Limehurst Academy Computing Curriculum

Technology is everywhere and will play a pivotal part in students' lives. Therefore, at Limehurst Academy we want to model and educate our students on how to use technology positively, responsibly and safely. We have a broad curriculum that encompasses computing, information technology and digital literacy. We want our students to understand that there is always a choice with using technology and as a school we utilise technology to model positive use.

Knowledge and understanding

We recognise that technology can allow students to share their learning in creative ways. We also understand the accessibility opportunities technology can provide for our students. Our knowledge rich curriculum must be balanced with the opportunity for students to apply their knowledge creatively which will in turn help our students become skilful computer scientists.

We want our students to be fluent with a range of tools to best express their understanding and hope by the end of Key stage three, students have the independence and confidence to choose the best tool to fulfil the tasks and challenge set by their teachers.

Skills

Due to the broad nature of the Computing curriculum students will gain practical ICT skills which are transferrable to other subject areas and the world of work. Students will be confident in using a range of different software packages to solve problems.

Many of the ICT and Computing units require students to recall and build upon their mathematical skills. In Computing particularly students will need to have a logical mindset, where they will be required to design and program algorithms.

Literacy plays a key role in the Computing curriculum. Students will develop their evaluative skills as this is a key element of the 'Project Life Cycle', that needs to be completed so that reflection on the end solution can take place.

The Future

The subject-specific knowledge developed in our Computing lessons equip students with experiences which will benefit them in further education and future workplaces. From research methods, use of presentation and creative tools and critical thinking, Computing at Limehurst Academy gives students the building blocks that enable them to pursue a wide range of interests and vocations in the next stage of their lives.

Computing Road Map

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1		Summer 2
Year 7	Games Programming in Scratch	Using Computers Effectively, Safely and Responsibly	Spreadsheet Modelling	Database Development	HTML and Web Development		Control Systems with Flowol
Year 8	Spreadsheet Modelling	Understanding Computers	E-Safety	First Steps in Small Basic	Introduction to Python		Games Development in Kodu
Year 9	Modelling in Small Basic	Spreadsheet Modelling	Graphic Design	Python Next Steps	ICT and Computing theory		
Year 10 Cam Nat	LO3 Data and Information	LO4 Collecting, Processing and Storing Data/Information	LO5 Spreadsheet and Database Development	LO6 Different Methods of Processing Data	LO1	LO2	Practice CA
Year 11 Cam Nat	Controlled Assessment – 20 hours		Exam Revision LO1, LO3 and LO4 and LO6				GCSE Examinations
Year 10 Computing	Introduction to Python Programming	Computer Architecture; Memory; Storage	Wired and Wireless Networks; Network Topologies	System Security; Types of software	Ethics, Legality and Environmentalism		Computational Logic
Year 11 Computing	Producing Robust Programs	Programming Techniques	Algorithms	Translators and Facilities of languages	Data Representation		GCSE Examinations

Year Seven

Unit One: Games Programming in Scratch

In this unit students will be introduced to the Scratch programming environment and begin by reverse-engineering some existing games. They will then progress to planning and developing their own games, learning to incorporate variables, procedures (using the Broadcast function), lists and operators. They should be able to create a fully working game with lives, scoring and some randomisation of objects. Finally, they will learn to test and debug their programs.

Intent

Knowledge acquired:

1. Relate computational abstractions and programming code to on-screen actions

2. Design algorithms to solve problems

3. Sequence instructions in order to make things happen

4. Use variables in programming structures

5. Assemble code in procedural blocks

6. Use Boolean operators in programming code

7. Identify and use screen objects in their own Scratch game

8. Carry out tests to debug their project

Skills developed:

• Logical thinking and problem-solving skills will be developed

Understanding:

• Compare the effectiveness of their algorithms with those of peers

• Critically analyse the limitations of their projects

Links to National Curriculum KS2:

• Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts

• Use sequence, selection, and repetition in programs; work with variables and various forms of input and output

• Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

Links to future study:

Year 8: First Steps in Small Basic

Introduction to Python

Games Development in Kodu

KS4: GCSE OCR Computer Science: 2.1 Computational Thinking, 3 Developing a game program

Implementation

Number of lessons: ≈6

Sequence of lessons:

1. Movement	4. Randomising the behaviour of Sprites
2. Lives and scoring	5. Shooting and Jumping
3. Adding a new level	6. Revision and Assessment

Main Resources	**Method of Assessment**	**Use of Assessment Results**
• PG Online Worksheets • Teacher prepared PowerPoint & Activities • Teacher prepared example code and games in Scratch to use for modelling purposes • Software: Scratch online	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment

Unit Two: Using Computers Effectively and Safely and Responsibly

This is a theoretical unit covering the necessary basic knowledge to use computers safely, effectively, and responsibly. Students begin by looking at file management and security. The unit then moves on to e-safety (cyber-bullying, phishing etc.), and online profiles to give students a better understanding and awareness of using social media. The functionality and operation of email and search engines and how to use them effectively are covered

Intent

Knowledge acquired:

1. Use file management techniques to create folders, save, copy, move, rename and delete files and folders and make backup copies of files

2. Recognise extensions for common file types such as .doc or .docx, .ppt, .jpg etc

3. Keep their files in well organised and appropriately named folders

4. Explain what constitutes a "strong" password for an online account

5. Describe a code of conduct

6. List the dangers and drawbacks of social networking sites

7. List responses to cyberbullying

8. Use a search engine to find information

Skills developed:

- File management skills will be developed that the students will hopefully use whenever documents need to be saved onto the computer.
- Skills and an understanding of staying safe when online will be developed.

Understanding:

- Understanding how to resound to cyber bullying.
- Understanding how to use advanced features of a search engine.
- Understanding why the information they find may not be accurate.

Links to National Curriculum KS2:

- use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content
- use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.

<u>Links to future study:</u>

Year 8:   Understanding Computers

E-Safety

KS4:   GCSE OCR Computer Science: Unit 1.6 - 1.8, threats to a computer system, and ethical, legal, and environmental considerations.

OCR Cambridge Nationals: LO4 – Understanding factors to be considered when collecting and processing data/information

Implementation

Number of lessons: ≈6

Sequence of lessons:

1. File Management	4. Using Email
2. Social Networking	5. Searching the Web
3. Keeping your Data Safe	6. Revision and Assessment

<u>Main Resources</u>	<u>Method of Assessment</u>	<u>Use of Assessment Results</u>
• PG Online Worksheets • Teacher prepared PowerPoint & Activities	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment

Unit Three: Spreadsheet Modelling

This is a practical, skills-based unit covering the principles of creating and formatting basic spreadsheets to produce and use simple computer models. Students will learn how to use basic Formula and Functions, use different formatting features, and create graphs and charts with data. They will also learn to use and ling multiple tabs on a spreadsheet.

Intent

Knowledge acquired:

1. Use the / * - + to create simple formulas
2. Add formatting to text and cells
3. Work independently to create professional spreadsheets that are formatted to the needs to the required audience
4. Create a chart using data from a spreadsheet, with appropriate chart titles and axis labels.
5. Use AutoFill to replicate a formula
6. Use the Sum, MAX, MIN and AVEARAGE Functions appropriately
7. Use the Sort and Filter tool to sort the data in ascending order
8. Format the text to appropriately use text wrap, Merge Cells and resize cells
9. I know when it is appropriate to format the cells to currency
10. I can add an image to my spreadsheet
11. Understand that Some Charts will need Data labels (E.G Percentages). And Colours on a chart can be changed.

Skills developed:

• Be able to use MS Excel to create spreadsheet models to solve real life problems.
• Use spreadsheet features effectively to create spreadsheet models

Understanding:

• Understand the uses of a spreadsheet, and where in industry they are useful.

Links to National Curriculum KS2:

• Select, use, and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating, and presenting data and information

Links to future study:

Year 8:   Spreadsheet Modelling – Chimp Andy

KS4:   OCR Computer Science: Unit 2 and 3 - Formulas and data validation are important due to programming elements. The logic used is the same.

                OCR Cambridge Nationals: L05- to be able to import and manipulate data to develop a solution to meet an identified need.

Implementation

Number of lessons: ≈7

Sequence of lessons:

1. Shopping List – Using basic Formulas and formatting	5. Stationary Shop – Planning and creating a spreadsheet
2. Hogwalk's Houses – Basic Functions, entering data and formatting features	6. Delivering Letters - Planning and creating a spreadsheet
3. School Tests – Formatting cells and using functions	7. Revision and Assessment
4. Spell Costs – Working on multiple sheets, sorting data and setting cells to currency	

Main Resources	**Method of Assessment**	**Use of Assessment Results**
- Teach-ICT Worksheets - Teacher prepared PowerPoint - Teacher prepared example Spreadsheets for modelling purposes - Software: MS Excel	- Self-Assessed and Peer assessed - End of Unit Assessment	- Used to identify areas of weakness - Used to set WWW and EBI based on Assessment

Unit Four: Database Development

This will be the first time the students use MS Access to create a database. We will start by developing their understanding of the uses of Databases. We will then move on to carrying out sorts and filters in MS Excel. Once students are comfortable with handling data, they will be introduced to MS Assess. They will then create a flat file database with a Table, Form, Queries and Reports.

Intent

Knowledge acquired:

1. Basic formulae (addition, subtraction, multiplication, division, using multiple cells)

2. Relative cell referencing

3. Appropriate naming conventions for worksheets and files

4. Basic and appropriate formatting of appearance

5. Built in functions (SUM, MIN, MAX, AVERAGE)

6. BODMAS

7. Simple charts (bar chart, pie chart, line graph)

8. Data types

9. Flat file database

10. Primary key

11. Single table query

12. Sorting data

13. Report from simple query

14. Report from single table

15. Boolean operators in queries

16. House style.

Skills developed:

Students will build the skills to create a fully functioning flat file database with a table, Form Queries and reports.

Understanding:

Students will understand the purpose of a database and the elements that make up a flat file database.

Links to National Curriculum KS2:

- Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content

- Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information

<u>Links to future study:</u>

Year 8:   Understanding Computers

KS4:   OCR Computer Science: Unit 2 and 3 - Formulas and data validation are important due to programming elements. The logic used is the same.

OCR Cambridge Nationals: L05- to be able to import and manipulate data to develop a solution to meet an identified need.

Implementation

Number of lessons: ≈6

Sequence of lessons:

1. Introduction to Databases	4. Input Forms
2. Creating a Database Table	5. Creating a Report
3. Queries	6. Revision and Assessment

Main Resources	**Method of Assessment**	**Use of Assessment Results**
- PG Online Worksheets - Teacher prepared PowerPoint - Teacher prepared example Spreadsheets for modelling purposes - Software: MS Access	- Self-Assessed and Peer assessed - End of Unit Assessment	- Used to identify areas of weakness - Used to set WWW and EBI based on Assessment

Unit Five: HTML and Web Development

Students will learn the basics of HTML and CSS. They will learn how to create text styles and add content, including text and graphics, in a specified position on a page, as well as navigation links to other pages on their website and to external websites. The basics of good design are covered, and with the help of worksheets, students will develop their own templates in a text editor such as Notepad. They will decide on a Unit for their websites, document their designs and collect suitable text and images. They will then use their HTML templates to create their websites, including a web form.

