

# Year 13 Applied Science Sequence



	Content Taught	NC Ref	Knowledge Skills	Assessment	Rationale
<b>Year 13</b>					
<b>HT1</b>	<b>Unit 8</b>	A C	<p><b>A: Musculoskeletal system</b></p> <p>Understand the impact of disorders of the musculoskeletal system and their associated corrective treatments.</p> <p>Structure of the musculoskeletal system Structure and identification of major bones, muscles, joints and supporting apparatus by visual examination of diagrams or models and manipulative means in living subjects as appropriate.</p> <p>Function of the musculoskeletal system Functions of each part of the musculoskeletal system and how each contributes to the effective functioning of the whole system.</p> <p>Health matters and treatments related to the musculoskeletal system The causes, symptoms and common treatments involved in common disorders or dysfunction in the musculoskeletal system. Disorders may include: forms of arthritis; hip dysplasia; hypermobility; bone fracture and dislocation; repetitive strain injury (RSI); muscle, ligament and tendon trauma.</p> <p><b>C: Digestive System</b></p>	Coursework Based Assignments. Pass-Distinction marked and assessed as per the assessment deadlines in the BTEC Assessment Plan.	<p>Unit 2 is a coursework based unit, assessed internally. This builds on the skills students have gained during unit 3 and applies it to titrations, colorimetry, chromatography and cooling curves. Each technique requires expert technical skill and an ability to analyse and evaluate high level practical methods.</p> <p>While completing unit 2 for one teacher, they start unit 8 with their other teacher. The students research a number of body systems, look in detail at the physiology and diseases affecting them. In this learning aim, the students research in detail diseases of the musculoskeletal</p>

		<p>Explore the physiology of the digestive system and the use of corrective treatments for dietary-related diseases</p> <p>Structure of the digestive system Location and structural features of the following parts of the digestive system and associated organs: mouth, pharynx, oesophagus, stomach, small intestine (duodenum, jejunum, ileum), large intestine, rectum, anus, associated organs: pancreas, liver, gall bladder.</p> <p>Function of the digestive system Processes involved in digestion, absorption and assimilation of nutrients</p> <p>Health matters and treatments related to the digestive system, Dietary sources and importance of macronutrients and micronutrients including symptoms of deficiencies – fibre, lipids, protein, water, carbohydrates, vitamins (A, B, C, D) and minerals (iron, magnesium and iodine). Digestive system diseases and physiological reasoning behind treatments, e.g. coeliac disease, irritable bowel syndrome, colitis</p> <p><b>B: Lymphatic system</b> Understand the impact of disorders on the physiology of the lymphatic system and the associated corrective treatments Structure of the lymphatic system Composition and location of component parts: spleen, thymus gland, tonsils, lymph glands, lymph vessels, major</p>		<p>system, then evaluate each treatment for each of the diseases and draws conclusions from extensive research on the system.</p>
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		<p>of other types of chromatograph – e.g. gas chromatography, ion-exchange chromatography – and that procedures and chromatogram interpretations are very different.</p> <p>Interpretation of a chromatogram. Polarity of molecules/intermolecular forces in relation to solubility in the mobile phase. Polarity of molecules/intermolecular forces in relation to retention of molecules in the stationary phase. Size of molecules in relation to solubility and mobility. Calculation of Rf value. Interpretation of chromatograms in terms of the number of substances present and the Rf values of components. Awareness of common problems in technique resulting in difficulty interpreting a chromatogram, e.g. overloading samples, disturbing plate/paper during development or contamination of plate/paper.</p> <p>Results from the paper chromatography and TLC of extracted plant pigments from paper chromatography of amino acids. An explanation of the principles behind the chromatographic separations. Suggestions for improvements to the chromatographic procedures carried out and full justification of these suggestions. An observation report with a checklist, completed by the teacher, including safety.</p> <p><b>D: Personal Development of Scientific Skills</b> A presentation or report that focuses on the evaluation of learners' performance and skill</p>		
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			development across all scientific procedures and techniques carried out in learning aims A, B and C		
<b>HT3</b>	<b>Unit 9</b>	B C A	<p>B: Homeostasis</p> <p>A presentation on the mechanisms used to maintain homeostasis and the importance of normal homeostatic function.</p> <p>Understand the homeostatic mechanisms used by the human body Processes, organs and hormones involved in maintaining the internal environment.</p> <p>Feedback and control: Positive and negative feedback loops, to include the part played by: set point, receptors, coordinator(s), effectors. Glands and organs Location, nature and hormone secretion from: exocrine glands, e.g. sweat glands, Brunner's glands, endocrine glands, to include hypothalamus, pituitary gland, thyroid and parathyroid, endocrine and exocrine organs, e.g. pancreas, liver</p> <p>Homeostatic mechanisms Stages involved in the regulation of: water (osmoregulation), blood glucose, temperature</p> <p>Impact of an imbalance. Conditions caused by an imbalance of a homeostatic mechanism, to include effects on normal functioning and potential management strategies, e.g. dehydration, hyperglycaemia, hypoglycaemia, diabetes, hypothermia, hyperthermia, syndrome of inappropriate antidiuretic hormone (SIADH).</p> <p><b>C: Reproductive system</b></p>		

