Computing Across the Curriculum within Key Stage 4

Subject / Strand	Computational thinking	Analytical Skills	Problem Solving & Design	Creativity	E-Safety
Art & Photography	• Using **algorithmic thinking** to work through design stages using well-defined steps to create an outcome (**sequencing**). • **Pattern recognition** in artworks and surface pattern design. • Development of ideas and sampling – using **decomposition** to break down an image or idea, using a range of materials to sample techniques, working on once component at a time.	• Review **Primary** and **Secondary** image sources. • Able to discuss the **significance** of imagery and **compare** it to others. • **Extract** useful information from sources to use for written analysis. • Draw an overall **conclusion** based on evidence.	• Create **design** ideas. • Work around issues and **solving problems** such as issues with design choices/construction. • **Solving** the **issue** of the best materials and techniques to use for a specific purpose/piece of work. • **Decision making** and implementation of ideas.	• **Creativity** skills demonstrated throughout KS4. Research, ideas generation, exploration of materials, techniques and processes and the creation of outcomes fulfils this, using a variety of **software**.	• **Safe use of technology** employed during the gathering of research whilst using the internet.

Business (Enterprise and Marketing)	• Use **decomposition** to break down exam questions, based on question type, knowing how many marks and linked strands are required for maximum marks.
	• **Abstraction** required in 3- 8-mark questions to filter out unnecessary detail and to focus on specific context provided.
	• **Algorithmic thinking** to be applied when working through BLT (because, leading to, therefore) stages in extended answers.
	• **Pattern recognition** used when identifying similar impacts across different business topics.
	• Decomposing NEA assignment briefs to identify suitable products for business proposal.
	• Recognise patterns in answers given as part of research for market research tasks in order to then create suitable products.
		• **Extract** relevant detail from given case studies to complement answers and achieve maximum application marks.
		• Make **judgments** for which options will be most suitable to answer based on prior knowledge when completing justify questions.
		• Interpret market research data, identify trends, and justify why a particular product design or price point is suitable.
		• Compare and evaluate competitors, analysing strengths, weaknesses and market gaps.
		• Analyse financial information, such as break-even diagrams, cost structures and revenue forecasts.
		• Evaluate the effectiveness of marketing materials they create (e.g., what worked, what didn't, why).
			• Use **problem solving** to identify the correct finance formulas to correctly calculate finance-based questions.
			• **Decision making** used when identity impacts of each option when answering justify and evaluate questions.
			• Adjust their product design or marketing mix based on feedback or research insights.
			• Find solutions under constraints, e.g., designing a promotional strategy with limited budget.
			• Refine prototypes after evaluating initial designs or user feedback.
				• Use online revision link to help students answer **creative** questions that engage them.
				• Students to create **creative** revision resource such knowledge organisers and mind maps, using appropriate software.
				• Develop innovative selling points (USPs) for their product.
				• Think creatively about branding, packaging, pricing strategies and customer engagement.
				• Design their own product concept based on the OCR scenario.
				• Create marketing and promotional materials, such as:
				  • Logos
				  • Slogans
				  • Social media posts
				  • Advertisements
					• **Discuss** e-safety when discussing online reviews and social media during the promotion section of the marketing mix and market research.
					• **Discussions** around the lack of laws (data protection and copyright) surrounding manufacturing and production costs in different countries.
					• Use digital technologies responsibly for research and communication during coursework.
					• Consider online safety in marketing, such as:
					  • Avoiding copyright infringement
					  • Ethical use of customer data
					  • Understanding GDPR impacts on enterprises

Health & Social Care	• Explain the impacts of actions using a logical chain of **reasoning (sequencing).**	• **Extract** useful information from scenarios to use for describe and explain questions.	• Explain the impacts of actions using a logical chain of **reasoning.**	• Use of **creativity** to produce a health promotion campaign, using appropriate software, to be presented to peers.	• **Safe use of technology** employed during the gathering of research whilst using the internet for coursework.

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		• **Critical thinking** using reasoning to analyse and evaluate. • Make a **reasoned qualitative judgement** considering different factors and using available knowledge/experience to answer exam questions.			• Exploring the Data Protection Act allows students to understand how to **keep electronic data safe**.