Intent

Knowledge acquired:

1. Write HTML code to create a simple web page and display it in a browser

2. Write CSS to define the styles used in a web page

3. Create a simple navigation system using HTML

4. Use a design to create a template for a web page using HTML

5. Insert text, images and links on their web pages

6. Use a range of HTML tags to create well laid out web pages

7. Use the template to design a multi-page website with a consistent look and feel to each page

8. Create a simple web form to collect user data

Skills developed:

• Students will learn the skills to code websites in HTML and Serif Web Plus.

Understanding:

• Understand the basic HTML Tags that can be used to create a webpage

• Understand that Small Basic –Web Plus is a Web authoring software

• Understand how to change HTML code for a website that they have created in Web Plus.

Links to National Curriculum KS2:

• select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information

<u>Links to future study:</u>

KS4:   OCR Computer Science: Unit 2 of OCR GCSE Specification for programming and unit 3 programming project.

          OCR Cambridge Nationals: LO7 to be able to select and present information in the development of the solution to meet an identified need.

Implementation

Number of lessons: ≈6

Sequence of lessons:

1. HTML	4. Development
2. CSS	5. Creating a web Form
3. Design	6. Evaluation and Assessment

Main Resources	**Method of Assessment**	**Use of Assessment Results**
• PG Online Worksheets • Teacher prepared PowerPoint • Teacher prepared example Spreadsheets for modelling purposes • Software: Notepad and Serif Web plus	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment

Unit Six: Control Systems with Flowol

This is a practical unit covering the principles of producing control and monitoring solutions using a flowchart-based interface (Flowol). Students will start by producing systems that use simple loops and basic outputs, and then move on to look at systems that have multiple inputs and outputs. They will refine their solutions using subroutines and variables.

Intent

Knowledge acquired:

1. Identify everyday situations where computer control is used

2. Identify common types of sensors used by control systems

3. Identify control flowchart symbols and understand how they are used to break down problems

4. Produce flowchart-based solutions for control systems that include sequences and loops

5. Explain why control systems might fail and how this might impact on safety

6. Produce control solutions for problems that include subroutines

7. Produce control solutions for problems that include variables

Skills developed:

- Use Flowol to create flowcharts, that can be linked to mimics to test

- Build skills to create routines and subroutines with flowcharts

Understanding:

- Understand the control flowchart symbols and how they are used to break down problems

- Understand that flowcharts are used a planning tool by professional coders in industry

Links to National Curriculum KS2:

- Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- Use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

Links to future study:

- Year 8: First Steps in Small Basic
    - Introduction to Python
    - Games Development in Kodu

Links to future study:

KS4: GCSE OCR Computer Science: Unit 2 of OCR GCSE Specification for programming and unit 3 programming project.

Implementation

Number of lessons: ≈6

Sequence of lessons:

1. Flow Charts (Zebra Crossing)	4. Subroutines
2. Controlling Traffic Lights (two flow Charts operating in a sequence)	5. Actuators
3. Sensors and Flowcharts	6. Variables and Assessment

Main Resources	**Method of Assessment**	**Use of Assessment Results**
• PG Online Worksheets • Teaching PowerPoint • Flowol Mimics • Mimic Solutions • Software: Flowol	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment

Year Eight

Unit One: Spreadsheet Modelling

This is a practical Spreadsheet modelling unit where students will understand how Spreadsheets are used. Students will learn basic formula and functions to solve problems. They will learn to create professional looking sheets with formatting to meet the needs of the end user. They will learn to create charts and graphs from datasets, and work between multiple sheets.

Intent

Knowledge acquired:

1. Format a spreadsheet, by resizing column widths, merging cells and centre the title and wrap text labels.
2. Font style, size and colours need to be consistent and professional
3. Images used are appropriate and of a good quality and formatted correctly
4. Change data types appropriately
5. Appropriately use formula and functions to solve problems
6. Use advanced features of the software to sort and filter data
7. Able to amend IF statements to reflect changes of certain rules
8. Make proper use of absolute cell referencing and conditional formatting
9. Create meaningful charts with appropriate Data Labels
10. Use Goal Seek to solve 'What If' problems

Skills developed:

- Build skills to be able to independently create professional spreadsheets with formulae and functions.

- Create meaningful charts and graphs with data within a spreadsheet

Understanding:

- Understand when it is appropriate to use spreadsheet software, and the types of problems that can be solved.

- Understand where in industry Spreadsheet models are used

Links to National Curriculum KS2:

- select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information

Links to future study:

Year 9:   Spreadsheet Modelling

KS4:   GCSE OCR Computer Science: Unit 2 and 3 - Formulas and data validation are important due to programming elements. The logic used is the same.

OCR Cambridge Nationals: L05- to be able to import and manipulate data to develop a solution to meet an identified need.

Implementation

Number of lessons: ≈6

Sequence of lessons:

1. Chimp Andy's Resources (Adding and Formatting data)	4. Mobile Phone Comparisons - (Formatting text and data, creating graphs)
2. Wrestling Match – (Conditional Formatting, Basic Functions and formatting)	5. Right Hand Man Competition - (Formatting text and data, creating graphs)
3. Operation Catnip – (Formatting text and data, creating graphs)	6. Revision and Assessment

Main Resources	Method of Assessment	Use of Assessment Results
• Original resources from Teach-ICT • Teacher prepared PowerPoint & Workbook	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment

Unit Two: E-Safety

This unit of work aims to make students aware of the risks of being online. They will learn about, online blackmail, grooming, cyber slacking, general computer misuse and the behaviours to be aware of. They will investigate the different sources of help that are available, and what to do if in trouble.

Intent

Knowledge acquired:

1. Common health risks related to computer use and prevention methods
2. What a Digital Imprint is and how it is created
3. Consequences of posting inappropriate of offensive messages or images online
4. Ways to maintain a good digital imprint
5. Cyber slacking and the consequences

Skills developed:

- Know when they are an online victim
- Know the signs to spot in a friend
- How to use the internet safely

Understanding:

- Understand the online risks
- Know where to get help
- Know what to do when in trouble
- Understand the laws related to online malpractice (Computer Misuse Act, Health and Safety at Work Act)

Links to National Curriculum KS2:

- Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.

Links to future study:

Year 9: Computer Crime and Cyber Security

KS4: GCSE OCR Computer Science: Unit 1.6 - 1.8, threats to a computer system, and ethical, legal, and environmental considerations.

OCR Cambridge Nationals: LO4 – Understanding factors to be considered when collecting and processing data/information

Implementation

Number of lessons: ≈6

Sequence of lessons:

1. Health and Safety risks	4. Grooming
2. Digital Imprint	5. Viruses and Malware
3. Cyber Slacking	6. Revision and Assessment

Main Resources	Method of Assessment	Use of Assessment Results
- Teacher prepared Worksheets - Teacher prepared PowerPoint - Teacher prepared example Spreadsheets for modelling purposes	- Self-Assessed and Peer assessed - End of Unit Assessment	- Used to identify areas of weakness - Used to set WWW and EBI based on Assessment

Implementation

Unit Three: Understanding Computers

This is a theoretical unit covering the basic principles of computer architecture and use of binary. Students will revise some of the theory on input and output covered in previous learning and continue to look at the Input-Process-Output sequence and the Fetch-Decode-Execute cycle through practical activities. Students will then look at some simple binary to decimal conversion and vice versa and learn how text characters are represented using the ASCII code. This will be followed by some simple binary addition. Students will learn more in depth how storage devices represent data using binary patterns and physically save these patterns. Finally, they will look at a brief history of communication devices, how new technologies and applications are emerging and the pace of change.

Intent

Knowledge acquired:

1. Distinguish between hardware and software
2. CPU, input, output and storage devices
3. Name different types of permanent storage device
4. Suggest appropriate input and output devices for a simple scenario
5. Explain what RAM and ROM are used for
6. Show how numbers and text can be represented in binary
7. Explain the impact of future technologies
8. Perform simple binary arithmetic
9. State strengths and weaknesses of different storage devices
10. Describe briefly how data is stored on a CD
11. Identify input and output devices for more complex scenarios
12. Explain how characters are encoded using the ASCII system
13. Use an ASCII reference chart to convert a character into binary and its decimal equivalent

Skills developed:

Develop theoretical computing skills about the basic principles of computer architecture and use of binary. Develop an understanding of the Input-Process-Output sequence and the Fetch-Decode-Execute cycle. Develop skills to use binary numbers and how storage devices represent data using binary patterns and physically save these patterns.

- Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems
- Understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds, and pictures) can be represented and manipulated digitally, in the form of binary digits; be able to convert between binary and decimal, and perform simple binary arithmetic.

Links to National Curriculum KS2:

- understand computer networks, including the internet; how they can provide multiple services, such as the World Wide Web, and the opportunities they offer for communication and collaboration

Links to future study:

Year 9:   Computer Crime and Cyber Security

Computer Theory

KS4:   GCSE OCR Computer Science: Unit 1.1 - 1.4 as well as Unit 2.6 Learning about the ASCII Character set

Implementation

Number of lessons: ≈7

Sequence of lessons:

1. Elements of a Computer	4. Binary Addition
2. The CPU	5. Storage Devices
3. Understanding Binary	6. Convergence and New Technologies Revision and Assessment

Main Resources	**Method of Assessment**	**Use of Assessment Results**
• PG Online Worksheets • PG Online PowerPoint	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment

Unit Four: First Steps in Small Basic

This unit is an introduction to programming in a textual language designed to make programming easy and approachable for beginners. It starts by introducing Turtle graphics, leading to the use of variables and **For…EndFor** loops. Simple programs using the Text window are used to introduce input, output and selection. Students will get used to these programming statements while having fun producing coloured graphics and making a simple screensaver. They will learn the importance of writing statements accurately, documenting their programs and finding out for themselves in a very visual way how different program statements work.

Intent

Knowledge acquired:

1. Write and run programs in Small Basic using For…EndFor loops, variables, input output and selection statements
2. Create a simple quiz game
3. Identify and correct syntax errors in a program
4. Use a While…EndWhile loop in a program
5. Find and correct logic errors in a program
6. Use the graphics window to draw different shapes in random colours
7. Use variables effectively to create repeating patterns
8. Add scoring to their quiz game
9. Create an effective screensaver which runs until the user stops it

Skills developed:

- Simple programs skills using the Text window are used to introduce input, output and selection.

- Writing statements accurately, documenting programs and finding out in a very visual way how different program statements work.

Understanding:

- Gain an understanding of coding in a textual programming language, to solve a variety of computational problems; make appropriate use of data structures; design and develop modular programs that use procedures and functions.

Links to National Curriculum KS2:

- design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts

- use sequence, selection, and repetition in programs; work with variables and various forms of input and output

- use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

Links to future study:

Year 9:   Modelling in Small Basic

           Python Next Steps

KS4:   GCSE OCR Computer Science: Unit 2 - programming and unit 3 -programming project.

