

Programme of study for Applied Science Year 12 2023-2024

Autumn (1st and 2nd term) Teacher 1,2 and 3	Spring and Summer terms Teacher 1	Spring and Summer terms Teacher 2	Spring and Summer terms Teacher 3
<p>Other timescale: From: September 2023 To: January 2024</p>	<p>Other timescale: From: End of January 2024 To: July 2024</p>	<p>Other timescale: From: End of January 2024 To: July 2024</p>	<p>Other timescale: From: End of January 2024 To: July 2024</p>
<p>Topic: Unit 1: Fundamentals of Science. Exam 1 hour and 30min in total. Each paper Biology, Chemistry and Physics are 30min each. First exam to be sat in May 2020. All Extended Certificate and Diploma students to take this unit.</p> <p>Skills (students should be able to do): Researching, reading, essay writing, exam practice. Personal learning thinking skills including:</p> <ul style="list-style-type: none"> • independent enquirers, • creative thinkers, • reflective learners, • team workers, • self-managers 	<p>Topic: Unit 3: Scientific Investigative skills. Exam based. 2 parts: practical then written exam.</p> <p>Skills (students should be able to do):</p> <ul style="list-style-type: none"> • Researching, reading, essay writing, exam practice. Personal learning thinking skills including: • independent enquirers, • creative thinkers, • reflective learners, • team workers, • self-managers, • effective participants 	<p>Topic: Unit 2: Practical Scientific Procedure and Techniques. Coursework based. Diploma and Extended Certificate students to take this unit.</p> <p>Skills (students should be able to do):</p> <ul style="list-style-type: none"> • Researching, reading, essay writing, exam practice. Personal learning thinking skills including: • independent enquirers, • creative thinkers, • reflective learners, • team workers, • self-managers, • effective participants. <p>The fundamental knowledge, practical skills, transferable skills – for example, organisation, self-assessment and problem-solving, and the ability to interpret data – all developed in this unit will give students confidence when they undertake the more complex practical techniques involved in higher education science courses such as biochemistry, chemistry,</p>	<p>Topic: Unit 8: Physiology of human body systems. Coursework based. Diploma students only to take this unit.</p> <p>Skills (students should be able to do):</p> <ul style="list-style-type: none"> • Reading, revising, essay writing, exam practice. Personal learning thinking skills including • independent enquirers, • creative thinkers, • reflective learners, • team workers, • self-managers, • effective participants.

		forensic science and environmental science.	
<p>Key Learning Outcomes (students should know):</p> <p>AO1: Students should be able to demonstrate knowledge of scientific facts, terms, definitions and scientific formulae Command words: give, label, name, state Marks: ranges from 12 to 18 marks</p> <p>AO2: Students should be able to demonstrate understanding of scientific concepts, procedures, processes and techniques and their application Command words: calculate, compare, discuss, draw, explain, state, write Marks: ranges from 39 to 45 marks</p> <p>AO3: Students should be able to analyse, interpret and evaluate scientific information to make judgements and reach conclusions Command words: calculate, comment, compare, complete, describe, discuss, explain, state Marks: ranges from 18 to 24 marks</p> <p>AO4: Students should be able to make connections, use and integrate different scientific concepts, procedures, processes or techniques Command</p>	<p>Key Learning Outcomes (students should know):</p> <p>AO1: Students should be able to demonstrate knowledge and understanding of scientific concepts, procedures, processes and techniques and their application in a practical investigative context.</p> <p>AO2: Students should be able to interpret and analyse qualitative and quantitative scientific information to make reasoned judgements and draw conclusions based on evidence in a practical investigative context</p> <p>AO3: Students should be able to evaluate practical investigative procedures used and their effect on the qualitative and quantitative scientific information obtained to make reasoned judgements</p> <p>AO4: Students should be able to make connections between different scientific concepts, procedures, processes and techniques to make a hypothesis and write a plan for a practical investigation.</p>	<p>Key Learning Outcomes (students should know):</p> <p>Assignment A: Students to undertake titration and colorimetry to determine the concentration of solutions.</p> <p>Assignment B: Students to undertake calorimetry to study cooling curves.</p> <p>Assignment C: Students to undertake chromatographic techniques to identify components in mixtures.</p> <p>Assignment D: Students to review personal development of scientific skills for laboratory work.</p>	<p>Key Learning Outcomes (students should know):</p> <p>Assignment A: Students to understand the impact of disorders of the musculoskeletal system and their associated corrective treatments.</p> <p>Assignment B: Students to understand the impact of disorders on the physiology of the lymphatic system and the associated corrective treatments.</p> <p>Assignment C: Students to explore the physiology of the digestive system and the use of corrective treatments for dietary-related diseases</p>

