further information then you can speak to the relevant subject teachers.

Mrs H. Kaushal

Key Stage 5 Coordinator for the Sciences

Topic areas	Learning outcome	Evidence: page no.	Red	Amber	Green
Symbols and units	State the quantities used in AS physics and give their symbols and their units				
	Show you can use index notation e.g. ms^{-1} rather than m/s				
	Describe large or small numbers using standard form				
	Use multiples from 10^{12} to 10^{-15}				
Speed, displacement and velocity	Give definitions of speed, displacement and velocity				
	Use $speed = \frac{distance}{time}$ including problems involving rearranging the equation				
Vectors	Give the definition of a vector				
	Be able to represent vectors using arrows drawn to scale				
	Add two vectors together using scale drawings				
	Add two vectors, which are at right angles, together using Pythagoras' theorem				
	Resolve a vector into horizontal and vertical components				
Acceleration	Give the definition of acceleration				
	Explain why acceleration can be negative or positive				
	Use $acceleration = \frac{final\ velocity - initial\ accleeration}{time}$ including problems involving rearranging the equation				
	Solve problems involving the acceleration due to gravity ($g=9.81ms^{-1}$)				
Displacement-time graphs	Describe a journey by interpreting data from a displacement-time graph				
	Calculate the speed of an object from its displacement-time graph				
Velocity-time graphs	Describe a journey by interpreting data from a velocity-time graph				
	Calculate the distance travelled by an object by calculating the area under its velocity-time graph				
	Calculate the acceleration of an object from its velocity-time graph				
Forces	Calculate the resultant of two forces using scale drawing				
	Calculate the resultant of two forces using Pythagoras' theorem				
	State Newton's first law				
	Explain what a resultant force is				
	State Newton's second law				
	Use $force = mass \times acceleration$ including problems involving rearranging the equation				
	Stae Newton's third law				
	Describe the structure and function of cellulose.				

Kinetic and gravitational potential energy and conservation	Know what kinetic energy is				
	Use $kinetic\ energy = {}^{1}/_{2} \times mass \times speed^2$ including problems involving rearranging the equation				
	Know what gravitational potential energy (GPE) is				
	Use $E_P = m \times g \times h$ including problems involving rearranging the equation				
	State the principle of conservation of energy				
	Calculate the speed of a falling object knowing its initial GPE or height				
	Calculate the height reached by an object knowing its launch velocity or kinetic energy				
Work and power	Give the definition of work				
	Use the equations $W = F \times s$ and $W = Fcos\theta \times s$ including problems involving rearranging the equations				
	Solve problems involving the transfer of work into kinetic energy and/or GPE				
	Give the definition of power				
	Use the equations $P = \frac{work}{time}$ and $power = force \times speed$ including problems involving rearranging the equation				
	Use the equation $efficiency = \frac{useful\ energy\ out}{total\ energy\ in} \times 100\%$ including problems involving rearranging the equation				
Forces and springs	Give the definition of the spring constant (also called force constant)				
	State Hooke's law				
	Give definitions of these terms: • Extension • Elastic behaviour • Elastic limit • Plastic behaviour				
	Describe the main features of a force-extension graph				
	Use the equation $force = spring\ constant \times extension$ including problems involving rearranging the equation				
	Why are some mutations harmful?				
Electric current	Give the definition of electric current				
	Use the equation $Q = I \times t$ including problems involving rearranging the equation				
	State Kirchhoff's first law and explain how is related to the conservation of charge				
	Solve problems involving currents at a junction using Kirchhoff's first law				
Potential difference	Give the definition of potential diifference				
	Use the equation $V = \frac{W}{Q}$ including problems involving rearranging the equation				
	State Kirchhoff's second law and explain how it is related to the conservation of energy				

	Solve problems in circuits using Kirchhoff's second law				
Resistance	Give the definition of resistance				
	Use the equation $R = \frac{V}{I}$ including problems involving rearranging the equation				
	State Ohm's law				
	Know the characteristic I-V graphs for the following components: • An ohmic conductor • A filament lamp • A diode				
	Calculate the resistance of a component by interpreting data from its I-V graph characteristics				
Electrical power	Use the equations $P = I \times V$, $P = I^2R$ and $P = \frac{V^2}{R}$ including problems involving rearranging the equations				
	Why must the cell(s) of an organism be able to exchange substances with its environment?				
	Calculate the surface area to volume ratio of a cube animal of side length 2cm.				
Waves	Describe waves in terms of energy tranfer				
	Describe the differences between transverse and longitudinal waves				
	Describe wave using a displacement-time graph				
	Give defintions of the following terms: • Displacement • Amplitude • Wavelength • Period • Frequency				
	Use the equation $f = \frac{1}{T}$ including problems involving rearranging the equation				
	Use the equation $v = f \times \lambda$ including problems involving rearranging the equation				
Superposition	Explain what is meant by superposition				
	Describe how constructive interference happens				
	Describe how destructive interference happens				
Reflection, diffraction and refraction	Describe the main features of a diagram showing reflection				
	State the law of reflection				
	Explain what diffraction is				
	Describe how the size of the gap affects the amount of diffraction				
	Describe a diffraction pattern and how it is formed				
	Explain how refraction is caused				
	Use the Snell's law $n = \frac{sini}{sinr}$ to solve refraction problems including problems involving rearranging the equation				