Implementation

Number of lessons: ≈6

Sequence of lessons:

1. Introducing the Turtle	4. Using Variables
2. Using the For Loop	5. Conditions and Branching
3. The Text window	6. Using Random numbers Revision and Assessment

Main Resources	**Method of Assessment**	**Use of Assessment Results**
• PG Online Worksheets • Teacher prepared PowerPoint & Activities • Teacher prepared example code and games in Scratch to use for modelling purposes	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment

Unit Five: Introduction to Python

This is an introduction to Python, a powerful but easy-to-use high-level programming language. Python is an object-oriented language. The focus is on getting students to understand the process of developing programs, the importance of writing correct syntax, being able to formulate algorithms for simple programs and debugging their programs. Python is the language that we use at GCSE level, so this unit give the students a flavour for GCSE Computing.

Intent

Knowledge acquired:

1. Run simple Python programs in Interactive and Script mode
2. Write pseudocode to outline the steps in an algorithm prior to coding
3. Write programs using different types of data (e.g. strings and integers)
4. Correctly use different variable types (e.g. integer and floating point), assignment statements, arithmetic operators
5. Distinguish between syntax and logic errors and be able to find and correct both types of error
6. Use relational operators to control the order in which program statements are executed and in what order (if and while statements)
7. Use comments to document their programs and explain how they work
8. Write an error-free, well-documented program involving selection and iteration, but with some help given
9. Write an error-free, well-documented program involving selection and iteration
10. Describe how a binary search is carried out
11. Explain the advantages of a binary search over a linear search for an ordered list
12. Devise their own algorithms to solve reasonably complex problems, e.g. a binary search
13. Test and debug their programs, and correct both syntax and logic errors
14. Make allowances in their programs for user input errors, ensuring that the program still runs to a successful conclusion – which may include printing an error message and stopping the run

Skills developed:

- Build skills to develop programs, the importance of writing correct syntax, being able to formulate algorithms for simple programs and debugging their programs.

Understanding:

- Use Python to solve a variety of computational problems; make appropriate use of data structures; design and develop modular programs that use procedures and functions.
- Understand several key algorithms that reflect computational thinking

Links to National Curriculum KS2:

- design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

Links to future study:

Year 9:   Modelling in Small Basic

           Python Next Steps

KS4:   GCSE OCR Computer Science: Unit 2 - programming and unit 3 -programming project.

Implementation

Number of lessons: ≈6

Sequence of lessons:

1. Strings and Variables	4. Writing algorithms
2. Numbers and Arithmetic	5. While Loops
3. Selection	6. Searching Revision and Assessment

Main Resources	**Method of Assessment**	**Use of Assessment Results**
• PG Online Worksheets • Teacher prepared PowerPoint • Teacher prepared example Spreadsheets for modelling purposes	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment

Unit Six: Games Development in Kodu

Kodu is a visual programming language made specifically for creating games. It is designed to be accessible for children and enjoyable for anyone. The programming environment runs on the Xbox, allowing rapid design iteration using only a game controller for input. Int this unit students will learn to plan and program their very own game.

Intent

Knowledge acquired:

1. Use the terrain tools to create an interesting game environment
2. Control character's movement/actions
3. Insert objects into the environment
4. Program Kodu to collect objects and earn points
5. Insert objects into the environment
6. Use pathways and create roads, walls and platforms
7. Program enemies that can shoot or chase
8. Solve problems by decomposing them into smaller parts
9. Make clones and understand the idea of Creatables.
10. Use timers, health monitors, and power ups
11. Use scoring to change a behaviour
12. Design and write a program to achieve certain goals
13. Detect and correct errors in programs

Skills developed:

- Build skills to develop a working game with characters and scoring. Program keys on the keyboard to do certain things such as move the character in the game. Build in scoring.

Understanding:

- Students will understand the how to plan, develop and evaluate their own game.

Links to National Curriculum KS2:

- design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

Links to future study:

Year 9:   Modelling in Small Basic

          Python Next Steps

KS4:   GCSE OCR Computer Science: 2.1 Computational Thinking, 3 Developing a game program

Implementation

Number of lessons: ≈6

Sequence of lessons:

1. Creating a basic world	4. Creating a Lockable Island
2. How to write a simple program	5. Spawning characters
3. How to follow a path	6. Finishing off Revision and Assessment

Main Resources	**Method of Assessment**	**Use of Assessment Results**
• Kodu Video Tutorials • Teaching PowerPoint • Teacher Prepared Student Workbook	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment

Year Nine

Unit One: Modelling in Small Basic

The unit covers Modelling, using Small Basic. Students start to write small programs which will eventually become subroutines in their Lemonade Stand model. The students will discuss some of the different areas in which models are used, from climate change to business enterprises, and the limitations of their own model. The unit moves through the concepts of selection and iteration, giving practice in each of these, before covering subroutines and modular programming.

Intent

Knowledge acquired:

- Programming Syntax
- Small Basic Language
- Decomposition
- Abstraction
- Algorithmic design

Skills developed:

- Small Basic Programming
- Computational Thinking
- Problem Solving
- Troubleshooting

Understanding:

- How to program simple programs
- How to break a big problem down into smaller more manageable steps

Links to National Curriculum KS2:

- Use of Computational Abstractions
- Understand how instructions are stored and executed in a computer
- 1st half of using at least 2 programming languages

Links to future study:

KS4   GCSE OCR Computer Science: Unit 2 of OCR GCSE Specification for programming and unit 3 for programming project.

OCR Cambridge Nationals: L05- to be able to import and manipulate data to develop a solution to meet an identified need. (Some elements of Spreadsheet skills are transferable)

Number of lessons: ≈6

Sequence of lessons:

1. Inputs and outputs "HELLO WORLD"	4. Loops
2. Mathematical operands and calculations	5. Subroutines
3. Selection	6. Revision and Assessment

Main Resources	Method of Assessment	Use of Assessment Results
• PG Online Worksheets • Teacher prepared PowerPoint • Teacher prepared code of Small Basic	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment

Unit Two: Spreadsheet Modelling

This is a practical, skills-based unit covering the principles of creating and formatting basic spreadsheets to produce and use simple computer models. The unit is centred around creating a financial model for a TV show. Students start by looking at different types of model and then use basic spreadsheet techniques to create and format a simple financial model to calculate the expected income from viewers' voting. The model is then extended to include sales from merchandising, with the introduction of "what if" scenarios. Finally, the students create a seating plan, book seats and calculate income from seat sales.

Intent

Knowledge acquired:

- Charts
- Formulas
- Conditional Formatting
- Data Validation
- Macros

Skills developed:

- Microsoft Excel Skills

Understanding:

- How to input data into a spreadsheet
- How to use this data for formulas and charts
- How to make custom buttons

Links to National Curriculum KS2:

- Understanding simple Boolean Logic
- Creative Projects involving selection, and usage

Links to future study:

KS4:   OCR GCSE Computer Science: Formulas and data validation is important for Unit and 3 of the OCR GCSE due to programming. A lot of the logic used is the same.

OCR Cambridge Nationals: L05- to be able to import and manipulate data to develop a solution to meet an identified need.

Number of lessons: ≈6

Sequence of lessons:

1. Understanding cell referencing	**4.** Conditional formatting and Data Validation
2. Using Spreadsheets to make a financial model	**5.** Macros and Pie charts
3. What If scenarios	**6.** Revision and Assessment

Main Resources	Method of Assessment	Use of Assessment Results
• Original resources from Teach-ICT • Teacher prepared PowerPoint & Workbook • Teacher prepared example Spreadsheets for modelling purposes	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment

Unit Three: Graphic Design

This unit is an introduction to graphics and graphic file types. The unit explores how bitmap and vector images are represented and stored by the computer. There is also opportunity for students to practise skills in design, photo-editing and image manipulation using a suitable graphics package.

Intent

Knowledge acquired:

- Fundamentals of shapes
- Lines
- 3D Shapes
- How computers make art
- How pixels are used to structure artwork
- Creativity

Skills developed:

Creating Digital Art

Being able to create something from a description

Understanding

- Shapes
- Lines
- Digital Artworks
- Pixels

Links to National Curriculum KS2:

Creating digital artefacts

Undertaking Creative Projects

Links to future study:

KS4:   OCR GCSE Computer Science: Unit 2 and 3 of OCR GCSE for designing and implementing an algorithm and system. This unit will teach them how to go from a concept in their heads to a design or finished product. Also known as computational thinking.

OCR Cambridge Nationals: L01 – Understanding the tools and techniques that can be used to initiate and plan solutions.LO7 – To be able to select and present information in the development of the solution to meet an identified need.

Implementation

Number of lessons: ≈6

Sequence of lessons:

1. Vectors	4. Abstraction
2. 2D Shapes	5. Effects and Enhancement
3. 3D Shapes	6. Revision and Assessment

Main Resources	Method of Assessment	Use of Assessment Results
• Teach-ICT Worksheets • Teacher prepared PowerPoint • Teacher prepared examples of art that can be produced digitally	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment

Unit Four: Python Next Steps

The first lesson has a series of tasks designed to revisit the basic skills that were covered in year 8. Students then use for loops and compare their use with while loops, before moving on to arrays (lists), which are introduced as a new data structure and are used in conjunction with for loops. Procedures and functions with parameters are covered to help students understand the concept and benefits of modular programming. This unit is designed to take students right up to a point where a GCSE in Computing can pick up from and should provide ample experience of programming in order to confirm any decision to pursue Computing as a GCSE option.

Intent

Knowledge acquired:

- Programming Syntax
- Python language
- Decomposition
- Abstraction
- Algorithmic design

Skills developed:

- Python Programming
- Computational Thinking
- Problem Solving
- Troubleshooting

Understanding:

- How to program simple programs
- How to break a big problem down into smaller more manageable steps

Links to National Curriculum KS2:

- Use of Computational Abstractions
- Understand how instructions are stored and executed in a computer
- 2nd half of using at least 2 programming languages

Links to future study:

KS4:   OCR GCSE Computer Science: Unit 2 for programming and unit 3 for programming project they will do in year 11

<u>Implementation</u>

Number of lessons: ≈6

Sequence of lessons:

1. Input and Outputs ("HELLO WORLD")	4. Procedures
2. Loops	5. Functions
3. Lists	6. Revision and Assessment

<u>Main Resources</u>	**<u>Method of Assessment</u>**	**<u>Use of Assessment Results</u>**
• PG Online Worksheets • Teacher prepared PowerPoint & Activities • Teacher prepared example code to use for modelling purposes	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment

Unit Five: ICT/Computing Theory

The aim of this unit is to prepare students for either GCSE Computing or Cambridge Nationals in Information Technology. We have taken some of the learning objectives from the Entry level GCSE Computer Science and Entry level GCSE ICT courses and adapted them for our students. This unit will give students a flavour of GCSE Computing and Cambridge Nationals in IT and help with the decision-making process of choosing their GCSE options.