Dance (Year 11)	• **Algorithmic thinking** using sequencing when choreographing or learning dances.
	• **Decomposition** skills when dances are broken down into smaller components in order to refine them.
	• **Pattern recognition** used to develop good technique and movement patterns.
		• Review relevant primary and secondary sources.
		  ○ Use this information to reach an interpretation of what happened and formulate an argument.
		  ○ Draw an overall conclusion based on a balance of evidence.
		• Students' recorded performances are analysed and evaluated.
		• Professional performance works and the work of dance companies and practitioners analysed.
			• Students work in groups to make **creative decisions** and confront and overcome issues as they arise such as staging, blocking and choreography.	• Creating a dance routine.
				• When a creative performer is facing a problem, they can come up with an answer to that problem that is in line with the brief.
				• **Creativity** can be shown through a skill, movement.
					• **Safe use of technology** employed during the gathering of research whilst using the internet.

Drama (Year 10)	• **Algorithmic thinking** using sequencing when choreographing and blocking scenes. • **Pattern recognition** when performing and analysing scripts, seeing patterns in the lines in the play/musical.	• Students analyse own performances and then evaluate the effectiveness. • Analyse professional performances and drama practitioners.	• Working in groups and creating performances. Being creative and making decisions. • Overcoming issues as they arise such as staging, blocking, choreography, and characterisation.	• Using digital media to create sound effects and projections used in performances. • Record and edit performances. • The use of lighting and sound effects using computers and lighting desks.	• **Safe use** of sharing media across the internet. • **Copyright** in performances and live productions.

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Engineering Design	• Using **algorithmic thinking** to work through design stages using well defined steps to an outcome.
	• Development of ideas and sampling using **decomposition** to break down an image or idea, using a range of materials to sample techniques, working on one component at a time.
	• **Pattern recognition** using CAD/CAM to design and explore different manufacturing techniques/scaling sizes.
	• 2D/3D design linked to operating different manufacturing designs.
	• Decompose design challenges (e.g., breaking a design brief into functions, constraints, components, materials and user needs).
	• Recognise patterns in existing products when completing the Product Analysis task in R039.
	• Use abstraction by focusing only on essential product features needed to meet a design brief.
	• Apply algorithmic thinking when creating step-by-step workflows for producing sketches, CAD models, or prototypes.
	• Follow logical sequences in R040 when producing manufacturing specifications and working drawings.
		• **Analysing** information to make an overall conclusion based on the outcome of the design and model.
		• **Analysis** of statistics and data to look for trends and to draw conclusions in manufacturing processes.
		• **Critical thinking** using reasoning to analyse and evaluate. Allowing the opportunity to give opinions, consider alternative arguments, weigh up evidence and listen to and respond to the views of others when creating designs and prototypes.
		• Compare design concepts using decision matrices or justification frameworks.
		•
			• Create **design** ideas.
			• Work around issues and **solving problems** such as issues with design choices/construction.
			• **Solving** the **issue** of the best materials and techniques to use for a specific purpose/piece of work.
			• **Decision making** and implementation of ideas against a brief.
			• Adapt manufacturing plans based on available tools, accuracy issues or user feedback.
			• Troubleshoot prototypes, such as:
			  • Materials not behaving as expected
			  • Parts not aligning
			  • Structural weaknesses
				• **Creativity** skills demonstrated throughout KS4.
				  ○ Research, ideas generation, exploration of materials, techniques and processes and the creation of outcomes fulfils this using a range of CAD/CAM software.
				
				Developing original design concepts in response to the OCR brief (R038).
				
				Sketching innovative product ideas using both freehand and annotated methods.
				
				Producing imaginative 3D CAD models, experimenting with form, surfaces, textures and components.
				
				Selecting unique solutions to meet user needs, rather than copying existing products.
				
				Considering aesthetic factors, such as colour, ergonomics, branding, and how a product "feels" in user hands.
					• **Safe use of technology** employed during the gathering of research whilst using the internet for coursework.
					• Exploring the Data Protection Act allows students to understand how to keep electronic data safe.
					• Safe and lawful use of information from other sources.