<p>words: comment, compare, complete, discuss, explain Marks: ranges from 9 to 12 marks</p>			
<p>End of year assessment to cover:</p> <ul style="list-style-type: none"> • End of chapter test on various Chemistry topics • End of chapter test on various Biology topics • End of chapter test on various Physics topics. • Mock exam to be sat after Ester holidays. 	<p>End of term 1 assessment to cover:</p> <ul style="list-style-type: none"> • Unit 3 only: various practical exams and then practical write-ups will be assessed. January mock exam on one practical exam and write up will also be given just before the actual exam. 	<p>No end of term assessment for this unit as coursework based.</p>	<p>No end of term assessment for this unit as coursework based.</p>
<p>Building understanding: Rationale for your sequence of lessons:</p> <p>Lessons have been broken down so it is preparing students to recall, select and apply scientific knowledge and understanding to vocational and realistic situations.</p> <p>Lessons will prepare students so that they will be able to use scientific terminology and concepts in given situations, and to use given information and apply appropriate mathematical and technical skills in context.</p> <p>Lessons will prepare students so that learners will be able to interpret and analyse information in order to make valid judgements.</p> <p>Lessons will prepare learners to be able to integrate relevant scientific knowledge and understanding from different areas to demonstrate a deeper understanding of how these apply to</p>	<p>Building understanding: Rationale for your sequence of lessons:</p> <p>Lessons have been broken down so it is preparing students to demonstrate a sound knowledge and understanding of scientific concepts, procedures, processes and techniques and their application within a practical context.</p> <p>Lessons will prepare learners to interpret and analyse their own data and secondary data, leading to reasoned judgements on the qualitative and quantitative data they have collected during their investigation. The lessons prepare students to be able to draw links between different scientific concepts, procedures, processes and techniques to make a hypothesis and plan an investigation.</p>	<p>Building understanding: Rationale for your sequence of lessons:</p> <p>Lessons before assignment A given to help prepare students for this assignment to address:</p> <p>1) Pass, lessons will prepare learners to follow instructions to safely undertake titration and colorimetry. These must be performed correctly to obtain reliable and valid outcomes. Lessons will prepare learners to correctly carry out calculations of concentration. For titration, lessons will prepare learners to check the calibration of equipment used to ensure the validity of outcomes obtained (for example the calibration of a pipette, balances and a pH meter using buffer solutions.) Lesson will prepare learners to safely and correctly calibrate and use a</p>	<p>Building understanding: Rationale for your sequence of lessons:</p> <p>Lessons before assignment A given to help prepare students for this assignment to address:</p> <p>1) Pass, lessons will explain how the structure of the human skeleton, muscles and joints form an essential system in the functioning of the human body by providing support, protection, movement and storage/production of minerals and blood cells. Lessons will prepare the students to identify and name six major joints in the human musculoskeletal system and fully explain the importance of their structure and role in the human body in terms of normal movement. Lessons will prepare the students to name one disorder of musculoskeletal system and outline how it impacts normal function of the human body. Lessons will prepare students to reference specific muscles or muscle groups and joints affected by the disorder and give an</p>

