Year 13 Half Term 1 Curriculum

Subject	Half Term 1 – Topic/Summary of Powerful Knowledge
English Literature	Crime Fiction in Analysis (3 weeks): • Tropes of Crime fiction • Traditional plots, archetypal characters and themes • Victorian, Golden-Age, Hard Boiled Detective and Modern • Integrating critical and contextual material • Nominalisation to shape academic voice Discourse markers to shape the direction of an essay • Thesis statements • Counter argument *Atonement* (McEwan) *Oliver Twist* (Dickens) Theory and Independence - NEA (8 weeks): • Applying critical theory • Feminist and Marxist ways of reading • The Literary Canon • Aspects of Narrative *Selected texts from Summer Reading List* *The Critical Anthology (AQA)*
Maths	Functions and Graphs • The modulus function • Functions and mappings • Composite functions • Inverse functions • Combining transformations • Solving modulus problems Binomial Expansion • Expanding • Expanding • Using partial fractions Regression, correlation and hypothesis testing • Exponential models • Measuring correlation • Hypothesis testing for zero correlation Conditional probability • Set notation • Conditional probability • Conditional probabilities in Venn diagrams • Probability formulae • Tree diagrams Normal distribution

	• The normal distribution • Finding probabilities for normal distributions • The inverse normal distribution function • The standard normal distribution • Finding and • Approximating a binomial distribution • Hypothesis testing with the normal distribution Radians • Radian measure • Arc Length • Areas of sectors and segments • Solving trigonometric equations • Small angle approximations
Science	Biology • Photosynthesis • chlorophyll absorbs light, leading to photoionisation of chlorophyll • some of the energy from electrons released during photoionisation is conserved in the production of ATP and reduced NADP • the production of ATP involves electron transfer associated with the transfer of electrons down the electron transfer chain and passage of protons across chloroplast membranes and is catalysed by ATP synthase embedded in these membranes (chemiosomotic theory) • photolysis of water produces protons, electrons and oxygen. • The light-independent reaction uses reduced NADP from the light-dependent reaction to form a simple sugar. The hydrolysis of ATP, also from the light-dependent reaction, provides the additional energy for this reaction. • The light-independent reaction in such detail as to show that: • carbon dioxide reacts with ribulose bisphosphate (RuBP) to form two molecules of glycerate 3-phosphate (GP). This reaction is catalysed by the enzyme rubisco • ATP and reduced NADP from the light-dependent reaction are used to reduce GP to triose phosphate • some of the triose phosphate is used to regenerate RuBP in the Calvin cycle • some of the triose phosphate is converted to useful organic substances. **Required practical 7:** Use of chromatography to investigate the pigments isolated from leaves of different plants, eg, leaves from shade-tolerant and shade-intolerant plants or leaves of different colours. **Required practical 8:** Investigation into the effect of a named factor on the rate of dehydrogenase activity in extracts of chloroplasts. • Inheritance • Species exist as one or more populations. • A population as a group of organisms of the same species occupying a particular space at a particular time that can potentially interbreed. • The concepts of gene pool and allele frequency.

	• The Hardy–Weinberg principle provides a mathematical model, which predicts that allele frequencies will not change from generation to generation. The conditions under which the principle applies. • The frequency of alleles, genotypes and phenotypes in a population can be calculated using the Hardy–Weinberg equation: • where is the frequency of one (usually the dominant) allele and is the frequency of the other (usually recessive) allele of the gene. • Evolution may lead to speciation • Individuals within a population of a species may show a wide range of variation in phenotype. This is due to genetic and environmental factors. The primary source of genetic variation is mutation. Meiosis and the random fertilisation of gametes during sexual reproduction produce further genetic variation. • Predation, disease and competition for the means of survival result in differential survival and reproduction, ie natural selection. • Those organisms with phenotypes providing selective advantages are likely to produce more offspring and pass on their favourable alleles to the next generation. The effect of this differential reproductive success on the allele frequencies within a gene pool. • The effects of stabilising, directional and disruptive selection. • Chemistry • **Optical isomerism** • Optical isomerism is a form of stereoisomerism and occurs as a result of chirality in molecules, limited to molecules with a single chiral centre. • An asymmetric carbon atom is chiral and gives rise to optical isomers (enantiomers), which exist as non super-imposable mirror images and differ in their effect on plane polarised light. • A mixture of equal amounts of enantiomers is called a racemic mixture (racemate). • **Students should be able to:** • draw the structural formulas and displayed formulas of enantiomers • understand how racemic mixtures (racemates) are formed and why they are optically inactive. • **Aldehydes and Ketones** • Aldehydes are readily oxidised to carboxylic acids. • Chemical tests to distinguish between aldehydes and ketones including Fehling's solution and Tollens' reagent. • Aldehydes can be reduced to primary alcohols, and ketones to secondary alcohols, using $NaBH_4$ in aqueous solution. These reduction reactions are examples of nucleophilic addition. • The nucleophilic addition reactions of carbonyl compounds with KCN, followed by dilute acid, to produce hydroxynitriles. • Aldehydes and unsymmetrical ketones form mixtures of enantiomers when they react with KCN followed by dilute acid. • The hazards of using KCN. • **Students should be able to:** • write overall equations for reduction reactions using [H] as the reductant