English	• Identifying and exploring narrative arcs and patterns within the stereotypical nature of an arc as well as the sequencing and composition of narratives creatively and independently. • Breaking down large chunks of analysis into smaller components. • Identifying patterns in speech and dialogue. • Semantic field analysis.	• Analysis of language and structure. • Analysis of world seminal texts, Shakespeare plays, pre and post 1900 poetry, modern drama. • Explorations and evaluations of writers' viewpoints and perspectives. • Responding to the views of others and formulating own arguments and perspectives.	• Translation of Shakespearean and pre 1900 Literature into modern English. • Use of glossaries to extend vocabulary and understanding. • Decoding skills to break down quotations and inferences / deeper meanings. • Decoding at word level – deconstructing meaning in a complex text.	• Creative writing, designing descriptions, narrative arcs, stories, poetry, using images as stimulus etc. using appropriate software • Encouraging creativity and imaginative ideas. • Using reading to enhance imagination and to inspire own writing. • Inferences based on own understanding of creative intent of writers.	• The dangers of social media explored through writing to argue / persuade. • Fear Factor in Y8 explores stereotyping and prejudice perpetuated on the internet. • Search for Truth in Y9 is focussed on explorative journalism, students encouraged not to believe everything they read online or in print. Explores how the media can

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	• Analysis within poetry of rhyme and rhythm.		• Etymology of words to enhance understanding.		manipulate the viewpoints of society.
Hospitality & Catering	• **Abstraction** and **decomposition** in paring down language chunks for closer analysis and reapplication across contexts when looking into different nutritional properties and designing food labels. • Application of **algorithmic thinking** in production and manipulation of grammatical structures and processing when sequencing and creating time plans and recipe cards.	• Able to analyse the **significance** of nutritional needs, **comparing** to others. • **Extract** useful information from sources to use for written analysis such as recipes and RI (recommended intake and legislation linked to food safety). • Draw an overall **conclusion** based on evidence when evaluating dishes using our senses, using star diagrams alongside written text. • Make a **reasoned qualitative judgement** considering different factors and knowledge/experience to answer exam questions.	• Create **design** ideas linked to a contextual challenge. • Work around issues and **solving problems** such as customer needs and dietary requirements. • **Solving** the **issue** of the best equipment, ingredients and techniques to use for a specific ingredient. • **Decision making** and implementation of ideas before, during and after evaluations.	• Creativity skills demonstrated throughout KS4 linked to food styling from images and research using digital media. • Research, ideas generation, exploration of materials, techniques and processes and the creation of outcomes. • Use of online language learning tools e.g. digital textbook and SKO for creating individualised retrieval and practise.	• **Safe use of technology** employed during the gathering of research whilst using the internet for coursework. • Exploring the Data Protection Act allows students to understand how to keep electronic data safe. • Safe and lawful use of information from other sources.
MFL (French and Spanish)	• **Pattern recognition** in applications of phonics, vocabulary/syntax and grammatical processes. • **Abstraction** and **decomposition** in paring down language chunks for closer analysis and reapplication across contexts. • Application of **algorithmic thinking** in production and manipulation of grammatical structures and processing. • Recognition of **trends** and **exceptions** in irregular and colloquial structures and verbs which do not follow predefined patterns.	• **Analyse** and **appraise** chunked language to identify and reinforce phonological, lexical and grammatical knowledge. • **Analysis** of rich texts to identify and **evaluate** language use in context.	• Grammar and translation tasks **solving problems** of **language choice** and interconnectivity across syntactical and lexical sequences of speech/writing. • **Problem solving** informing choices of tense, time frame and mood alongside stylistic choices to enhance and develop language richness in written/spoken tasks. • Transactional role play: **decision making** and requesting correct information in context.	• **Creation** of audio files for preparation and practise in speaking tasks including mock and final exams, using appropriate software. • Use of online language learning tools e.g. Quizlet, Blooket for **creating** individualised retrieval and practise.	• AQA Theme 1, Topic 2: Technology in Everyday life. **Exploration** and **discussion** of online risks, device/Internet usage including frequency and addiction, consequences of excessive internet usage, advantages and disadvantages of technology and the internet.
Geography	• Use of **models** to describe and explain **abstract** concepts such as urbanisation, water cycle, migration, glaciation, nutrient cycle and DTM. • **Algorithmic thinking** to understand complex theories in geography such as the formation of a corrie. • **Recognition of trends** in data in the use of graphs/statistical work and then be able to draw conclusions.	• **Extract** useful information from sources, graphs and maps. • **Extraction** of relevant information from given text and data to draw conclusions and evaluate. • Fieldwork to **analyse the validity** of conclusions, trends and patterns. • Understand that people have different opinions and be able to make a **balanced judgement/conclusion.**	• Fieldwork involves an unseen element; therefore, students use problem solving when they are issued an evaluation (provided with a problem) and students suggest solutions. • **Decision making** and implementation of ideas (Issue Evaluation). • **Problem solving** the opportunities and challenges that the physical	• **Creation** of graphs and data presentation techniques for the student's primary fieldwork findings, using appropriate software. • Use of online learning tools such as Seneca, Internet Geography, MS Forms, Cool Geography and Quizlet for **creating** individualised retrieval and practise.	• **Safe use of technology** employed during the gathering of research whilst using the internet. • Students complete fieldwork and discuss ethics on how people can actively communicate and recognise **consent** from others, and how and when consent can be withdrawn.