Intent

Knowledge acquired:

- An Entry level understanding of GCSE Computer Science
- An Entry level understanding of GCSE ICT
- Input, Output, and storage Devices
- Components of a Computer
- Memory
- Storage
- Operating Systems
- Types of Software
- Cyber Security
- Threats to a computer system
- Protection
- Computer Legislation
- Ethics
-

Skills developed:

- Perception for identifying peripherals and internal components.
- How to identify the different types of software
- What to do to prevent any compromises to a computer system
- How to protect a computer system
- How to obey the law when using the internet

Understanding:

- How computers can transmit data
- How computers can use a series of electric circuits to give you what you see in front of you
- Entry level knowledge of GCSE and ICT
- The difference between Proprietary and open source software
- What different threats are and how they can infect and disrupt your computer system
- Methods of protection

Links to National Curriculum KS2:

- Understanding Hardware and software components
- Understand how instructions are stored and executed within a computer system

Links to future study:

KS4:   OCR GCSE Computer Science: All content is based on unit 1 of the OCR Entry level 1 qualification which leads onto the Level 2 GCSE.

OCR Cambridge Nationals: L03 – Understand how data and information can be collected, stored and used. LO4 – Understand factors to be considered when collecting and processing data and storing data/information.

Implementation

Number of lessons: ≈12

Sequence of lessons:

1. Input, Output, and Storage	7. Threats to a computer system
2. Computer Components	8. Protection for Computers
3. Memory	9. Computer Legislation
4. Storage	10. Ethics
5. Operating Systems	11. Revision and Assessment
6. Types of Software	

Main Resources	Method of Assessment	Use of Assessment Results
• Teacher prepared Workbook • Teacher prepared PowerPoint	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment

OCR Cambridge Nationals in Information Technology

Unit One: LO3 Understand how data and information can be collected stored and used

Computer systems can be used to collect, store and process data and information. In this unit students will learn about the difference between data and information, how data can be collected, stored and used for various purposes.

Intent

Knowledge acquired:

1. Data and Information
2. How data and information are related
3. The methods used to collect data and store data/information, and the appropriateness of the use of these in a given context
4. Information Technology (IT) used to support data collection, and the appropriateness of the use of these in context
5. Different storage methods and the appropriateness of the use of these in context
6. The use of data in a given context including Big Data
7. Applications and interaction of data stores

Skills developed:

- Be able to compare the suitability and uses of two or more collection methods and uses of two or more collection methods.
- They must be able to select and justifying their selection and choose the most appropriate method of storage for different contexts.
- They must be able to use the collected data for a specific and meaningful purpose

Understanding:

- Know that data is raw facts and figures before they have been processed
- Know what the data types are and understand how they are used in different contexts.
- Know that information is made by taking data and processing it
- Understand the different methods of collecting data and information and how IT can be used to support these activities. They must understand the advantages and disadvantages of each method and be able to select the appropriate collection method for different contexts, justifying their choice.
- Learners must understand the different storage methods for data and information. Big data is used to describe data sets which are so large or complex that traditional data processing software cannot deal with them.
- Learners must understand the differing applications of data and how these stores of data can interact to share data and information. They must understand the difference between the interaction between big data sets and the holding of small data sets in different contexts.
- Learners must understand, for example, that errors in data is a drawback that can create a negative impact, but the use of complete and correct data can have positive impacts

Links to National Curriculum KS3:

- Understanding how data and information is stored in a computer system

Links to future study:

A Level Computer Science: 1.1 Systems Architecture; 1.2 Memory; 1.3 Storage; 2.4 Binary

Digital Media Level 3: Unit 3: Awareness of converging Digital Technology

Cambridge Technical Level 3: Unit 1 Fundamentals in IT; Unit 2 Global information; Unit 18 Computer Systems and Hardware; Unit 22 Big Data Analytics

Implementation

Number of lessons: ≈18

Sequence of lessons:

1. Data and Data Types	4. Storage Methods
2. Information	5. Uses of Data, the applications and interaction of data stores, and the Benefits and drawbacks of the uses of data.
3. The Methods used to collect data and store data/information. And the IT used to support Data Collection	6. Revision and end of Unit assessment

Main Resources	**Method of Assessment**	**Use of Assessment Results**
- Dynamic Learning PowerPoints and Worksheets - Teacher prepared Worksheets - Teacher Prepared Examples of Exam Answers or Spreadsheets/Databases used for modelling - Course Textbook: Hodder: Cambridge National Level 1/2 Certificate in Information Technologies - Revision Guide: Hodder: My Revision Notes: Cambridge National Level 1/2 Certificate in Information Technologies	- Self-Assessed and Peer assessed - End of Unit Assessment	- Used to identify areas of weakness - Used to set WWW and EBI based on Assessment - Used to plan future lessons

Unit Two: LO4 Understand the factors to be considered when collecting, processing and storing data/information

There are many different types of threats to data that is stored, on both the cloud and on physical storage devices. Students will learn about some of the different threats and the vulnerabilities that can lead to these threats being carried out. The students will learn about the considerations that need to happen when people's personal data is being collected, stored and processed. Students will learn about the different data protection measures that can be put in place.

Intent

Knowledge acquired:

1. Types of threats

2. The vulnerabilities which can be exploited in a cybersecurity attack

3. The impacts and consequences of a cyber-security attack

4. Prevention measures

5. Current relevant IT legislation, at time of delivery, its implications and applications

6. The importance of validity, reliability and bias when collecting and using data and information

Skills developed:

- Be aware that a storage device could be vulnerable to physical attack if it is not adequately secured

- Understand that personal data loss can result in identity theft which could have financial and reputational impacts.

- Apply prevention measures to their Controlled assessment

- Take the necessary steps to mitigate risks

- Abide by al ICT laws

- Understand the factors that should be considered when assessing any external sources of data and information they may use.

Understanding:

- Know the types of threats that exist when collecting, processing data and storing data/information.

- Identify vulnerabilities and understand how they can be exploited by an attacker. Understand that cyber-security attacks can result in a range of impacts. Know what the different prevention measures are (both physical and logical).

- Understand how to mitigate risks.

- Know what the legislation/Acts are and their purpose. Explain the implications of the current relevant IT legislation for an individual, for an organisation and on the data, including when dealing with cyber-security issues.

- Understand the implications of validity, reliability and bias of data and information when collecting, processing and using internal or external data and information sources.

Links to National Curriculum KS3:

- Understanding how data and information is stored in a computer system
- Understand a range of ways to use technology safely

Links to future study:

A Level Computer Science: Unit 1.4 Networks; Unit 1.6; System Security; Unit 1.8 Ethical Legal, and environmental considerations

Cambridge Technicals IT 3: Unit 20: IT Technical Support; Unit 17: Internet of everything; Unit 16; Developing a smarter planet; Unit 3: Cyber Security; Unit 4: Computer Networks

Digital Media Level 3: Unit 3: Awareness of converging Digital Technology; Unit 6: Ensure your own actions reduce risk to health and safety

Implementation

Number of lessons: ≈18

Sequence of lessons:

1. Types of threats	5. Current and relevant IT legislation, its implications and applications
2. The vulnerabilities that can be exploited in a cyber-security attack	6. The importance of validity, reliability and bias when collecting and using data/information
3. The impacts and consequences of a cyber-security attack	7.Revision and Assessment
4. Prevention measures	

Main Resources	**Method of Assessment**	**Use of Assessment Results**
- Dynamic Learning PowerPoints and Worksheets - Teacher prepared Worksheets - Teacher Prepared Examples of Exam Answers or	- Self-Assessed and Peer assessed - End of Unit Assessment	- Used to identify areas of weakness - Used to set WWW and EBI based on Assessment - Used to plan future lessons

Spreadsheets/Databases used for modelling • Course Textbook: Hodder: Cambridge National Level 1/2 Certificate in Information Technologies • Revision Guide: Hodder: My Revision Notes: Cambridge National Level 1/2 Certificate in Information Technologies	41	

Unit Three: LO5 to be able to import and manipulate data to develop a solution to meet an identified need (Spreadsheet and Database)

In this Unit the students will learn the skills and know how to carry out data handling with both spreadsheet and database management software. They will learn the skills to create a customised solution to meet the needs of a client. They will also learn to import/link data between different software packages and how to keep it secure.

Intent

Knowledge acquired:

1. How to create, edit, delete and process data using appropriate software tools and techniques including:
2. Spreadsheet Software: Functions, absolute cell referencing, linking worksheets, what if analysis, macros, import data from different sources, link to external data, how to present data using, hide/unhide columns rows, applying security measures, export and link data to other applications/technologies.
3. Database Software: relational database, import data, data validation techniques, create and use input forma and controls via macros, design and create queries using, design and create reports using, applying appropriate security measures, export and link data to other applications/technologies.

Skills developed:

- Develop the skills and knowhow to create a fully functioning Spreadsheet model and a Relational database that meets the needs of the intended audience. The solution will be fully integrated with various software used.

Understanding:

- Learners must be able to select the appropriate tools and techniques to allow them to create, edit, delete and process data effectively to develop an effective data handling solution.
- Learners must be able to select, use and integrate an appropriate range of tools to securely import, manipulate and store data effectively. It is the appropriate use of the tools to create an effective data handling solution that is important.

Links to National Curriculum KS3:

Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems

Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users

Links to future study:

A Level Computer Science: Unit 2.1 Computational Thinking; Unit 3: Design and prototype a program based on previous criteria

Cambridge Technicals IT Level 3: Unit 6: Application Design; Unit 7 Data Analysis and Design; Unit 8: Project management; Unit 9: Product Development; Unit 19: Computer systems software;

Digital Media Level 3. Unit 8: Creative Media Industry Awareness

Implementation

Number of lessons: ≈18

Sequence of lessons:

Spreadsheet Modelling

1. Remembering the Basics (Formula and Functions, Conditional Formatting)	6. Goal Seek and what If's
2. Absolute Cell Referencing and Budget Model	7. Algrove School Trip Model
3. Count If and other Functions	8. Dance'O Clock – (Inc Mail merge)
4. Comic Relief Model (Basic)	9. Mario Model
5. Comic Relief Talent Show	10. Revision and end of Unit assessment

Databases

1. Cars Database – Importing Data, Setting up a Table	6. Cars Database – Main Menu and Macros
2. Cars Database – Database Forms	7. Cars Database – Mail Merge
3. Cars Database – Queries	8. Adding security – Passwords
4. Cars Database – Reports	9. Recap and Revision
5. Cars Database – Adding more Tables – Creating relationships	10. Revision and end of Unit assessment

Main Resources	**Method of Assessment**	**Use of Assessment Results**
• Dynamic Learning PowerPoints and Worksheets • Teacher prepared Worksheets	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment

• Teacher Prepared Examples of Exam Answers or Spreadsheets/Databases used for modelling • Course Textbook: Hodder: Cambridge National Level 1/2 Certificate in Information Technologies • Revision Guide: Hodder: My Revision Notes: Cambridge National Level 1/2 Certificate in Information Technologies	44	• Used to plan future lessons

Unit Four: LO6 Understanding different methods of processing data and presenting information

Once data has been collected it needs to be processed and presented. In this unit students will learn about the different tools and techniques that can be used to present the information. They will learn how to present information appropriately based on the client requirements. The students will learn about the advantages and disadvantages of different presentation methods, and by knowing these they will be able to make an informed decision about the presentation method to be used and be able to justify their choices.

