Cardinal Newman Catholic School

INTENT: Curriculum Overview Year 9 Computing

A learner in Year 9 will know:	**A learner in Year 9 will be able to**:
They will understand the components that make up computer systems and how they communicate with one another. They will learn about the different kinds of memory used within a computer system, software and the different types of software, the roll of the OS, computer networks and the security issue associated with the use of computer networks. They will also learn about the computational thinking processes that is essential to create programs for a computer.	*Understand and apply the fundamental principles and concepts of Computer Science, including algorithms, and data representation, analyse problems in computational terms through practical experience of solving such problems, including designing, writing and debugging programs and understand the impacts of digital technology to the individual and to wider society.* *They will also be able to explain what pre-production documents are, when and why they are created. They will be to identify suitable file formats for the different production documents and suitable application to use when developing the different preproduction documents.*

9.1 Computer System Architecture	**9.2 Memory**	**9.3 System Software**	**9.3 Pre-Production skills**	**9.3b Sound sequence**	**9.3 Computational think and Algorithms**	**9.3 Programming in python**

Term 1	**Topics/Themes** 1.1 Systems architecture	**Topics/Themes** 1.2 Memory and 1.3 System Software	Autumn % Assessment
	Knowledge: This unit will introduce students to the components of the motherboard, identifying heir features and functions within the computer system. **Skills:** ▪ Examine the major components of the PC architecture; the CPU, Cache and Registers, their features/characteristics and functions within the computer system. ▪ Understand the purpose of embedded systems and be able to identify them ▪ Understand how design an algorithm for chosen problem ▪ Understand how to interpret algorithms ▪ Understand sorting algorithm (insertion, merge &bubble sort) and searching algorithm (linear and binary) **Formative Assessment:** Pit stops: Components of the motherboard **End point:** ▪ Students can identify the features of CPU and their functions ▪ They can explain the role and impact of Cache on the performance of the computer ▪ They can explain and identify embedded computer systems	**Knowledge:** This Unit looks at types of memory, their features, characteristic and their role within the computer system; virtual memory and its impact the performance of a computer system. Unit also covers data capacity and calculation of data capacity requirements and common types of storage technology used within the industry. **Skills:** ▪ Understand the functions of RAM, ROM and virtual memory ▪ Understand the impact on performance of RAM ad virtual memory ▪ Identify common types of storage technologies and storage media ▪ Understand how design an algorithm for chosen problem ▪ Understand how to interpret algorithms **Formative Assessment:** it stop assessment **End point:** ▪ They can explain the difference between RAM & ROM ▪ Explain the function of cache and its impact on the speed of a computer ▪ Understand the impact of virtual memory on the performance of a computer ▪ Identify suitable storage media for different applications, their pros and cons	Knowledge coverage: **Memory and System Software** **Systems architecture** Skills tested: ▪ Components of computer architecture, their features and functions ▪ Types of memory, their features and functions ▪ Types of storage and examples of different storage media and technology **Assessment style/questions:** Exam style questions, combination of short written answers requiring students to state, explain, describe analyse and compare

Term 2	**9.2 Pre-Production Skills & Documents**	9.3b Sound Sequence Project	Spring % Assessment
	Knowledge: This unit will introduce students to the concept pre-production documents. Students will learn about preproduction documents, why they created and how they created. They will have the opportunity to design these using suitable application. **Skills:** ▪ Be able to define /explain what a preproduction document are ▪ Identify all pre-preproduction documents ▪ Explain why they are created ▪ Use suitable applications to create pre-production documents **Formative Assessment:** Pit stop: quiz on preproduction documents End point: ▪ Identify preproduction documents ▪ Explain why they are created ▪ Create preproduction documents	**Knowledge:** This unit is project based, they will be given a task, based on scenario to create a suitable publication (sound sequence) they are expected to use the knowledge and content of the previous unit, to plan and design an audio advert. **Skills:** ▫ Identify & Create preproduction documents for the sound project ▫ Chose a suitable sound track and edit these to be used in the radio advert ▫ Create an advert and convert text to audio clip ▫ Create a radio advert using Audacity ▫ They willable to import and edit sound clips in Audacity. ▫ They will learn to export their completed radio advert into suitable format **Formative Assessment**: Pit stop: quiz on preproduction documents and sound sequence skills **End point:** Students will create a radio advert.	Knowledge coverage: ▫ preproduction documents skills and knowledge ▫ sound editing skills and knowledge **Skills tested:** ▪ creating / designing preproduction documents ▪ creating/designing sound sequence ▪ **Assessment style/questions:** exam style questions, combination of short written answers requiring students to state, explain, describe analyse and compare. Peer assessment of the completed sound project
Term 3	**9.3 Computational thinking and Algorithm**	**9.3b Programming in Python**	**Summer % Assessment**
	Knowledge: Introducing student to the concept of problem solving, they will look the role of algorithms when design algorithms and how algorithm can be represented using flow charts and pseudocode. They will look at sorting and searching algorithms **Skills:** Understand how design an algorithm for chosen problem Understand how to interpret algorithms Understand sorting algorithm (insertion, merge &bubble sort) and searching algorithm (linear and binary) Data compression Data encryption **Formative Assessment:** Pit stop: quiz on computational thinking **End point:** ▪ Can explain what an algorithm is	**Knowledge:** Students will apply the knowledge on computational thinking and algorithmic thinking to learn to program in python. Students will learn about the programming constructs, apply these programming concepts in scenario based **Skills:** Application of Computational thinking concepts – abstraction, decomposition, pattern recognition and algorithmic thinking. Application of programming constructs – sequencing selection and iteration **Formative Assessment**: Programming task **End point:** ▪ Students can explain the difference between a variable and constant ▪ Students will be able to identify where sequencing, selection and iteration has been used	**Knowledge coverage:** ▪ Algorithms – representation, interpretation searching and sorting algorithms ▪ Data Representation - number systems, text, sound, images, data compression and data encryption **Skills tested**: ▪ Identify and explain key terminologies used in programming **Assessment style/questions**: Exam style questions, combination of short written answers requiring students to state, explain, describe analyse and compare