<p>vocational and realistic situations. They will be able to use scientific terminology and concepts, communicating consistently and effectively in given situations. They will be able to select relevant information and apply appropriate mathematical and technical skills to justify decisions or solve problems in context.</p> <p>Lessons will prepare learners to be able to interpret and analyse information in order to make valid judgements that are supported by evidence, with awareness of limitations</p>	<p>Lessons help prepare learners to be able to make evaluative judgements on scientific data, processes and procedures that make reference to scientific reasoning.</p> <p>Lessons also prepare students to demonstrate a thorough understanding of how scientific concepts, procedures, processes and techniques can be integrated and applied within a practical context.</p> <p>Lessons will prepare students to interpret, analyse and evaluate their own collected data and secondary data to support judgements and conclusions drawn.</p> <p>Lessons will prepare learners to use and integrate knowledge and understanding of scientific concepts, procedures, processes and techniques to make a hypothesis and plan an investigation that is fully supported by scientific reasoning.</p> <p>Lessons will also prepare learners to be able to provide rationalised evaluative judgements on scientific data, processes and procedures that are fully supported by scientific reasoning.</p>	<p>colorimeter or visible spectrometer to determine the concentration of a coloured solution.</p> <p>2) Merit, lessons will prepare learners to undertake quantitative analytical procedures and techniques with minimal supervision, and perform to a high degree of accuracy and precision in order to obtain reliable and valid outcomes, with consideration for health and safety. Lesson will prepare learners to demonstrate skills and fluency in a number of areas, such as: calibrating pipettes transferring solids, measuring volumes, mixing solutions, carrying out titrations and making the dilutions for colorimetry standards.</p> <p>3) Distinction, lessons will prepare learners to interpret outcomes of their quantitative analytical procedures and techniques to make sound judgements on the accuracy of them. Lessons will prepare learners to be able to coherently discuss problems/issues with the quantitative procedures and techniques used and develop a strong rationale for suggestions made to improve accuracy and precision in order to obtain reliable and valid outcomes (or for justifying the appropriate steps already taken should no problems be identified).</p>	<p>overview of the corrective treatment(s) associated with it.</p> <p>2) Merit, lessons will prepare students to provide a detailed comparison of three disorders affecting different aspects of the musculoskeletal system and how normal movement is affected. Lessons will prepare learners to use the correct scientific and technical terms to clearly outline the type of joint, muscle movement at the joint, muscle attachment and the groups of muscles that are involved in bringing about normal movement. Lessons will also explain the importance of the movement to the normal functioning of the human body and how each disorder differs in terms of its effect on normal function. Lessons will prepare students to compare corrective treatments for each disorder, and the scientific rationale for using that particular treatment over others.</p> <p>3) Distinction, lessons will prepare students to research disorders/dysfunctions of the musculoskeletal system. Lessons will prepare learners to reach conclusions based on referenced evidence they have produced from research on the impact on health of one named disorder/dysfunction and its corrective treatment(s). Lessons will prepare learners to then establish how the disorder impacts the normal functioning/movement in the human body. Lessons will prepare students to evaluate how the work of the medical</p>
--	---	--	--

		<p>Lessons before assignment B given to help prepare students for this assignment to address:</p> <p>1) Pass lessons will prepare learners to safely check the calibration of a given thermometer, following instructions. Lessons will prepare learners to also explore the accuracy of the temperature measurements obtained from thermometers and other equipment by comparing their readings in water that is being heated. Lessons will prepare learners to use a table of their own design for recording their readings. Lessons will prepare learners to demonstrate key practical competencies in calorimetry, including being able to set up a vessel containing a solid, heating it to above its melting point, cooling it and measuring its temperature as a function of time, following a standard procedure. Lessons will prepare learners to plot graphs for a substance undergoing freezing.</p> <p>2) Merit, lessons will prepare learners to demonstrate a selection of an appropriate amount of solid; selection of a suitable vessel for heating the solid, setting up the equipment to enable heating and cooling of the vessel in an appropriate way and monitoring temperature as a function of time in a safe way. Lessons will prepare learners to demonstrate numerical</p>	<p>professional uses corrective mechanisms and treatments in order to improve the functioning of the skeleton and its physical, physiological and social impact on human health.</p> <p>Lessons before assignment B given to help prepare students for this assignment to address:</p> <p>1) Pass, lessons prepare learners to describe the gross anatomy of the organs and associated structures that form the lymphatic system. Lessons allow learners to describe how lymph is formed and its role in the health of the body. Lessons will prepare learners to describe a named disorder and its effect on the normal function of the lymphatic system, including the symptoms present in the human body and give an overview of the corrective treatment(s) associated with the disorder</p> <p>2) Merit, lessons will prepare learners to demonstrate a detailed understanding of the anatomy and function of the lymphatic system, using correct scientific terminology to explain the rationale for use of corrective treatment for the effects of a named disorder of the lymphatic system. Lessons will prepare learners to give detailed explanations of the disorder affecting the normal functioning of the lymphatic system and the associated corrective treatment.</p> <p>3) Distinction, lessons will prepare learners to use the skill of evaluation on one named disorder. The lessons will</p>
--	--	---	---