Intent

Knowledge acquired:

1. Selection and justification of the appropriate software tools and techniques to process data to meet the defined objectives in a given context

2. Selection of the appropriate software tools and techniques to present information to meet the defined objectives in a given context. Justification of the use of the selected tool and format

3. The purpose and suitability of methods of presenting information

4. The advantages and disadvantages of methods used for presenting information.

5. The resources required for presenting information and the appropriateness of the use of these in context

Skills developed:

- Know how to select the most appropriate tools and techniques to be used to process information and data for different contexts.

- While selecting presentation method(s) learners need to consider the hardware and/or software resources required along with any connectivity requirements.

Understanding:

- Understand that different tools and techniques can be used to meet the defined objectives depending on the desired outcome.

- Understand the purpose of different methods of processing and presenting information and be able to apply this to different contexts.

- Understand that different methods have advantages and disadvantages and be able to use these to select methods, justifying their choice, for different contexts.

Links to National Curriculum KS3:

- Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems

- Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users.

A Level Computer Science: Unit 2.1 Computational Thinking; Unit 3: Design and prototype a program based on previous criteria

Cambridge Technicals IT Level 3: Unit 6: Application Design; Unit 7 Data Analysis and Design; Unit 8: Project management; Unit 9: Product Development; Unit 19: Computer systems software;

Digital Media Level 3. Unit 8: Creative Media Industry Awareness

Implementation

Number of lessons: ≈18

Sequence of lessons:

1. Selection and justification of the appropriate tools and techniques to process data	6. The resources required for presenting information
2. Presenting Information	7. Practical Task – Word Processing
3. Selecting Presentation Methods	8. Practical Task – Using Presentation Software (Inc. Slide Masters and Embedding Data)
4. Distribution channels	9. Practical Task – Using Desktop Publishing
5. Presentation methods	10. Revision and end of Unit assessment

Main Resources	**Method of Assessment**	**Use of Assessment Results**
- Dynamic Learning PowerPoints and Worksheets - Teacher prepared Worksheets - Teacher Prepared Examples of Exam Answers or Spreadsheets/Databases used for modelling - Course Textbook: Hodder: Cambridge National Level 1/2	- Self-Assessed and Peer assessed - End of Unit Assessment	- Used to identify areas of weakness - Used to set WWW and EBI based on Assessment - Used to plan future lessons

Certificate in Information Technologies • Revision Guide: Hodder: My Revision Notes: Cambridge National Level 1/2 Certificate in Information Technologies	47	

Unit Five: LO1 Understanding the tools and techniques that can be used to initiate and plan solutions

During the life of a project, there are different phases and activities which should be carried out. By completing these activities, the project will have an increased chance of being successful. During this unit students will learn about the four phases of the project life cycle and the tasks that need to be completed.

Intent

Knowledge acquired:

1. The phases of the project life cycle and the tasks carried out in each phase

2. The interaction and iteration between the phases of the project life cycle

3. The inputs and outputs of each phase of the project life cycle

4. Initial project considerations

5. Planning tools and the software types used to develop project plans

Skills developed:

- Be able to justify their selection of planning tool(s).

- Plan a solution to a problem using the correct planning tools

- Evaluate the success of the planning phase

Understanding:

- Understand the purpose of the different phases project life cycle

- Objective setting is one task within the initiation phase. Be able to explain user requirements and produce success criteria for different contexts. Identify constraints and justify steps taken to mitigate those constraints.

- Recognise each planning tool and its purpose. They must be able to know about the components used in different planning tools. Consider the advantages and disadvantages of using them.

- Evaluate multiple planning tools that could be used in different contexts including comparing these tools.

Links to National Curriculum KS3:

- Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems

- Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users

<u>Links to future study:</u>

A Level Computer Science: Unit 2.1 Computational Thinking; Unit 3: Design and prototype a program based on previous criteria

Cambridge Technicals IT Level 3: Unit 6: Application Design; Unit 7 Data Analysis and Design; Unit 8: Project management; Unit 9: Product Development; Unit 19: Computer systems software; Unit 21: Web Design and Prototyping

Digital Media Level 3. Unit 8: Creative Media Industry Awareness

Implementation

Number of lessons: ≈8

Sequence of lessons:

1. Project Life Cycle	4. Initial Project Considerations
2. Interaction and Iteration between phases	5. Planning Tools
3. Inputs and Outputs of each phase	6. Revision and end of Unit assessment

Main Resources	**Method of Assessment**	**Use of Assessment Results**
• Dynamic Learning PowerPoints and Worksheets • Teacher prepared Worksheets • Teacher Prepared Examples of Exam Answers or Spreadsheets/Databases used for modelling • Course Textbook: Hodder: Cambridge National Level 1/2 Certificate in Information Technologies • Revision Guide: Hodder: My Revision Notes: Cambridge National Level 1/2 Certificate in Information Technologies	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment • Used to plan future lessons

Unit Six: LO2 to be able to initiate and plan a solution to meet an identified need

A project must be initialised and planned correctly from the beginning otherwise it will not be effectively carried out to completion. In this unit students will learn about the use of appropriate tools and techniques that need to be considered and used so that a project is more likely to go well and reach a successful conclusion and meet the client brief.

Intent

Knowledge acquired:

1. How to initiate a project by analysing the requirements to a given context

2. How to mitigate risks through the planning process

3. Creating planning documentation using appropriate technology and planning tools

4. How to undertake iterative testing

Skills developed:

- Select the appropriate project planning tools and techniques to use when given a scenario

- Select and use appropriate technology and tools to create the planning documentation.

- Develop the skill to create and use a test plan to test the finished solution, to ensure all objectives have been met.

Understanding:

- Select the appropriate tools and techniques to allow them to initialise and plan a project effectively.

- Select, use and integrate appropriate software tools and techniques to effectively create a detailed project plan.

- Project documentation examples:

        - Data dictionaries, asset log (e.g. hardware, software, images required)

- Prototype (e.g. digital design of screen layouts)

- House style (e.g. colours, fonts, headings, borders, tables, image branding).

  - Create a test plan for their solution which can be used during the execution phase of the project and then referred to during both iterative reviews and final evaluation.

Links to National Curriculum KS3:

- Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems

- Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users

A Level Computer Science: Unit 2.1 Computational Thinking; Unit 3: Design and prototype a program based on previous criteria

Cambridge Technicals IT Level 3: Unit 6: Application Design; Unit 7 Data Analysis and Design; Unit 8: Project management; Unit 9: Product Development; Unit 19: Computer systems software; Unit 21: Web Design and Prototyping

Digital Media Level 3. Unit 8: Creative Media Industry Awareness;

Implementation

Number of lessons: ≈10

Sequence of lessons:

1. Client Brief Analysis	6. Planning Tools
2. Smart Objectives	7. Data Dictionaries
3. Work Plans	8. Wireframes
4. Risks	9. Iterative Testing
5. Risk Mitigation	10. Revision and end of Unit assessment

Main Resources	**Method of Assessment**	**Use of Assessment Results**
- Dynamic Learning PowerPoints and Worksheets - Teacher prepared Worksheets - Teacher Prepared Examples of Exam Answers or Spreadsheets/Databases used for modelling - Course Textbook: Hodder: Cambridge National Level 1/2 Certificate in Information Technologies - Revision Guide: Hodder: My Revision Notes:	- Self-Assessed and Peer assessed - End of Unit Assessment	- Used to identify areas of weakness - Used to set WWW and EBI based on Assessment - Used to plan future lessons

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Unit Seven: LO7 to be able to select and present information in the development of the solution to meet an identified need (This unit will be taught discretely via a practice project. Skills from LO2 and LO5 will be recalled)

Solutions to problems can be presented in many ways. In this unit students will learn to select and use the most appropriate type of data for a given purpose. They will learn how to present data and the information derived from it, using the most appropriate software tools and techniques.

Intent

<u>Knowledge acquired:</u>

1. How to select and extract data for an identified need

2. How to present information using appropriate software tools and techniques: word processing/desktop publishing (DTP)

> presentation techniques

> web/mobile technologies

<u>Skills developed:</u>

- Students will develop the skills needed to present their solution in a professional format, which is suitable for the intended purpose.

- The student will use all the skill to select the most appropriate software and use features of the software that are relevant.

<u>Understanding:</u>

- Present datasets/ information selecting from a wide range of media distribution channels

- Be able to select, use and integrate appropriate software tools and techniques to present integrated information accurately and appropriately to an intended audience.

<u>Links to National Curriculum KS3:</u>

- Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems

- Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users

A Level Computer Science: Unit 2.1 Computational Thinking; Unit 3: Design and prototype a program based on previous criteria

Cambridge Technicals IT Level 3: Unit 6: Application Design; Unit 7 Data Analysis and Design; Unit 8: Project management; Unit 9: Product Development; Unit 19: Computer systems software; Unit 21: Web Design and Prototyping

Digital Media Level 3. Unit 8: Creative Media Industry Awareness;

Implementation

Number of lessons: ≈6

Sequence of lessons:

1. Analysis of brief and planning approach	4. Select and Present integrated information
2. Initiate and Plan	5. Execution Phase – Develop Solution
3. Import and Manipulate Data	6. Iterative Review and Final review

Main Resources	**Method of Assessment**	**Use of Assessment Results**
• Dynamic Learning PowerPoints and Worksheets • Teacher prepared Worksheets • Teacher Prepared Examples of Exam Answers or Spreadsheets/Databases used for modelling • Course Textbook: Hodder: Cambridge National Level 1/2 Certificate in Information Technologies • Revision Guide: Hodder: My Revision Notes: Cambridge National Level 1/2 Certificate in Information Technologies	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment • Used to plan future lessons

Unit Eight: LO8 to be able to iteratively review and evaluate the development of the solution (This Unit will be taught discretely via a practice project)

Part of the project life cycle is to review the progress at every phase. Students will learn that phase reviews can show up areas that could potentially be improved and action should be taken on the points raised. The students will learn to review their project as it progresses and how to record their findings.

Intent

Knowledge acquired:

1. Carry out and document an iterative review

2. Carry out a final evaluation

Skills developed:

- The student will develop the skills to write a professional iterative and final review.

- They will build the skills to use appropriate ICT vocabulary in the correct context

- The student will also build the skill to critically evaluate their own work and list improvements that can be made

Understanding:

- Carry out a detailed review of their project during/after: • development of the data handling aspect of the project

• development of the communication aspect of the project

• the completion of the development of the project commenting upon the process undertaken and what future developments could take place.