	▪ Able to explain key terminology – abstraction, decomposition and algorithmic thinking ▪ Able to design, interpret and correct algorithm ▪ Able to use pseudocode to represent an algorithm	▪ They can identify why programming concept to use when writing a program ▪ They can use the knowledge and skills to create a program based on given scenario	

EIF: Overview of research and key principles - Quality of Education

- *Construct a curriculum that is ambitious for all, coherently planning and sequenced to give learners (particularly the most disadvantaged) the knowledge and skills needed to be successful.*
- *Teaching is designed to help learners to remember in the long term the content they have been taught and to integrate new knowledge into larger concepts.*
- *Assessment is used to help learners embed and use knowledge fluently, check understanding and inform further lesson planning or remediation, without unnecessary burdens for staff or learners.*

Curriculum (i)

- 'Knowledge-engaged' school – knowledge underpins and enables the application of skills and leaders desire that both are intertwined and developed. (pg. 6)

Effective teaching (ii)

Achievement is likely to be maximised when teachers actively present material and structure it by:

- Providing overviews and/or reviews of objectives (pg. 12)
- Outlining the content to be covered and signalling transitions between different parts of lesson (pg. 12)
- Calling attention to main ideas (pg. 12)
- Reviewing main ideas (pg. 12)

Effective teaching through: (Pg. 13)

- Effective questioning – teachers provide substantive feedback to pupils, resulting from pupils' questions or answer to teachers' question. Correct answers should be acknowledged positively and appropriately. Partially correct answers should be prompted before moving on. If an answer is wrong it should be pointed out and ascertained how they got it wrong. Teachers should encourage responses from girls and shy pupils who may be less assertive. Teachers should use product (single response) questions and process questions (calling for explanation from pupils). Pupils should be encouraged to ask questions. (pg. 13)

- Differentiation – focus group is the best practice, not range of resources or activities re: workload (pg. 14)
- Routines - stimulating learning environments, clear goals (so what?) (pg. 15)
- Modelling - language and introducing new words in context/WAGOLL (pg. 15)
- Group activity and pair – must be structured and prepared. Explicit guidelines must be given and roles should be assigned. (pgs. 13 & 14)

Memory and Learning (iii)

- Spaced or distributed practice - where knowledge is rehearsed for short periods over a longer period of time is MORE effective that massed practice when we study more intensively for a shorter period of time. Good practice is to block learning and repeat practice over time as this leads to greater long-term retention. (AAABBBCCC) (pg. 16)
- Interleaving - mixes the practice of A, B and C e.g. (ABCABCABC). There is growing evidence that this can improve intention, and research in maths is particularly promising. (pg. 16)
- Retrieval practice – involves recalling something you have learned in the past and is far more effective than re-reading because it strengthens memory. IT needs to occur a reasonable time after the topic has been taught and should take the form of testing knowledge either by the teacher or through pupil self-testing and should be checked for accuracy but not necessarily recorded re: workload. (pg. 16)
- Elaboration – describing and explaining something learned to others in some detail. Contextualising learning and making connections among ideas and connecting to one’s memory and experiences. (pg. 16)
- Dual coding – representing information both visually and verbally enhances learning and retrieval from memory. (pg. 16 & 17)
- Cognitive load theory (CLT) – presenting learners with information in small chunks and embedding learning/memory before moving on to something else in order to avoid overloading. (schemata) (pg. 17)

Assessment (iv)

Assessment, if appropriately employed has a positive impact on learning and teaching. Pupils must understand the aim of their learning, where they are and how they can achieve the aim. In order for assessment to have a positive impact, two conditions need to be met:

- Pupils are given advice on how to improve (pg. 18)
- Pupils act on the advice by using materials provided by the teacher, going to the teacher for help (focus group), or working with other pupils. (pg. 18)

- Use of low stakes testing can contribute to learning in valuable ways. Working to recall knowledge that has previously been learned has a positive mental impact on learners. Learners who do a test shortly after studying material do better on a final test than those that don't – even if no feedback is given.
- Teachers should use assessment to plan/adapt lessons to tackle gaps in knowledge and re-teach where problems persist.
- Assessments at the start of learning is important, to know the level that pupils are starting from.