		<p>skills in graph plotting when constructing their cooling curve.</p> <p>3) Distinction, lessons will prepare learners to interpret outcomes of their calorimetry to make sound judgements on accuracy. Lessons will prepare learners to be able to use appropriate mathematical terminology (for example rapid increase, decrease, approximately constant, etc.) to describe the patterns and trends in the shapes of cooling curves. Lessons will prepare learners to discuss the way in which the substance was cooled and the resulting changes to the curve and to explain why it may be necessary to make changes to procedures in order to reduce levels of uncertainty</p> <p>Lessons before assignment C given to help prepare students for this assignment to address:</p> <p>1) Pass, lessons will prepare students to follow instructions, demonstrating safe working practices and a good level of ability when carrying out paper and TLC. Lessons will prepare learners to comment on the suitability of the techniques for separation and the chromatogram produced for each technique (TLC and paper chromatography).</p> <p>2) Merit, lessons will prepare students to demonstrate safe working practices and a high level</p>	<p>prepare students to analyse the effect of the disease on the lymphatic system, the normal functioning of which will be explicitly explained. The implications of the disease on the health status of an individual suffering from the disorder will be addressed within the context of a patient case study in the lessons. Lessons will prepare learners to be able to evaluate the physiological basis of any treatment and discuss the impact of this on the restoration of normal lymphatic function.</p> <p>Lessons before assignment C given to help prepare students for this assignment to address:</p> <p>1) Pass, lessons will prepare students to perform analytical tests to identify the nutrients present in dietary sources of macronutrients as listed in the unit content, they must also give detailed descriptions of nutrient-deficiency symptoms. Lessons will prepare learners to describe the gross anatomy of the different areas of the digestive system as listed in the unit content. Lessons will prepare students to label each of the areas of the digestive system and describe, in brief, the role of the component labelled.</p> <p>2) Merit, lessons will prepare students to analyse the mode of action of digestive enzymes as applied to each of the macronutrients listed in the unit content. This will include named enzymes, the location of enzyme secretion, the location of enzyme action (if different), substrates and products of</p>
--	--	---	--

		<p>of proficiency when carrying out paper- and thin-layer chromatography (TLC) with minimal supervision. Lessons will prepare students to produce chromatograms showing clear separation of spots, repeating the separations if they are not satisfied with the quality of the separation obtained. Lessons will prepare learners to comment on the suitability of the techniques for separation and to use appropriately calculated Rf values and consider factors that influence separation to justify conclusions drawn about the identification of components in a mixture (for example the polarity of the components of the mixtures and the polarity of the solvents and effect of the size of a molecule on its mobility).</p> <p>3) Distinction, lessons will prepare learners to articulate strong links between outcomes and techniques used in order to give a rationale for specific improvements that could be made to the chromatographic techniques. Lessons will prepare learners to demonstrate awareness that some chromatograms may show the spots rising at an angle or have spots that are too big or smeared out rather than being distinct.</p>	<p>each nutrient broken down with enzymatic assistance. This will be linked to the analysis of nutrients in foods. Lessons will prepare learners to consider how nutrient deficiency can be tackled in terms of corrective treatments.</p> <p>3) Distinction, lessons will prepare students to research dietary-related disorders of the digestive system. Lessons will allow learners to choose a named digestive system-related disease that affects the normal functioning of the body. Lessons will allow learners to consider the effects on the person that is suffering from the disease and how medical intervention seeks to treat the effects of disease. Lessons will prepare students to produce evaluations that cover the implications to the health status of the individual and compare this with the healthy functioning of the digestive system.</p>
--	--	--	---