- The iterative review will give the learner the opportunity to share the thinking behind their choices

Links to National Curriculum KS3:

- Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems

- Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users

A Level Computer Science: Unit 2.1 Computational Thinking; Unit 3: Design and prototype a program based on previous criteria

Cambridge Technicals IT Level 3: Unit 6: Application Design; Unit 7 Data Analysis and Design; Unit 8: Project management; Unit 9: Product Development; Unit 19: Computer systems software; Unit 21: Web Design and Prototyping

Digital Media Level 3. Unit 8: Creative Media Industry Awareness;

Implementation

Number of lessons: ≈4

Sequence of lessons:

1. Phase reviews	2. Client Review
3. Final Evaluation	

Main Resources	**Method of Assessment**	**Use of Assessment Results**
- Dynamic Learning PowerPoints and Worksheets - Teacher prepared Worksheets - Teacher Prepared Examples of Exam Answers or Spreadsheets/Databases used for modelling - Course Textbook: Hodder: Cambridge National Level 1/2 Certificate in Information Technologies - Revision Guide: Hodder: My Revision Notes: Cambridge National Level 1/2 Certificate in Information Technologies	- Self-Assessed and Peer assessed - End of Unit Assessment	- Used to identify areas of weakness - Used to set WWW and EBI based on Assessment - Used to plan future lessons

Unit Nine: RO13 Developing technological solutions (LO2, LO5, LO7 and LO8 are assessed) – OCR Set Assignment

During this part of the course the students will carry out the OCR Set Assignment. This is a practical element of the course, that the students have to carry out independently. The students will be required to recall skills from LO2, LO5, LO7 and LO8. The students will have approximately 20 hours in class to complete the assignment. The assignment will be submitted to OCR electronically therefore meaningful filenames and organised folder structure is essential. This Assignment will form 50% for the students final Cambridge Nationals grade.

Intent

<u>Knowledge acquired:</u>

1. RO13 Assessment in this qualification is designed to require learners to draw on the skills, knowledge and understanding they have acquired in LO2, LO5, LO7 and LO8 and to utilise them in an appropriate and relevant way to complete the key tasks, leading to a more progressive and holistic understanding of the subject content.

<u>Skills developed:</u>

- Effectively use the skills developed in LO2, LO5, LO7 and LO8 when developing a technological solution.

- Develop a technological solution that processes data and communicates information.

- Follow the project life cycle phases of initiation/planning, execution, communication and evaluation, demonstrating the practical skills that have acquired such as carrying out a SWOT analysis, creating GANTT charts, developing online surveys, and/or presenting data through web based technologies; keeping the project on track through on-going, iterative reviews.

- Use different hardware and software technologies to create an integrated technological solution for data processing and communication of information.

<u>Understanding:</u>

- The knowledge and understanding from LO2, LO5, LO7 and LO8 will help them to make appropriate choices and decisions about the technological solution(s) they will develop.

<u>Links to National Curriculum KS3:</u>

- Design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems

- Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users

A Level Computer Science: Unit 2.1 Computational Thinking; Unit 3: Design and prototype a program based on previous criteria

Cambridge Technicals IT Level 3: Unit 6: Application Design; Unit 7 Data Analysis and Design; Unit 8: Project management; Unit 9: Product Development; Unit 19: Computer systems software; Unit 21: Web Design and Prototyping

Digital Media Level 3. Unit 8: Creative Media Industry Awareness;

Implementation

Number of lessons: ≈36 (20 hours of which will be spent doing the Set Assignment)

Sequence of lessons:

1. 1a - The use of tools and techniques to initiate/plan (LO2)	5. 1c - The use of tools and techniques to select and present integrated information (LO7)
2. 2a - Analysis of brief and planning approach (LO2)	6. 2c - Selecting and presenting information (LO7)
3. 1b - The use of tools and techniques to import and manipulate data (LO5)	7. 3a -The iterative review and final evaluation (LO8)
4. 2b - Importing and manipulating data (LO5)	

Main Resources	**Method of Assessment**	**Use of Assessment Results**
• Dynamic Learning PowerPoints and Worksheets • Teacher prepared Worksheets • Teacher Prepared Examples of Exam Answers or Spreadsheets/Databases used for modelling • Course Textbook: Hodder: Cambridge National Level 1/2 Certificate in Information Technologies • Revision Guide: Hodder: My Revision Notes: Cambridge National Level 1/2 Certificate in Information Technologies	• Self-Assessed and Peer assessed • End of Unit Assessment	• Used to identify areas of weakness • Used to set WWW and EBI based on Assessment • Used to plan future lessons

Unit Ten: RO12 Understanding tools, techniques, methods and processes for technological solutions. Exam Revision LO1, LO3 and LO4 and LO6

During this final part of the course, the students will carry out a gap analysis on the examination units (LO1, LO3 and LO4 and LO6). Mock Exam results from year 10 and 11, combined with the results of the gap analysis will form the specific structure and contents of these lessons.

Intent

Knowledge acquired:

This unit is the final part of the GCSE course. Students spend time recapping work from LO1, LO3, LO4 and LO6 in preparation for the public examinations in May. We will start with a gap analysis to identify the areas from the specification that students are most confident with and those areas that need addressing. This analysis is used in conjunction with previous assessment information to build the most suitable programme of study for the final part of the course for each group of students.

Skills developed:

See LO1, LO3, LO4 and LO6

Understanding:

See LO1, LO3, LO4 and LO6

Links to National Curriculum KS3:

Understanding how data and information is stored in a computer system

Understand a range of ways to use technology safely

Links to future study:

A Level Computer Science: 1.1 Systems Architecture; 1.2 Memory; 1.3 Storage; 2.4 Binary Unit 1.4 Networks; Unit 1.6; System Security; Unit 1.8 Ethical Legal, and environmental considerations

Digital Media Level 3: Unit 3: Awareness of converging Digital Technology

Cambridge Technicals Level 3: Unit 1 Fundamentals in IT; Unit 2 Global information; Unit 18 Computer Systems and Hardware; Unit 22 Big Data Analytics; Unit 20: IT Technical Support; Unit 17: Internet of everything; Unit 16; Developing a smarter planet; Unit 3: Cyber Security; Unit 4: Computer Networks

Number of lessons: ≈54

Sequence of lessons:

LO3 Understand how data and information can be collected stored and used	LO6 Understanding different methods of processing data and presenting information
LO4 Understand the factors to be considered when collecting, processing and storing data/information	LO1 Understanding the tools and techniques that can be used to initiate and plan solutions

Main Resources	**Method of Assessment**	**Use of Assessment Results**
- Dynamic Learning PowerPoints and Worksheets - Teacher prepared Worksheets - Teacher Prepared Examples of Exam Answers or Spreadsheets/Databases used for modelling - Course textbook: Hodder: Cambridge National Level 1/2 Certificate in Information Technologies - Revision Guide: Hodder: My Revision Notes: Cambridge National Level 1/2 Certificate in Information Technologies	- Self-Assessed and Peer assessed - End of Unit Assessment	- Used to identify areas of weakness - Used to set WWW and EBI based on Assessment - Used to plan future lessons

OCR GCSE Computing

Unit One: Systems Architecture (1.1)

This unit looks at the physical elements of a computer and how it can receive, process, and return information. Students will look at different computer models such as Von Neumann's and the Harvard model, and be able to identify different parts of a computer system. They will also learn about the Fetch Decode Execute Cycle and what relevance it has to computers. After this, students will be able to compare different parts of a computer and justify the differences to performance those parts would make.

Intent

Knowledge acquired:

OCR GCSE Computer Science specification:

1. Von Neumann Model & Essential parts to a Computer System
2. Computer Components
3. Fetch-Decode-Execute Cycle
4. CPU and Registers

AO1: Ability to identify different parts of a computer and explain how a computer processes information

Skills developed:

AO2: Ability to identify different parts of a computer system

AO3: Ability to explain the roles of different registers

Understanding:

AO4: Ability to understand how the Fetch-Decode Execute Cycle works and the steps involved with it

Links to previous study:

- Link to KS3 Unit – Understanding Computer Systems
- Link to understanding how to answer exam style questions

Links to future study:

- Link to OCR A Level: Systems Architecture

Implementation

Number of lessons: ≈6

Sequence of lessons:

Computer Architecture	Fetch Decode Execute Cycle	CPU
1) Input, Output, and Storage Devices	**3)** The Role of different components	**5)** Factors that affect performance
2) Von Neumann Architecture	**4)** Fetch-Decode-Execute Cycle	

<u>Main Resources</u>	<u>Method of Assessment</u>	<u>Use of Assessment Results</u>
• PG Online Worksheets & Homework • Teacher Prepared PowerPoint & Activities	• Self-Assessed and Peer assessed exam style questions • End of Unit Assessment • End of Year 10 Mock • December Mock year 11 • Final Assessment Paper 1	• Used to identify areas of weakness with regards to answering exam questions • Reserve lessons will be retained to allow content to be revisited if students are struggling

Unit Two: Memory (1.2)

Students look at Memory which is things like RAM; ROM; and Cache. They will explain the roles each of these play in computer systems. They will look at the properties of memory and how each one operates. Students will also justify how improvements would affect performance too.

Intent

Knowledge acquired:

OCR GCSE Computer Science specification:

1. What is meant by Memory and Primary Storage

2. The different types of Memory and its role such as RAM, Cache, Registers, ROM, and Virtual Storage

AO1: Ability to identify types of Memory

Skills developed:

AO2: Ability to identify the role of the types of Memory

AO3: Ability to explain how each of the types of Memory operate

Understanding:

AO4: Ability to understand factors that can affect speed of a computer with regards to Memory and how fast each type of memory is and why.

Links to previous study:

- Link to KS3 Unit – Understanding Computer Systems

- Link to understanding how to answer exam style questions

Links to future study:

- Link to OCR A Level: Hardware

Implementation

Number of lessons: ≈2

Sequence of lessons:

1) Types of Memory and what they are used for	2) How memory can affect performance of a computer

Main Resources	Method of Assessment	Use of Assessment Results
• PG Online Worksheets & Homework • Teacher Prepared PowerPoint & Activities	• Self-Assessed and Peer assessed exam style questions • End of Unit Assessment • End of Year 10 Mock • December Mock year 11 • Final Assessment Paper 1	• Used to identify areas of weakness with regards to answering exam questions • Reserve lessons will be retained to allow content to be revisited if students are struggling

Unit Three: Storage (1.3)

Students will look at the different storage devices commonly used for computers such as Optical, SSD, and Magnetic. They will look at the history as well as how they work and operate. Students will look at the different properties of the types of storage and compare them for different scenarios too.

<u>Intent</u>

<u>Knowledge acquired:</u>

OCR GCSE Computer Science specification:

1.   What is meant by the term storage

2.   What the different types of storage are

3.   The advantages and disadvantages of the different types of storage

AO1: Ability to identify different storage devices and how they work

<u>Skills developed:</u>

AO2: Ability to compare different storage devices

AO3: Ability to explain how the storage devices work

<u>Understanding:</u>

AO4: Ability to compare different storage devices for different scenarios and justify why they have chosen said storage device.