	• outline the nucleophilic addition mechanism for reduction reactions with $NaBH_4$ (the nucleophile should be shown as H^-) • write overall equations for the formation of hydroxynitriles using HCN • outline the nucleophilic addition mechanism for the reaction with KCN followed by dilute acid • explain why nucleophilic addition reactions of KCN, followed by dilute acid, can produce a mixture of enantiomers. • **Carboxylic acids and Derivative** • The structures of: • carboxylic acids • esters. • Carboxylic acids are weak acids but will liberate CO_2 from carbonates. • Carboxylic acids and alcohols react, in the presence of an acid catalyst, to give esters. • Common uses of esters (eg in solvents, plasticisers, perfumes and food flavourings). • Vegetable oils and animal fats are esters of propane-1,2,3-triol (glycerol). • Esters can be hydrolysed in acid or alkaline conditions to form alcohols and carboxylic acids or salts of carboxylic acids. • Vegetable oils and animal fats can be hydrolysed in alkaline conditions to give soap (salts of long-chain carboxylic acids) and glycerol. • Biodiesel is a mixture of methyl esters of long-chain carboxylic acids. • Biodiesel is produced by reacting vegetable oils with methanol in the presence of a catalyst. • **Acylation** • The structures of: • acid anhydrides • acyl chlorides • amides. • The nucleophilic addition–elimination reactions of water, alcohols, ammonia and primary amines with acyl chlorides and acid anhydrides. • The industrial advantages of ethanoic anhydride over ethanoyl chloride in the manufacture of the drug aspirin. • **Students should be able to** outline the mechanism of nucleophilic addition–elimination reactions of acyl chlorides with water, alcohols, ammonia and primary amines. • **Required practical 10** • Preparation of: • a pure organic solid and test of its purity • a pure organic liquid. Physics • Periodic Motion Analysis of characteristics of simple harmonic motion (SHM). Condition for SHM: a ∝ − x Defining equation: a = − ω 2 x x = Acosωt and v = ± ω A 2 − x 2 Graphical representations linking the variations of x, v and a with time. Appreciation that the v − t graph is derived from the gradient of the x − t graph and that the a − t graph is derived from the gradient of the v − t graph. Maximum speed = ωA Maximum acceleration = ω 2A • Study of mass-spring system: T = 2π m k Study of simple pendulum: T = 2π l g Questions may involve other harmonic oscillators (eg liquid in U-tube)

	but full information will be provided in questions where necessary. Variation of Ek , Ep , and total energy with both displacement and time. Effects of damping on oscillations. • Required practical 7: Investigation into simple harmonic motion using a mass–spring system and a simple pendulum. • Motion in a circular path at constant speed implies there is an acceleration and requires a centripetal force. Magnitude of angular speed ω = v r = 2π f Radian measure of angle. Direction of angular velocity will not be considered. Centripetal acceleration a = v 2 r = ω 2 r The derivation of the centripetal acceleration formula will not be examined. Centripetal force F = mv2 r = mω 2 r • Qualitative treatment of free and forced vibrations. Resonance and the effects of damping on the sharpness of resonance. Examples of these effects in mechanical systems and situations involving stationary waves. • Thermal Physics • Internal energy is the sum of the randomly distributed kinetic energies and potential energies of the particles in a body. The internal energy of a system is increased when energy is transferred to it by heating or when work is done on it (and vice versa), eg a qualitative treatment of the first law of thermodynamics. Appreciation that during a change of state the potential energies of the particle ensemble are changing but not the kinetic energies. Calculations involving transfer of energy. For a change of temperature: Q = mc Δ θ where c is specific heat capacity. Calculations including continuous flow. For a change of state Q = ml where l is the specific latent heat. • Gas laws as experimental relationships between p, V, Tand the mass of the gas. Concept of absolute zero of temperature. Ideal gas equation: pV = nRT for n moles and pV = NkT for N molecules. Work done = pΔV Avogadro constant NA, molar gas constant R, Boltzmann constant k Molar mass and molecular mass. • Required practical 8: Investigation of Boyle's law (constant temperature) and Charles's law (constant pressure) for a gas • Brownian motion as evidence for existence of atoms. Explanation of relationships between p, V and T in terms of a simple molecular model. Students should understand that the gas laws are empirical in nature whereas the kinetic theory model arises from theory. Assumptions leading to pV = 1 3Nm crms 2 including derivation of the equation and calculations. A simple algebraic approach involving conservation of momentum is required. Appreciation that for an ideal gas internal energy is kinetic energy of the atoms. Use of average molecular kinetic energy = 1 2m crms 2 = 3 2 kT = 3RT 2NA Appreciation of how knowledge and understanding of the behaviour of a gas has changed over time.
History	• African American Civil Rights 1865-1992 • Thematic study covering black leaders, • Federal Government, • white opposition • Depth studies – Gilded Age, New Deal, Black Power
Art	<u>BTEC Art and Design - Personal Investigation and The Creative Process</u> • Understand the stages and activities within the creative process