		<p>Lessons before assignment D given to help prepare students for this assignment to address:</p> <p>1) Pass, lessons will prepare students to identify areas of scientific skills developed in relation to the learning aims and will help prepare them to draw on scientific skills they have previously acquired and use them to illustrate the transferability and development of skills.</p> <p>2) Merit, lessons will prepare learners to make judgements on their skill development and level in relation to their peer group and to recognise the improvements that need to be made and how they will take steps to achieve them.</p> <p>3) Distinction, lessons will prepare learners to draw upon all areas of practical work carried out to critically reflect on strengths and weaknesses of their own performance and skill development drawing on feedback, for example from peers, teachers and industry. Drawing on others' feedback is crucial for developing balanced progression goals.</p>	
<p>Home – Learning:</p> <ul style="list-style-type: none"> • Knowledge (flipped learning) • -6 Mark essays to be set when appropriate. • -Exam Practice • -Pupils are to read extracts prior to the lessons. • -Revision for end of topic tests. 	<p>Home – Learning:</p> <ul style="list-style-type: none"> • Knowledge (flipped learning) • Pupils are to read extracts prior to the lessons. • Exam Papers 	<p>Home – Learning:</p> <p>Assignment A:</p> <p>A report describing health and safety legislation relevant to an organisation, describing the hazards and discussing aspects of health and safety management.</p>	<p>Home – Learning:</p> <p>Assignment A:</p> <p>Students to produce a report and use information gained from research, visits, dissections/videos, models and simulations to produce an illustrated report explaining and analysing the structure and function of the</p>

		<p>Assignment B: A report containing:</p> <ul style="list-style-type: none"> • notes and results from making and testing an organic liquid • a description of the principles behind the preparative methods and tests used • analysis of ways to improve yield and purity and the reliability of testing methods as a guide to purity • an explanation of the principles behind the industrial manufacture and testing of the liquid • an observation report by the teacher of making and testing the liquid safely. <p>Assignment C: A report containing:</p> <ul style="list-style-type: none"> • notes and results from making and testing an organic solid • a description of the principles of preparative methods and tests used • analysis of ways to improve yield and purity and of the reliability of testing methods as a guide to purity • an explanation of the principles behind the industrial manufacture and solid • an observation report by teacher of making and testing the solid safely. <p>Assignment D: A report containing:</p> <ul style="list-style-type: none"> • a description of the information stored and used in the laboratory 	<p>musculoskeletal system. An evaluation of a related disorder/dysfunction of the system and associated treatments must be included.</p> <p>Assignment B: Students to research work using the internet and TV documentaries to help learners to create a report that describes and explains the structure and function of the lymphatic system in promoting a healthy body. An evaluative case study of the effect of a disorder/dysfunction of the system and possible treatments must be included.</p> <p>Assignment C: A lab book/record of investigations modelling the functioning of the various parts of the digestive system. Photographs and information from the investigations will be used to create an information leaflet that explains the role and location of organs and evaluates dietary disorder in the system and possible treatments. Observation records of practical work undertaken to assess the nutrient content of food will be required. Evidence and conclusions from the investigations will be incorporated into the report.</p>
--	--	--	--