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	• **Decomposition** breaking down themes in geography to understand the bigger picture such as studying urbanisation through the lens of migration, natural increase, squatter settlements and sustainability.		world presents the human life. Students **judge the significance** of each problem or opportunity in order to make a judgement.		

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Music	• Use algorithmic thinking to work a key structure to compose music. Step by Step process, there is a **sequence** in these steps. • Use algorithms when looking and studying different **intervals (patterns)** during listening and composing sessions. • Algorithmic thinking is used in every performance such as rhythmic **patterns** and time keeping. • **Decompositio**n of rhythms in performance, composition and analysing. • **Abstraction** of music when studying set works stripping away all unnecessary details. Striping away melody and harmony to see chord structures or rhythmic devices. • **Pattern recognition** when composing/performing and analysing music, seeing **patterns** in music.	• **Analysing** music in performance for **decision making**. How to play style/focus. • **Analysing** composers, seeing what they have done to aid own composition. • **Analysing** own compositions and performances. Do they work? Sound finished?	• Working in groups to support **creative design** decisions in performance. • Solving **problems** in composition. key changes and modulations. • **Designing** concerts and performances.	• Composition **creative skills,** using Sibelius (notation package) and Ignite software (multi-tracking). • DAW software (Digital Audio Workstation) implementation and understanding, instilling **creative** thinking and creation. • **Creativity** in individual performance.	• **Safe use** of sharing music across the internet. • **Copyright** in composing and performance music.
History	• Using **algorithmic thinking** when writing a narrative account, placing events in correct chronological order to reach an outcome. Placing historical events into chronological order (**sequencing**). • **Decompositio**n of themes such as social, political and economic to understand their impact on society for rates of change. Looking at ciphers and coding during Elizabethan England. • **Pattern recognition** analysing patterns of continuity and change.	• Analyse primary sources for their usefulness and validity for an enquiry. Considering source content as well as provenance. • Evaluate historians' interpretation of past events and formulate an argument to come to an overall judgement.	• Look at abstract sources, analysing where the sources come from and the author, then apply its usefulness to the context of the time. • Students must be able to apply own knowledge to sources and interpretations to solve big questions.	• **Creation** of presentations on historical findings/information, using appropriate software.	• When looking at sources, consider where they come from and how their context may impact their reliability. • Using This knowledge to consider evidence in the real world including TikTok's, news articles on Facebook. • **Safe use of technology** employed during the gathering of research whilst using the internet.