<u>Links to previous study:</u>

•   Link to KS3 Unit – Understanding Computer Systems

•   Link to understanding how to answer exam style questions

<u>Links to future study:</u>

•   Link to OCR A Level: Hardware

Implementation

Number of lessons: ≈4

Sequence of lessons:

Storage Devices	Comparisons
1) Types of storage Device with Examples	3) Comparisons of storage devices
2) How Storage works	4) Storage Scenarios

Main Resources	Method of Assessment	Use of Assessment Results
• PG Online Worksheets & Homework • Teacher Prepared PowerPoint & Activities	• Self-Assessed and Peer assessed exam style questions • End of Unit Assessment • End of Year 10 Mock • December Mock year 11 • Final Assessment Paper 1	• Used to identify areas of weakness with regards to answering exam questions • Reserve lessons will be retained to allow content to be revisited if students are struggling

Unit Four: Wired and Wireless Networks (1.4)

Students will learn about how computers are able to communicate with one another in the form of a network. They will look at the different types of network such as LANs and WANs as well as the different hardware and prerequisites required to make them. Students will learn about the properties of networks and how this can affect performance. After, they will learn about the internet and the concept of virtual networks.

Intent

Knowledge acquired:

OCR GCSE Computer Science specification:

1. What is meant by the term Network
2. The different types of networks
3. Network Hardware
4. Factors that affect performance
5. The internet
6. Virtual Networks

AO1: Ability to explain what a network is and the different types

AO2: Be able to explain how a network is set up and how things can affect a network

Skills developed:

AO4: Ability to compare different networks

AO3: Ability to explain how the internet works and the concept of virtual networks

Understanding:

AO5: Ability to identify different networks from different scenarios and explain why they are of the certain network

AO6: Be able to explain the role of each piece of network hardware and what would happen if they were compromised

Links to previous study:

- Link to KS3 Unit – Understanding Computer Systems

- Link to understanding how to answer exam style questions

Links to future study:

- Link to OCR A Level: Networking

Implementation

Number of lessons: ≈7

Sequence of lessons:

Networks	Network Hardware	Internet
1) The difference between a WAN and LAN	3 - 4) Types of Network Hardware	6) The Internet and WWW
2) Client- Server and P2P Network	5) Factors that can affect performance	7) Virtual Networks

Main Resources	Method of Assessment	Use of Assessment Results
• PG Online Worksheets & Homework • Teacher Prepared PowerPoint & Activities	• Self-Assessed and Peer assessed exam style questions • End of Unit Assessment • End of Year 10 Mock • December Mock year 11 • Final Assessment Paper 1	• Used to identify areas of weakness with regards to answering exam questions • Reserve lessons will be retained to allow content to be revisited if students are struggling

Unit Five: Network Topologies (1.5)

Students learn about the different topologies (How a network can be set up) and the advantages and disadvantages of this. They will also learn about Wi-Fi and Ethernet which is how the actual data is transmitted. Students will then learn the different protocols required for information to be transmitted across a network. Along with packet switching.

Intent

Knowledge acquired:

OCR GCSE Computer Science specification:

1. The different types of network topologies such as Star and Mesh
2. Wi-Fi
3. Ethernet
4. Network Protocols

AO1: Ability to explain how different topologies are set up

AO2: Be able to explain the different protocols and what happens on each layer

Skills developed:

AO4: Ability to identify different protocols and their function on each layer

AO3: Ability to explain why certain networks are laid out in the topology chosen

Understanding:

AO5: Ability to identify which layer a protocol is on and why

AO6: Be able to explain the benefits and drawbacks of different topologies with explanations

Links to previous study:

- Link to KS3 Unit – Understanding Computer Systems

- Link to understanding how to answer exam style questions

Links to future study:

- Link to OCR A Level: Networking

Implementation

Number of lessons: ≈5

Sequence of lessons:

Network Topologies	TCP/IP Model
1-2) Different Topologies	4) Network Protocols
3) Wi-Fi	5) Packet Switching

Main Resources	Method of Assessment	Use of Assessment Results
• PG Online Worksheets & Homework • Teacher Prepared PowerPoint & Activities	• Self-Assessed and Peer assessed exam style questions • End of Unit Assessment • End of Year 10 Mock • December Mock year 11 • Final Assessment Paper 1	• Used to identify areas of weakness with regards to answering exam questions • Reserve lessons will be retained to allow content to be revisited if students are struggling

Unit Six: System Security (1.6)

This unit looks at the different threats that computer systems are susceptible to notably the types of viruses, and what these can do to a computer. After, students will look at how they are able to protect their devices from said threats. They will also gain a greater understanding by creating action plans along with looking at how a system could be vulnerable given a scenario

Intent

Knowledge acquired:

OCR GCSE Computer Science specification:

1. Different forms of attacks *e.g. Malware; Phishing; Social Engineering etc*
2. Different type of threats to a network *e.g. SQL Injections; Poor Network Policies; Denial of Service*
3. Identifying and preventing Vulnerabilities *e.g. Penetration Testing; Passwords; Encryption*

AO1: To be able to identify different types of cyber security threats

AO2: To be able to identify different prevention methods

Skills developed:

AO3: Ability to explain how a cyber security threat is able to violate a computer system

AO4: Ability to explain how different prevention methods stop threats to networks

Understanding:

AO5: Ability to order a series of threats from least to most secure

AO6: Be able to create an action plan on how to deal with different threats using different tools to protect the devices

Links to previous study:

- Link to KS3 Unit – Understanding Computer Systems
- Link to understanding how to answer exam style questions

Links to future study:

Link to OCR A Level: System Security

Implementation

Number of lessons: ≈4

Sequence of lessons:

1) Forms of attack	3) Identifying and preventing vulnerabilities
2) Threats posed to networks	4) Encryption

Main Resources	**Method of Assessment**	**Use of Assessment Results**
• PG Online Worksheets & Homework • Teacher Prepared PowerPoint & Activities	• Self-Assessed and Peer assessed exam style questions • End of Unit Assessment • End of Year 10 Mock • December Mock year 11 • Final Assessment Paper 1	• Used to identify areas of weakness with regards to answering exam questions • Reserve lessons will be retained to allow content to be revisited if students are struggling

Unit Seven: Systems Software (1.7)

This unit looks at all the different types of software, available for computers. It will explain how something such as an operating system will differ greatly to firmware or application software, and how they are all linked in with one another. It will look at the difference between proprietary and open source and how they can both be appropriate for different reasons. Learners will also investigate the 5 roles of an operating system and what each element entails.

Intent

Knowledge acquired:

OCR GCSE Computer Science specification:

1. Different types of software

2. The role of Operating Systems

3. Utility System Software

AO1: To be able to identify different types of software

AO2: To be able to identify the role of operating systems

Skills developed:

AO3: Ability to explain how a computer is able to function with use of an operating system

AO4: Ability to explain how computers are able to use tools to optimise their performance

Understanding:

AO5: Ability to compare full and incremental back up and its uses

AO6: Ability to decide which type of data compression is most suitable for different scenarios

Links to previous study:

- Link to KS3 Unit – Understanding Computer Systems

- Link to understanding how to answer exam style questions

Links to future study:

Link to OCR A Level: Systems Software

Implementation

Number of lessons: ≈6

Sequence of lessons:

Systems Software	Utility Software
1-2) Operating Systems	3) Computer Optimisation
3) Proprietary and Open Source	4) back up and data compression

Main Resources	Method of Assessment	Use of Assessment Results
• PG Online Worksheets & Homework • Teacher Prepared PowerPoint & Activities	• Self-Assessed and Peer assessed exam style questions • End of Unit Assessment • End of Year 10 Mock • December Mock year 11 • Final Assessment Paper 1	• Used to identify areas of weakness with regards to answering exam questions • Reserve lessons will be retained to allow content to be revisited if students are struggling

Unit Eight: Ethical, Legal, and Environmental Issues (1.8)

Students will learn about a range of historical and recent incidents relating to computers and how computers pay an active role in everyday life. They will learn about a range of different ethical dilemmas with computers and be able to structure compelling arguments for and against technology. Students will also look at computer science legislation, when it was passed, and why. Students will learn about environmental concerns such as global warming and landfills which are contributed by computer manufacture and use.

Intent

Knowledge acquired:

OCR GCSE Computer Science specification:

1. Different ethical issues

2. Different Legal Issues

3. Different Cultural Issues

4. Different Environmental Issues

5. Different Privacy Issues

6. Computer Science Legislation

AO1: To be able to identify different types of issues with computers

AO2: To be able to identify the 5 different laws regarding computers

Skills developed:

AO3: Ability to discuss and investigate different issues regarding computer science technologies

AO4: Ability to discuss and explain different laws and how they could be abided by in terms of computers

AO5: Ability to discuss and explain different laws and how they can be broken

Understanding:

AO6: To be able to articulate a balanced discussion regarding how one piece of technology can have many different effects on society.

AO7: To be able to justify prison sentences and penalties for violating computer legislation

AO8: To be able to justify why certain laws exist and how they protect people

Links to previous study:

- Link to KS3 Unit – Understanding Computer Systems

- Link to understanding how to answer exam style questions

Links to future study:

Link to OCR A Level: Ethics and Sociology

Implementation

Number of lessons: ≈8

Sequence of lessons:

Issues regarding Technology	Computer Legislation
1-3) Ethical, Legal, and Environmental issues	6-7) Computer Legislation
4-5) Financial implications and privacy issues with computers	8) How the laws effect day to day life

Main Resources	Method of Assessment	Use of Assessment Results
• PG Online Worksheets & Homework • Teacher Prepared PowerPoint & Activities	• Self-Assessed and Peer assessed exam style questions • End of Unit Assessment • End of Year 10 Mock • December Mock year 11 • Final Assessment Paper 1	• Used to identify areas of weakness with regards to answering exam questions • Reserve lessons will be retained to allow content to be revisited if students are struggling

Unit Eight: Algorithms (2.1)

Students will learn how to write a program from a given scenario or specification using computational thinking and algorithmic design. They will also learn how computers are able to organise and search data for information, and the methods the computer use to do this. Learners will be able to structure flow diagrams and pseudocode to write paper versions of computer code.

Knowledge acquired:

OCR GCSE Computer Science specification:

1. Computational Thinking

2. Search Algorithms

3. Sorting Algorithms

4. Pseudocode

5. Flow Diagrams

AO1: To be able to identify different types of computational thinking

AO2: To be able to identify the different sorting and search algorithms

AO3: To be able to identify the difference between Pseudocode and Flow Diagrams

Skills developed:

AO4: Ability to use Computational thinking to solve problems

AO5: Ability to use sorting and search algorithms on data to show the process

AO6: To be able to draw Flow Diagrams and write Pseudocode

Understanding:

AO7: Ability to explain how a program works from a reference of Pseudocode or Flow Diagrams

AO8: Ability to give the correct output from a search and sort algorithm

Links to previous study:

- Link to KS3 Unit – Understanding Computer Systems

- Link to understanding how to answer exam style questions

Links to future study:

Link to OCR A Level: Algorithms

Implementation

Number of lessons: ≈9

Sequence of lessons:

Computational Thinking	Search and Sort Algorithms	Algorithms
1) Abstraction	4) Binary and Linear Search	7) Pseudocode
2) Decomposition	5-6) Bubble Sort, Merge Sort, and Insertion Sort	8-9) Flow Diagrams
3) Algorithmic Thinking		

Main Resources	Method of Assessment	Use of Assessment Results
• PG Online Worksheets & Homework • Teacher Prepared PowerPoint & Activities	• Self-Assessed and Peer assessed exam style questions • End of Unit Assessment • End of Year 10 Mock • December Mock year 11 • Final Assessment Paper 2	• Used to identify areas of weakness with regards to answering exam questions • Reserve lessons will be retained to allow content to be revisited if students are struggling

Unit Nine: Programming Techniques (2.2)

Students will learn how to program using various tools such as Variables, iteration, File Handling etc. Given students a range of tools to make better programs. They will also look at how data is stored in a computer and what you can do with those tools. They will also be taught how data can be converted within a program to do something else later on.