		<ul style="list-style-type: none"> • a description of how useful information can be obtained from large data sets • analysis of the communication channels in the organisation • evaluation of the benefits and issues involved in making large volumes of data available to others. 	
<p>Reading and literacy:</p> <p>Unit 1 revision guide students to read and make notes.</p> <p>Unit 1 Applied science textbook</p> <p>Unit 1 PowerPoints for Biology, Chemistry and Physics.</p> <p>Literacy: Key terms which all students will need to understand for the exam: Understand these definitions in order to understand the question:</p> <p>Add/label: Learners label or add to a stimulus material given in the question, for example labelling a diagram or adding units to a table.</p> <p>Assess: Learners give careful consideration to all the factors or events that apply and identify which are the most important or relevant. Make a judgement on the importance of something and come to a conclusion where needed.</p> <p>Calculate: Learners obtain a numerical answer, showing relevant working. If the answer has a unit, this must be included.</p>	<p>Reading and literacy:</p> <p>Unit 3 revision guide students to read and make notes.</p> <p>Unit 3 Applied science textbook</p> <p>Unit 3 PowerPoints for Biology, Chemistry and Physics.</p> <p>Literacy: Planning a scientific investigation Developing a hypothesis for an investigation</p> <ul style="list-style-type: none"> • Be able to formulate a hypothesis or a null hypothesis based on relevant scientific ideas. Selection of appropriate equipment, techniques and standard procedures • Be able to select and justify the use of equipment/techniques/standard procedures for quantitative and/or qualitative investigations. <p>Health and safety associated with the investigation</p> <ul style="list-style-type: none"> • Understand risks and hazards associated with the investigation. <p>Variables in the investigation</p> <ul style="list-style-type: none"> • Independent. 	<p>Reading and literacy:</p> <p>Literature review</p> <ul style="list-style-type: none"> • Identification of criteria, e.g. how many sources, what is the oldest date that will be looked at, which types of source will be excluded. • Nature of study, which could include field work, laboratory-based work, sports facility, workshop. • Sources of information: <ul style="list-style-type: none"> o identification and location of relevant and reliable sources of information, e.g. journal articles, textbooks, websites o extraction – how to obtain the information from libraries, resource centres, organisations, government organisations, charities o recognising and using protocol for referencing of information sources, to include use of the Harvard referencing system. <p>Review the investigative project using correct scientific principles:</p> <ul style="list-style-type: none"> o structure and format o use of correct scientific terminology 	<p>Reading and literacy:</p> <p>Students will research through the internet and Applied Science textbook 1 the human body including its complex mix of organs and organ systems. Knowledge of how they function to maintain human life is an essential part of the study of human physiology and students will research this. In this unit, student’s research will focus on three body systems: musculoskeletal, lymphatic and digestive. Students will research and examine each of the systems as a functioning unit, identifying their structure and function. By exploring the anatomy of these systems, through experimentation and articles, students will develop their knowledge and understanding of the role in the human body. Students will also give attention to understanding the implications of what happens when the systems fail to work properly and the available treatments again through research and reading various articles.</p>

<p>Comment on: Learners synthesise a number of variables from data/information to form a judgement. More than two factors need to be synthesised.</p> <p>marks there must be a quantitative element to the answer.</p> <p>Devise: Learners plan or invent a procedure from existing principles/ideas.</p> <p>Discuss: Learners identify the issue/situation/problem/argument that is being assessed in the question. Explore all aspects of an issue/situation/problem/argument. Investigate the issue/situation, etc. by reasoning or argument.</p> <p>Draw: Learners produce a diagram, either using a ruler or using freehand.</p> <p>Evaluate: Learners review information then bring it together to form a conclusion, drawing on evidence, including strengths, weaknesses, alternative actions, relevant data or information. Come to a supported judgement of a subject's qualities and relation to its context.</p> <p>Explain: Learners' explanations require a justification/ exemplification of a point. The answer must contain some element of reasoning/justification – this can include mathematical explanations.</p>	<ul style="list-style-type: none"> • Dependent. • Control. <p>Method for data collection and analysis</p> <ul style="list-style-type: none"> • Be able to produce a clear, logically ordered method to obtain results. • Be able to select relevant measurements and the range of measurements to be recorded. • Understand the importance of obtaining data accurately/reliably and to appropriate levels of precision. • Understand how variables can be controlled/measured/monitored. • Understand how the data/information can be analysed. <p>Evaluation</p> <ul style="list-style-type: none"> • Be able to make any recommendations for improvements to the investigation. • Be able to explain anomalous data. • Be able to determine quantitative and discuss qualitative sources of error. • Be able to discuss evidence of the reliability of the data collected during the investigation. • Be able to identify strengths and weaknesses within method/techniques/standard procedures/equipment used. • Be able to suggest improvements to an investigation. 	<p>o past tense, including third person.</p> <ul style="list-style-type: none"> • References and bibliography: <ul style="list-style-type: none"> o correctly written o included in appendix o correct use of the Harvard referencing system. <p>Scientific evaluation of findings</p> <ul style="list-style-type: none"> • Evaluation of statistical results. • Conclusions drawn from primary and secondary data using scientific principles. • Limitations of investigative project and areas for improvement. • Assessment of information sources used and relevance to investigation experimental and literature investigations. • Evaluation of proof, or otherwise, of hypothesis stated. • Recommendations for further research. <p>Lessons will prepare students to be informed that when they are carrying out their search on the scientific topic, they are expected to give a comprehensive bibliography and list of references using a standard protocol, such as the Harvard system. Lessons will prepare learners to produce an appropriate research project proposal for an investigation.</p> <p>Lessons will prepare students to show that they can use the material to help them plan their</p>	
--	--	--	--