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IMedia (ICT)	• **Decomposition** when breaking down strands within coursework (NEA) mark schemes to identify tasks and improvements. • **Abstraction** when removing unnecessary detail to ascertain important information from set assignments within coursework (NEA). • **Algorithmic thinking** applied when following the flow of data within Flow charts. • **Pattern recognition** when creating Mood Boards and Mind Maps during coursework (NEA) and analysis of them when completing exam questions on these pre-production planning documents.	• Review **Primary** and **Secondary** sources when analysing exam scenarios and coursework (NEA) set assignments. • Analyse the suitability and properties of digital graphic and other assets when sourcing them. • Explain both the **validity** and reliability of sources when sourcing for use within coursework (NEA). • **Extract** the most relevant information from set assignments and exam questions to develop the most effective answers. • **Critical thinking** when deciding which images are most suitable for Mood Board, as well as deciding what should be include in visualisation diagrams. • **Analysis** of pre-production documents suitability for both audience and purpose in order to answer 12 mark essay question within examined unit.	• Create a range of **design** and planning document with creative elements such as mood boards, visualisation diagrams and wire frames diagrams. • Solve **problems** presented within the set assessment, deciding on what software, hardware and planning documents to create/use. • **Create designs** required to complete each coursework (NEA) unit.	• Use image editing software to **create** products required with the coursework (NEA) applying advanced tools. • Use image editing, video editing, sound editing, animation and web development software to **create** products required with the coursework (NEA) applying advanced tools. • Use a variety of different software to apply **creativity** to pre-production documents. • Be about to evaluate **creative** documents, identifying positives, negatives and ways to improve.	• Be able to identify different legislation surrounding assets and data. Understanding **intellectual properties, copyright, trademarks, Creative Commons and data protection.** • Identify steps on how to avoid breaking **legislation** surrounding the use of assets and the internet.
Mathematics	• **Algorithmic thinking** following a series of steps (**sequencing**) to find the solution to a problem, such as when solving equations. • Solving complex mathematical problems using **decomposition** working on individual parts of a problems before combining them to solve a larger problem. • Make and use connections between different parts of mathematics to solve problems. • **Abstraction** simplifying problems by removing unnecessary detail and focussing on the maths that can be used to solve a given problem. • **Pattern Recognition** analysing data to draw conclusions such as cumulative frequency curves and box plots.	• **Analysis** of data presented to understand and draw conclusions. • **Critical thinking** when comparing data sets or graphs and drawing conclusions about one over the another. • Reflect on how solutions determined may have been affected by any modelling assumptions made during modelling. • **Structure** work in such a way that can easily be revisited to identify errors in the steps taken should they occur, such as showing all working, with lines of calculations written under one another.	• Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems, interpreting their mathematical solution in the context of the problem they are solving. • Problem solving is continually used throughout KS4 mathematics, whereby students are expected to identify a problem and then develop and implement a step-by-step plan to solve said problem.	• Specialist software is used to **model** and **explore** mathematical concepts. Students are encouraged to be **creative** in their use of these software. • Tools for plotting graphs allow students to **explore** the effect of changing and manipulating variables in equations. • Geogebra software used for **modelling** and **exploring** geometric properties allowing students to develop a stronger understanding of these concepts.	• **Critical evaluation of** data during data and data handling, such as how graphs and charts can be used to convey a chosen point of view. • Students are encouraged to look critically at the source of any **information** they find online. • **Safe use of technology** employed during the gathering of information for homework or in lessons.

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Religious Studies	• **Algorithmic thinking** creating timeline of events for religious figures or events (**sequencing**). Creating a storyboard or social stories. Step by step guides e.g. Muslim prayer. • **Decomposition** breaking down stories into main parts. Key events that have taken place. Answering big questions e.g. how was the world created? • **Abstraction** when removing unnecessary detail and focussing summarising key findings. • **Pattern recognition** when comparing religious beliefs, teachings and practices, democratic countries versus other forms of government.	• **Analysing** information to make an overall conclusion based on the balance of evidence. • **Analysis** of statistics and data to look for trends and to draw conclusions. • **Critical thinking** using reason to analyse and evaluate. Allowing the opportunity to give opinions, consider alternative arguments, weigh up evidence and listen to and respond to the views of others. • **Extract** the most useful quotations to use as evidence to back up claims. • **Structure** an essay which presents a balanced account of an event and reflects different perspectives.	• **Analysing** case studies and trying to discuss and work out an appropriate moral response. • Reading case studies and scenarios, obtaining relevant information and understanding **how to deal** with problems that arise.	• **Creativity** through, sharing thoughts, expressing opinions, analysing and evaluating beliefs and values for example. These kinds of activities mean that students apply their curiosity and openmindedness, and then use imagination and problem-solving approaches to consider some very complex beliefs and values.	• Considerations of brainwashing and indoctrination through online activities and social media. What to do in situations of online discomfort and suspected brainwashing. • How to be aware of fake news online that may insight public hatred, e.g. Islamophobia. • How people can actively communicate and recognise **consent** from others, including sexual consent, and how and when consent can be withdrawn.

