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Year 10 Overview 2024-25 – *Computer Science*

Date	Wk	Week	Units Studied & Learning Outcomes	Key Concepts & Assessment
			8 weeks (?? Lessons) (38Days)	
2-Sep	A	1	Intro to programming and Data Representation	**Foundational Concepts**
9-Sep	B	2	**Unit 1 Outcomes**	**Topic 1: Computational thinking** – understanding of what algorithms are, what they are used for and how they work; ability to follow, amend and write algorithms; ability to construct truth tables.
16-Sep*	A	3		**Topic 6: Problem solving with programming.** The main focus of this paper is: ● understanding what algorithms are, what they are used for and how they work in relation to creating programs ● understanding how to decompose and analyse problems ● ability to read, write, refine and evaluate programs.
23-Sep	B	4		Define the term 'program' Identify types of programs used every day Identify Python as a programming language Access an integrated development environment Load and run a Python program Change a Python program Save a Python program Use arithmetic operators and BIDMAS Layout code to be readable and maintainable Correct errors in programs Use variables in algorithms and programs Define the term 'decomposition' Define the term 'algorithm' Decompose a problem Order the pieces of an algorithm (unplugged) Order the pieces of an algorithm (IDE) Define the term 'sequence' and use sequence in algorithms and program code Interpret error messages Correct errors in ordering
30-Sep	A	5		
7-Oct	B	6		
14-Oct	A	7		
21-Oct	B	8		**Links to history, culture, vocabulary:** Computer programming history - Ada Lovelace is credited as being the first person to describe or write a computer program. In 1843, she described an algorithm to compute Bernoulli numbers using the Analytical Engine. For more see: https://www.computerhope.com/history/programming.htm Program – noun a series of coded software instructions to control the operation of a computer or other machine. Programming - noun the process or activity of writing computer programs. Careers: Software application developer, Web developer, Computer systems engineer, Database administrator, Computer systems analyst, Software quality assurance (QA) engineer, Business intelligence analyst, Computer programmer, Network system administrator.
				Equality Diversity and Inclusion *15/09-17/09 Rosh Hashanah* *23/9 International day of sign languages* *2/10-8/10 Dyslexia awareness week* *5/10 world teachers day* *6/10 World cerebal palsy day*

Unit 1 Outcomes

Prior	Current	Next
Year 9 KS3 NC – understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem	Year 10 KS4 NC – develop and apply their analytic, problem-solving, design, and computational thinking skills	KS5 – Chapters 1 - 4 Learning to program effectively. Chapters 13 - 14 Planning and completing a programming project.

Decomposition, algorithms

Unit 6 Outcomes

Prior	Current	Next
Year 9 KS3 NC – use two or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions	Year 10 KS4 NC – develop and apply their analytic, problem-solving, design, and computational thinking skills or functions	KS5 – Chapters 1 - 4 Learning to program effectively. Chapters 13 - 14 Planning and completing a programming project.

<table>
<tr><td></td><td></td><td></td><td></td><td>Recognise primitive data types (int, real, char, string)
Define the term ‘variable’
Create variables of all types
Create meaningful identifier names
Assign values to variables, with the correct data types
View contents of memory (variable) in IDE
Take input and create output
Define the term ‘runtime error’
Find and fix runtime errors
Use primitive data types (integer, real, char, string)
Translate code into flowchart symbols
Represent an algorithm in a flowchart
Translate a flowchart into code</td></tr>
<tr><td>Half-Term</td><td colspan="4">7 weeks (?? lessons) (35 Days)</td></tr>
<tr><td>4-Nov</td><td>A</td><td>9</td><td rowspan="8">Unit 2 Outcomes
<table><tr><th>Prior</th><th>Current</th><th>Next</th></tr><tr><td>Year 9 KS3 NC – understand simple Boolean logic [for example, AND, OR and NOT] and some of its uses in circuits and programming; understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers [for example, binary addition, and conversion between binary and decimal]</td><td>Year 10 KS4 NC – develop and apply their analytic, problem-solving, design, and computational thinking skills</td><td>KS5 – Chapters 5 - 12 Foundations of Computer Science.</td></tr></table></td><td rowspan="8">Topic 2: Data – understanding of binary, data representation, data storage and compression.

Define what is meant by the terms ‘binary’ and ‘bit’
Explain why binary is used to represent data and program instructions in a computer
Describe the relationship between the number of available bits and the range of unique values that can be represented
Determine the number of unique values that can be represented by a binary pattern of a given length (2^n)
Define what is meant by the terms ‘nibble’ and ‘byte’
Convert between denary and 8-bit binary numbers
Convert between signed denary numbers and two’s complement binary numbers
Determine the range of values that can be represented in two’s complement by a binary number of a given length
Apply logical left and right shifts to binary integers
Use logical binary shifts to multiply and divide unsigned binary integers by powers of 2
Explain why a number may be less precise after a binary shift right has been applied
Apply arithmetic left and right shifts to signed binary numbers
Describe how an arithmetic right shift differs from a logical right shift
Define what is meant by the term ‘hexadecimal’
Define what is meant by the term ‘character set’
Describe how characters are represented in 7-bit ASCII
Given the ASCII code for one character derive the code for another
Outline the shortcomings of ASCII and how encoding systems that use more bits overcome them