<p>Give/state/name: These generally require recall of one or more pieces of information. Give a reason why When a statement has been made and the requirement is only to give the reasons why.</p> <p>Identify: Usually requires some key information to be selected from a given stimulus/resource.</p> <p>Plot: Learners produce a graph by marking points accurately on a grid from data that is provided and then drawing a line of best fit through these points. A suitable scale and appropriately labelled axes must be included if these are not provided in the question.</p> <p>Predict: Learners give an expected result.</p> <p>Show that: Learners prove that a numerical figure is as stated in the question. The answer must be to at least one more significant figure than the numerical figure in the question.</p> <p>Sketch: Learners produce a freehand drawing. For a graph this would need a line and labelled axes with important features indicated. The axes are not scaled.</p> <p>State and justify/identify and justify: When a selection is made and a justification has to be given for the selection.</p>		<p>work and indicate its relevance to the investigative work they have in mind. Lessons will prepare learners to understand what a hypothesis is and to come up with a research project proposal. Lessons will prepare learners to include any potential limitations of the project proposal, such as the accuracy of any graduated apparatus or limitations of instruments/sensors.</p> <p>Lessons will prepare students to show that they have considered in detail, more than one appropriate investigative method of approach to tackling the hypothesis and explain why their chosen approach is suitable. Lessons will prepare learners to justify their method of approach to the method used in their project proposal, using evidence from their literature review.</p>	
---	--	--	--

<p>State what is meant by: When the meaning of a term is expected but there are different ways in which this meaning can be described.</p> <p>Write: When the question asks for an equation.</p>			
<p>Numeracy:</p> <p>Physics: Graphical representation of wave features. Be able to use the wave equation: $v f = \lambda$</p> <p>Be able to use the equation: calculation of speed $T v = \mu$</p> <p>Understand the principles of fibre optics: o refractive index o calculation of critical angles at a glass-air interface Be able to use the inverse square law in relation to the intensity of a wave.</p> <p>Biology: Interpretation of graphical displays of a nerve impulse and electrocardiogram (ECG) recordings.</p> <p>Calculate magnification and size of cells and organelles from drawings or images.</p> <p>Chemistry: Understand the following: o balanced equations o relative atomic mass</p>	<p>Numeracy:</p> <p>Physics: Equations</p> <ul style="list-style-type: none"> • Power = VI (voltage × current). • Power = work done time • Work done = energy supplied or transformed. • Define – joules, kJ, calories (1 g by 1 oC), kilocalories, kWh. • The heat capacity of water will be given if required. • Calculate heat energy supplied by a fuel to water using: o heat energy = mass of water × specific heat capacity of water × temperature rise of water. • Calculate heat energy released from a fuel in kJ mol⁻¹. <p>Biology: Sampling sizes</p> <ul style="list-style-type: none"> • Select sample sizes for investigation with regards to practical constraints and the need to collect sufficient data to make valid conclusions. <p>Drawing conclusions and evaluation: Interpretation/analysis of data</p>	<p>Numeracy:</p> <p>Assignment C: Experimental procedures and techniques. Collect, collate and analyse data. Data presentation.</p>	<p>Numeracy:</p> <p>Assignment C: Chemical tests for the presence of macro-nutrients found in foods: starch, proteins, lipids, reducing and non-reducing sugars, vitamin C content.</p>