Knowledge acquired:

OCR GCSE Computer Science specification:

1. Use of various data assignments e.g. *Variables, Constants, Sequencing, Iteration, File Handling*

2. Basics of SQL

3. Sub Programs

4. Data Types *e.g. Integer, real, Boolean, character, string, casting*

AO1: To be able to identify different types of variables

AO2: To be able to identify the different tools used in programming

AO3: To be able to identify the different data types

Skills developed:

AO4: Ability to use justify why they have chosen the data assignment for different data

AO5: Ability to program using an array of tools available with programming

AO6: To be able to explain what different data types are and what is commonly stored in them

Understanding:

AO7: To write functioning code that follows set guidelines given beforehand

Links to previous study:

- Link to KS3 Unit – Small Basic

- Link to understanding how to answer exam style questions

- Link to Lighting Fire lessons at start of academic year

Links to future study:

Link to OCR A Level: Programming Techniques

Implementation

Number of lessons: ≈10

Sequence of lessons:

1) Basic Input, Output Functions	3) Iteration	5-6) String Manipulation	9) Basics of SQL
2) Sequencing	4) Selection	7-8) File Handling	10) Data Types and operators

Main Resources	Method of Assessment	Use of Assessment Results
• PG Online Worksheets & Homework • Teacher Prepared PowerPoint & Activities	• Self-Assessed and Peer assessed exam style questions • End of Unit Assessment • End of Year 10 Mock • December Mock year 11 • Final Assessment Paper 2	• Used to identify areas of weakness with regards to answering exam questions • Reserve lessons will be retained to allow content to be revisited if students are struggling

Unit Ten: Programming Robust Programs (2.3)

This Unit teaches students how to make better programs by making them robust. This means that users cannot break the program by not typing exactly what they need to in the program. They will also be able to identify errors in their program, and other people's code, and fix them.

Knowledge acquired:

OCR GCSE Computer Science specification:

1. Defensive Design considerations

2. Testing *e.g. iterative, final, terminal, black box, white box*

3. Syntax and Logic Errors

AO1: To be able to explain different methods of programming defences

AO2: To be able to identify methods of maintainability

AO3: To be able to identify methods of testing

Skills developed:

AO4: Ability to use defensive design to make programs robust

AO5: Ability to use comments and indentation in their programs

Understanding:

AO6: To be able to explain and justify different methods of defensive design and why they have been used in their program

Links to previous study:

- Link to KS3 Unit – Small Basic

- Link to understanding how to answer exam style questions

- Link to Lighting Fire lessons at start of academic year

Links to future study:

Link to OCR A Level: Programming Techniques

Implementation

Number of lessons: ≈5

Sequence of lessons:

Defensive Design	Testing	Errors
1) Input Sanitation and authentication	**3)** Iterative and Final	**5)** Syntax, Logic, and runtime errors
2) Maintainability	**4)** White and Black Box	

<u>Main Resources</u>	<u>Method of Assessment</u>	<u>Use of Assessment Results</u>
• PG Online Worksheets & Homework • Teacher Prepared PowerPoint & Activities	• Self-Assessed and Peer assessed exam style questions • End of Unit Assessment • End of Year 10 Mock • December Mock year 11 • Final Assessment Paper 2	• Used to identify areas of weakness with regards to answering exam questions • Reserve lessons will be retained to allow content to be revisited if students are struggling

Unit Ten: **Computational Logic (2.4)**

This unit, students will learn how data is stored in a computer and how the computer is able to display something on the screen. They will learn about logic gates and Binary representation along with Hexadecimal. Students will be able to do some basic arithmetic with binary and hexadecimal numbers and understand the ASCHII character set.

Intent

Knowledge acquired:

OCR GCSE Computer Science specification:

1. Binary representation and arithmetic

2. Logic Diagrams e.g. AND, OR NOT

3. Truth Tables

AO1: To be able to represent denary numbers in binary form

AO2: To be able to understand the outputs from logic diagrams

AO3: To be able to identify truth tables and match them to their logic diagrams

Skills developed:

AO4: Ability to do binary arithmetic

AO5: Ability to draw logic diagrams based on previous information

AO6: Ability to Draw truth tables from logic diagrams

Understanding:

AO7: To be able to explain why numbers are represented in binary form and what logic diagrams represent

Links to previous study:

- Link to KS3 Unit – Small Basic

- Link to understanding how to answer exam style questions

- Link to Lighting Fire lessons at start of academic year

Links to future study:

Link to OCR A Level: Computational Logic

Implementation

Number of lessons: ≈4

Sequence of lessons:

Binary Arithmetic	Logic Diagrams
1) Binary and Hexadecimal Representation	3) Logic Gates
2) Binary Arithmetic	4) Truth Tables

Main Resources	Method of Assessment	Use of Assessment Results
• PG Online Worksheets & Homework • Teacher Prepared PowerPoint & Activities	• Self-Assessed and Peer assessed exam style questions • End of Unit Assessment • End of Year 10 Mock • December Mock year 11 • Final Assessment Paper 2	• Used to identify areas of weakness with regards to answering exam questions • Reserve lessons will be retained to allow content to be revisited if students are struggling

Unit Eleven: **Translators and Facilities of Languages (2.5)**

Students will learn there are various ways to communicate with a computer using programming paradigms. They will also learn why there are different programming languages and why these exist, along with the advantages and disadvantages of both. Students will learn about the tools that are available to them for programming and how these can help a programmer.

Intent

<u>Knowledge acquired:</u>

OCR GCSE Computer Science specification:

1. Programming Paradigms

2. Assemblers, interpreters, and compilers

3. IDE facilities

AO1: To be able to identify different programming languages and their level

AO2: To be able to explain the role of Assemblers, Interpreters, and compilers

AO3: To be able to identify some of the tools available in IDEs

<u>Skills developed:</u>

AO4: Ability to do use some different programming languages

AO5: Ability to draw justify the use of different translators

AO6: Ability to explain the role of IDE intellicence *[sic]* and use it accordingly

<u>Understanding:</u>

AO7: To be able to use an IDE and explain what tools are being used and why
AO6: To be able to program the same program in multiple languages

<u>Links to previous study:</u>

• Link to KS3 Unit – Small Basic

• Link to understanding how to answer exam style questions

• Link to Lighting Fire lessons at start of academic year

<u>Links to future study:</u>

Link to OCR A Level: Facilities of Languages

Implementation

Number of lessons: ≈3

Sequence of lessons:

1) Programming Paradigms	3) IDE Facilities
2) Translators	

Main Resources	Method of Assessment	Use of Assessment Results
• PG Online Worksheets & Homework • Teacher Prepared PowerPoint & Activities	• Self-Assessed and Peer assessed exam style questions • End of Unit Assessment • End of Year 10 Mock • December Mock year 11 • Final Assessment Paper 2	• Used to identify areas of weakness with regards to answering exam questions • Reserve lessons will be retained to allow content to be revisited if students are struggling

Unit Twelve: **Data Representation (2.6)**

Students will lean how computers are able to represent data in a computer system such as numbers and letters and even things like sound and images. They will learn about Pixels, and the metadata of an image. They will also learn about sound and how the levels of quality increase the size of the file. Students will also learn how computer systems are able to make files smaller by the use of compression and the advantages and disadvantages of both lossy and lossless.

Intent

Knowledge acquired:

OCR GCSE Computer Science specification:

1. Units of data

2. Base number systems

3. ASCII Character sets

4. Images

5. Sound

6. Compression

AO1: To be able to identify different units of data, base number systems and character sets

AO2: To be able to explain how images and sound are stored in computers

AO3: To be able to explain how data can be compressed in computers

Skills developed:

AO4: Converting numbers to various number systems and data units

AO5: Be able to convert binary numbers into character representation

AO6: Be able to calculate the size of images and sound based on their metadata

Understanding:

AO7: To be able to show correct calculations of the various conversions

Links to previous study:

- Link to KS3 Unit – Small Basic

- Link to understanding how to answer exam style questions

- Link to Lighting Fire lessons at start of academic year

Links to future study:

Link to OCR A Level: Data Representation

Number of lessons: ≈7

Sequence of lessons:

Units and Numbers	Data Representation	Data Compression
1) Data Units	4) Representing ASCII Characters	7) Lossy and Lossless compression
2-3) Converting numbers to various number systems	5) Representing Images	
	6) Representing Sound	

Main Resources	Method of Assessment	Use of Assessment Results
• PG Online Worksheets & Homework • Teacher Prepared PowerPoint & Activities	• Self-Assessed and Peer assessed exam style questions • End of Unit Assessment • End of Year 10 Mock • December Mock year 11 • Final Assessment Paper 2	• Used to identify areas of weakness with regards to answering exam questions • Reserve lessons will be retained to allow content to be revisited if students are struggling

Unit Twelve: **Programming Project (3)**

The programming project gives students an opportunity of 20 to allow them to use their programming skills in order to make a working program, based on a specification. They will go through the various stages of project management and be given independence on how they are going to do this. They will have the opportunity to create things like Gannt Charts and Initial designs, and work through it to create a working game.

Intent

<u>Knowledge acquired:</u>

OCR GCSE Computer Science specification:

1. Variables

2. Iteration

3. Sequencing

4. Computational Thinking

AO1: To be able to code a program that meets a set criteria of a challenge

AO2: To be able to use a range of tools to solve a programming problem

<u>Skills developed:</u>

AO3: Various programming techniques such as file handling, iteration, sequencing and so on.

<u>Understanding:</u>

AO4: A finished program that meets the criteria of the programming project

<u>Links to previous study:</u>

• Link to KS3 Unit – Small Basic; Python

• Link to understanding how to answer exam style questions

• Link to Lighting Fire lessons at start of academic year

<u>Links to future study:</u>

Link to OCR A Level: Programming Project

(A harder project requiring more skills)

Implementation

Number of lessons: ≈20

Sequence of lessons:

Programming	Documentation
1–15) Programming project	**16)** Aim of program **17)** Decomposition of task **18)** Annotation **19)** Flowchart **20)** Evaluation and references

Main Resources	Method of Assessment	Use of Assessment Results
• OCR Programming Project specification • OCR Preparation resources • Teacher made PowerPoints and tools	• OCR Graded projects (Coursework so cannot grade them myself)	20% of their overall computer science grade from the coursework