Physical Education	• **Algorithmic thinking** when creating a session-plan. When leading a warm up to include the different aims and parts. Information processing model when performing a skill in any sport.
	• **Decomposition** when skills are broken down into smaller components in order to refine them. The rules of the sport. What are the requirements of the sport?
	• **Abstraction** when removing unnecessary detail when creating fitness Training plans and progression within. Focusing on key elements of each skill and how this leads to success.
	• **Pattern recognition** when developing good technique and movement patterns. Developing tactics and formations. Using
		• **Analysis** of data such as:
		  o fitness testing to compare against normative data and interpret what it means.
		  o own and others performance in a sporting activity, identifying areas of strengths and areas to improve upon. Using this information to plan for improvement.
		  o trends in physical activity participation.
		  o recorded from performance, such as number of goals scored.
		• **Critical thinking** using reasoning to analyse and evaluate. Allowing the opportunity to give opinions, consider alternative arguments, weigh up evidence and listen to and respond to the views of others.
			• Working in teams to support **creative design** of tactics and decisions that can affect the outcome in a performance.
			• Overcoming **problems** which may arise during a performance, such as the opposition having a strong right winger, how do we overcome that?
			• Adapting performance to overcome challenges within a game.
			• Playing in competition to overcome own and team weaknesses to encourage best performance.
				• Creating a trampoline or dance routine using knowledge of different routines and genres.
				• When a creative performer is facing a problem, they can come up with an answer to that problem that is unexpected by the opponent. **Creativity** can be shown through a skill, movement or a tactic.
				• Creating a health and physical activity campaign poster.
				• Creating a training plan/ session to ensure it is varied and not tedious.
					• Discuss the benefits/challenges of using wearable technology. How does technology impact what we see as healthy?
					• **Safe use of technology** employed during the gathering of research whilst using the internet.
					• Look at Sports professionals social media pages and the impact sponsorship and the media has on them.

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	statistics taken from a game on performance, such as number of shots on target or possession of the ball.	• **Extract** useful information from scenarios to use for describe and explain questions. • Make a **reasoned qualitative judgement** considering different factors and using available knowledge/experience to answer exam questions.			

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Science	• Using a **series of stages** to complete Punnett square diagrams and determine the outcome of genetic crosses (**sequencing**). • Use of **models** to describe and explain **abstract** concepts such as: ○ Cell division, movement of substances, enzyme action, negative feedback control, chromosome behaviour during meiosis, models of the atom, electron configuration, ionic compounds, covalent compounds, changes of state, density, particle arrangement. • **Recognition of trends** in data in required practical results and drawing conclusions from this. • **Recognition of trends** in activity in group 1 and 7 elements.	• **Analysis** of trends in data in required practical results and drawing conclusions from this. • **Extraction** of relevant information from given text and data to draw conclusions and evaluate. • Making **reasoned judgements** using scientific understanding and source information.	• **Planning** of experiments to make observations, test a hypothesis, check data or explore phenomena (required practicals). • Work around **solving problems** with experimental technique and errors. • **Problem solving** when completing mathematical components of science. When calculating an unknown value(s) in chemistry and physics.	• Creation of **animations** to model processes in cells, using appropriate software. • Creation of **models** to show abstract concepts such as cells structures, particle models, electrical circuits and the national grid, using appropriate software. • **Design** methods to investigate relationships, using appropriate software. • **Models** of DNA, using models • **Models** using molymods to make elements and compounds, using appropriate software.	• **Safe use of technology** employed during the gathering of research whilst using the internet.