<p>o atomic number and relative molecular mass o moles, molar masses and molarities.</p> <p>Understand the quantities used in chemical reactions:</p> <p>o mass, volume of solution, concentration</p> <p>o reacting quantities</p> <p>o percentage yields.</p>	<ul style="list-style-type: none"> • Be able to identify trends/patterns in data. • Be able to compare primary and secondary data. • Be able to use data to draw conclusions that are valid and relevant to the purpose of the investigation. • Interpretation of statistical tests using tables of critical values and a 5% significance level, with reference to the null hypothesis. <p>Collection of quantitative/qualitative data</p> <ul style="list-style-type: none"> • Be able to collect data accurately/reliably and to appropriate levels of precision. • Be able to tabulate data in a clear and logical format using correct headings with units where appropriate. • Be able to identify anomalous data and take appropriate action. • Be able to recognise when it is appropriate to take repeats. • Be able to make qualitative observations and draw inferences. <p>Processing data</p> <ul style="list-style-type: none"> • Be able to carry out relevant calculations where appropriate, involving: <ul style="list-style-type: none"> o mean and standard deviation o use and interpretation of error bars o use of statistical tests, including t-test, chi-squared and correlation analysis o use of formulae 		
---	---	--	--

	<ul style="list-style-type: none"> o transposition of formulae o conversion of units o use of standard form o percentage error of measuring equipment. • Be able to display data in an appropriate format, including: <ul style="list-style-type: none"> o choosing an appropriate graph/chart/tables o correct plotting/labelling/scales. 		
<p>Enrichment / opportunities to develop cultural capital (including careers, WRL and SMSC):</p> <p>Centres may involve employers in the delivery of this unit if there are local opportunities. There is no specific guidance related to this unit. However, we offer a chance during Science week and throughout the year for these students to go on visits to universities, companies visiting the school so that students can understand the purpose of this course and enhance practical skills. These visits and talks enable students to choose a career pathway for them too.</p> <p>Time management Individual working Group collaboration Verbal and electronic presentation Use of a variety of IT programs Research skills Teamwork Literacy Numeracy skills</p> <p>SMSC - What are the real dangers of mobile phone use? - How could specialized cells be used to treat new or</p>	<p>Enrichment / opportunities to develop cultural capital (including careers, WRL and SMSC):</p> <p>Centres may involve employers in the delivery of this unit if there are local opportunities. There is no specific guidance related to this unit. However we offer a chance during Science week and throughout the year for these students to go on visits to universities, companies visiting the school so that students can understand the purpose of this course and enhance practical skills. These visits and talks enable students to choose a career pathway for them too.</p> <p>Time management Individual working Group collaboration Verbal and electronic presentation Use of a variety of IT programs Research skills Teamwork Literacy and numeracy skills</p>	<p>Enrichment / opportunities to develop cultural capital (including careers, WRL and SMSC):</p> <p>Completing an investigative project is an excellent way for students to develop an understanding of the science-related workplace. The skills developed in this unit will be of considerable benefit for progression to higher education in a variety of science and science-related courses and to employment in the science or applied science sector.</p> <p>Time management Individual working Group collaboration Verbal and electronic presentation Use of a variety of IT programs Research skills Teamwork Literacy and numeracy skills</p> <p>SMSC - Real life applications of science are essential for modern life, which 3 have been to most critical to society as a whole? - Is</p>	<p>Enrichment / opportunities to develop cultural capital (including careers, WRL and SMSC):</p> <p>University sports science departments may be able to provide support and guidance and access to models of joints and a skeleton. Physiotherapy departments may be able to offer information and access to examples of replacement joints and exercises that will assist in treatment and recovery from musculoskeletal dysfunction. GP Surgeries may have specialist nurses who might be available to visit and provide information about management of digestive system disorders, such as coeliac disease, irritable bowel syndrome and colitis. This is done during Science week.</p>

<p>existing medical conditions? - How can metal extraction be made more efficient through experimentation?</p>	<p>SMSC - Is health and safety still relevant in a modern laboratory? Discuss. - Why is precision vital as a scientific skill when linked to medical treatment? - How can applications of these experiments be used in forensics Science to solve crime?</p>	<p>health and safety still relevant in a modern laboratory? Discuss. - Plant growth and distribution are becoming more and more vital with the rise of global warming, identify what could have the biggest impact on reducing global warming and justify your decision.</p>	
--	--	--	--