			<p>Understand the role of hormones in the regulation and control of the reproductive system. Learners put together a series of informative leaflets on the control of fertility.</p> <p>Structure and function of reproductive anatomy. Female reproductive system. Male reproductive system</p> <p>Reproductive processes. Stages in the following, to include the interactions of hormones (to include progesterone, oestrogen, testosterone, FSH and LH as appropriate). Timescales for each should be referenced and links made to effects on fertility. Gamete development and release; infertility causes and identification. Hormonal changes in the menstrual cycle. Processes leading to conception, how infertility can come about in these stages and potential treatments for assisting fertility. Contraceptive methods: oral, injection and implanted use of hormones to prevent pregnancy.</p>		
HT4		A C A	<p><b>A: Nervous system</b></p> <p>Understand the interrelationship and nervous control of the cardiovascular and respiratory systems. A report looking at how the organisation and function of the human nervous system, along with the importance of coordinating the cardiovascular and respiratory systems.</p> <p>Nervous system organisation. Components of the central and peripheral nervous systems. Neuron</p>		

		<p>and glial cells, to include a comparison of myelinated and unmyelinated neurons.  Transmission of action potentials and saltatory conduction, including interpretation of graphs.  Transmission at synapses, neuromuscular junctions and neuroglandular junctions.  Neurotransmitters. Stimuli detection by receptor cells and sense organs. Roles and regulation of the autonomic nervous system divisions. Stages in and role of voluntary and non-voluntary reflexes and reactions, to include afferent and efferent pathways and the role of interneurons.  Neurological disorders, e.g. Parkinson's disease, multiple sclerosis.</p> <p>Cardiovascular and respiratory system regulation and control: How changes in concentrations of oxygen and carbon dioxide come about. Role of chemoreceptors and baroreceptors. Gaseous exchange at tissues and alveoli. Autonomic nervous system; sympathetic and parasympathetic pathways. Role of medulla oblongata in coordination. Elasticity of blood vessels related to function. Control of heart rate. Control of inspiration, expiration and rate of ventilation.</p> <p><b>C: Manufacture of aspirin</b>  Explore manufacturing techniques and testing methods for an organic solid</p> <p>Manufacturing techniques: Precipitation crystallisation and recrystallisation, filtration, evaporation and drying:</p>		
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HT5	Unit 4	B  A	<p><b>B: Manufacture of ethyl ethanoate</b> Explore manufacturing techniques and testing methods for an organic liquid</p> <p>Manufacturing techniques: reflux, solvent extraction, use of chemicals to remove impurities, manufacture of either ethyl ethanoate or 3-methylbut-1-yl ethanoate (banana oil) from ethanol and ethanoic acid (for ethyl ethanoate), industrial scale – from ethanol and ethanoic acid (for ethyl ethanoate) and other commercial methods.</p> <p>Testing methods and techniques, measurement of boiling point, infrared spectroscopy, other methods used in industry: high-performance liquid chromatography (HPLC), gas chromatography (GC)</p> <p><b>A: Health and safety in industry</b> Understand the importance of health and safety in scientific organisations</p>		

			<p>Application of health and safety legislation in scientific organisations, health and safety at work legislation, health and safety policy or health, safety and environmental policy – scrutiny of examples from the workplace, consequences of not complying with health and safety legislation.</p> <p>Hazards in a scientific organisation, control of Major Accident Hazards (COMAH) sites, explosive atmospheres, electrical hazards, working at height, lone working, vehicles, sensitisers, noise, working environments in scientific settings: laboratories and educational settings.</p>		
HT6	Unit 4	D	<p><b>D: Storing data in industry</b> Understand how scientific information may be stored and communicated in a workplace laboratory.</p> <p>Systems for managing laboratory information. The need for traceability, records associated with laboratory work and laboratory information management system (LIMS).</p> <p>Communicating information in a scientific organisation. Types of information used in organisations, channels of communication.</p> <p>Use of informatics for storage and retrieval of scientific information, examples of science data stored in large databases, examples of uses of information from large databases, advantages of storing and retrieving large quantities of data,</p>		

			issues associated with bioinformatics, the need to use appropriate software effectively.		
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