	<u>Introduction to Year 2 A level Fine Art and BTEC Art and Design</u> • Development Ideas /Final Pieces
Business	<u>Marketing</u> • Discuss the different methods used to market products and services and whether these are likely to be the same in the near future. • Discuss and decide upon a definition of marketing. Compare aims and objectives and corporate and marketing objectives. • Investigate the marketing objectives of 4 contrasting organisations.
Computing	Students will use the basic skills they have developed in Microsoft Access at the end of year 12 (term 3b) and apply them to a given scenario. • Use abstraction to pick out key information in a scenario. • Define a data type • Define relationships between data • Order Data into logical groups • Set rules that data must meet to be valid and accepted • Be able to search a database for specific information • Evaluate the effectiveness of a database solution • Pick out what the database needs to accomplish from the scenario • Define the data type • Divide the fields into logical groups • Decide on Primary key/secondary keys and create relationships between the groups
Games Design	<u>Media Messaging</u> Students will study how messages are conveyed in the media. They will study how theories of media representation have helped to shape and define the concept. They will look at different types of audiences and define how they are represented in the media. • Demonstrate knowledge and understanding of media terminology, semiotics, theories, concepts and messages • Apply knowledge and understanding of media concepts, semiotics, theories and formal techniques to constructed representations
Film Studies	<u>Silent Cinema</u> • Modern Misconceptions about Silent Cinema • Lumiere Brothers and George Melies: Realist vs. Expressive debate • Introduction to silent comedy • Buster Keaton as auteur • Pioneering use of film techniques *Set texts:* *One Week (Keaton, 1920)*

	The Scarecrow (Keaton, 1920) *The 'High Sign' (Keaton, 1921)* *Cops (Keaton, 1922)* <u>Short Film Study and Production</u> • Editing workshops • Reviewing sequences and planning for improvement *Set texts:* *15 short films (pupils study a minimum of 3 totalling a minimum of 80 minutes)*
Health	<u>Unit 2 (single and double):</u> • Introduction to roles and responsibilities in the health and social care sector e.g., roles and responsibilities of social worker, specialist doctor) • Introduction to specific role and responsibilities in the health and social care sector e.g., promoting an anti-discriminatory practice, empowering individuals <u>Unit 4 (double):</u> Introduction to question 1: • Research methodologies • Data types • Reliability and validity Introduction to question 1: • Importance of secondary research • Impact on wider society <u>Unit 8 (double):</u> • Completion of public health policy and its aims <u>Unit 14 (single):</u> • Completion of causes, signs and symptoms and diabetes and Alzheimer's
Music	<u>Unit 5: Music Performance Session Skills</u> Learning Aim, A • The study of musical styles within genres. Styles should include; • Musical styles-theoretical and historical aspects of the use of – harmony, choice of chord extensions, scales, riffs, melodic conventions, rhythmic conventions, tonality, roles of instruments, textures, lyrics, vocal techniques used and role of improvisation. • Sonic conventions-theoretical and historical aspects of – instrument type and model, choice of amplifier and settings, use of effects and live processing, pedals, tone, choice of synthesiser model, synthesiser settings, live processing, samplers, choice of samples. • Stylistic interpretation-theoretical and historical aspects of phrasing, groove, instrumentation, arrangement, performance conventions, instrument-specific techniques.
PE	<u>Exam Unit</u> <u>Unit 3 – Sports organization and development</u>

	• LO1: Understand how sport in the UK is organised • LO2: Understand sports development <u>Coursework Unit</u> <u>Unit 2 – Sports coaching and activity leadership</u> • LO3: Being able to use methods to improve skills, techniques and tactics in sport • LO4: Being able to plan sports and activity sessions.
Photography	<u>Personal Project</u> This part of the course the students select a topic for their personal project and produce a body of work that explores their chosen topic.
RE/PSHE	<u>Self-Management</u>: • Life after examinations and school • Mindfulness • Physical and mental well-being • Practical strategies to relax and reduce stress
Psychology	<u>Unit 3 Exam unit</u> • Health Belief Model • Locus of control • Theory of planned behaviour • Self-efficacy theory • Transtheoretical model • Causes of stress and physiological responses to stress • Stress and ill health • Physiological addiction – smoking and alcohol
Sociology	<u>Theories and methods</u> • Sociological theories of society: Structural vs. social action theories and conflict vs. consensus theories. • Functionalist explanations of society <u>Crime and Deviance</u> • Definitions of crime and deviance with examples • Functionalist, Marxist, labelling theory and right realist explanations of crime, deviance, social order and social control • How crime statistics are socially constructed.
Hospitality	**Unit 1:** The Hospitality Industry • Understand the scale and diversity of the hospitality industry • Understand the classification systems and their standards • Know the organisation and structure of hospitality businesses • Know the purpose of support functions in hospitality businesses.