• Equality Diversity and Inclusion (EDI) links?
Mens health awareness month/disability confident month
1/11 Diwali
12/11 Remembrance Sunday
13/11-19/11 Transgender awareness week
14/11 World Diabetes Day
1/12 World AIDS day
25/12 Christmas Day</td></tr>
<tr><td>11-Nov</td><td>B</td><td>10</td></tr>
<tr><td>18-Nov</td><td>A</td><td>11</td></tr>
<tr><td>25-Nov</td><td>B</td><td>12</td></tr>
<tr><td>2-Dec</td><td>A</td><td>13</td></tr>
<tr><td>9-Dec</td><td>B</td><td>14</td></tr>
<tr><td>16-Dec</td><td></td><td></td></tr>
<tr><td></td><td>A</td><td>15</td></tr>
<tr><td>Christmas Holiday</td><td colspan="4">6 weeks (?? lessons) (30 Days)</td></tr>
<tr><td>6-Jan</td><td>B</td><td>16</td><td rowspan="3">Unit 6 Outcomes
<table><tr><th>Prior</th><th>Current</th><th>Next</th></tr></table></td><td rowspan="3">Format output to meet requirements
Format output suitable for the end user
Define the term ‘array’
Define the term ‘list’
Give characteristics of one-dimensional and two-dimensional data structures
Use indexing to access any item in a two-dimensional structure</td></tr>
<tr><td>13-Jan</td><td>A</td><td>17</td></tr>
<tr><td>20-Jan</td><td>B</td><td>18</td></tr>
</table>

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<table>
<tr><td>27-Jan</td><td>A</td><td>19</td><td rowspan="3">Year 9 KS3 NC – use two or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions</td><td rowspan="3">Year 10 KS4 NC – develop and apply their analytic, problem-solving, design, and computational thinking skills or functions</td><td rowspan="3">KS5 – Chapters 1 - 4 Learning to program effectively. Chapters 13 - 14 Planning and completing a programming project.</td><td rowspan="3">Use 'for' to iterate over every item in a two-dimensional structure
Use 'while' to find a row in a two-dimensional structure
Validate input using presence check, length check, range check, pattern check
Apply a linear search to a one-dimensional list (paper)
Complete a linear search algorithm in a flowchart
Write a linear search for a single item in a one-dimensional list (code)
Apply a linear search to a two-dimensional list (paper)
Complete a linear search algorithm in a flowchart
Write a linear search for a single record in a two-dimensional list (code)

• Equality Diversity and Inclusion (EDI) links?
LGBT+ History month
27/1 Holocaust memorial day

1/2 World Hijab Day
6/2-12/2 Children's mental health week.
7/2 Safer internet day
10/2 Chinese New Year</td></tr>
<tr><td>3-Feb</td><td>B</td><td>20</td></tr>
<tr><td>10-Feb</td><td>A</td><td>21</td></tr>
<tr><td colspan="2">Half-Term</td><td colspan="4">6 weeks (?? lessons) (29 Days)</td></tr>
<tr><td>25-Feb</td><td>B</td><td>22</td><td colspan="3" rowspan="9">INSET 24th Feb

Unit 3 Outcomes

<table><tr><th>Prior</th><th>Current</th><th>Next</th></tr><tr><td>Year 9 KS3 NC – 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</td><td>Year 10 KS4 NC – develop and apply their analytic, problem-solving, design, and computational thinking skills</td><td>KS5 NC – Chapters 5 - 12 Foundations of Computer Science.</td></tr></table></td><td rowspan="9">Topic 3: Computers – understanding of hardware and software components of computer systems and characteristics of programming languages.

Describe the role of the operating system in a computer system
Identify tasks carried out by an OS
Describe how the OS organises files and allocates space on a hard drive
Construct an expression to calculate the number of blocks of space on a hard drive needed to store a file of a given size
Describe how file permissions are used to control access to files
Select an appropriate level of file access (read, write, delete, none) for a user
Describe how an OS uses scheduling to give each active process a share of CPU time
Describe the features of the round-robin scheduling algorithm
Describe how the OS uses a paging algorithm to swap programs in and out of main memory.
Define what is meant by the term 'peripheral'
Describe how the OS uses drivers to communicate with and manage peripherals
Explain the purpose of a user interface and describe features of a user interface
Define what is meant by the term 'access control'
Describe commonly used methods of authentication
Select suitable access right for specified individuals

Equality Diversity and Inclusion (EDI)
Women's history month
Ramadhan 10/03-08/04
Passover 22/4-30/4
Good Friday 29/3
Easter Sunday 31/3</td></tr>
<tr><td>3-Mar</td><td>A</td><td>23</td></tr>
<tr><td>10-Mar</td><td>B</td><td>24</td></tr>
<tr><td>17-Mar</td><td>A</td><td>25</td></tr>
<tr><td>24-Mar</td><td>B</td><td>26</td></tr>
<tr><td>31-Mar</td><td>A</td><td>ST1</td></tr>
<tr><td colspan="2">Easter Holiday</td><td colspan="4">5 weeks (?? lessons) (23 Days)</td></tr>
<tr><td>22-Apr</td><td>B</td><td>ST1</td><td colspan="3" rowspan="5">Easter Monday 21st
Early May bank hol 6/5

Unit 6 Outcomes

<table><tr><th>Prior</th><th>Current</th><th>Next</th></tr></table></td><td rowspan="5">Define what is meant by the term 'utility software'
Identify different types of utility software
Describe the purpose of:
– file repair/recovery software
– backup/recovery software
– file compression software
– disk defragmentation software
Select which utility software tool to use for a particular task
Describe the merge sort algorithm
Merge two sorted lists (paper, code)
Open files for reading</td></tr>
<tr><td>28-Apr</td><td>A</td><td>ST1</td></tr>
<tr><td>5-May</td><td>B</td><td>30</td></tr>
<tr><td>12-May</td><td>A</td><td>31</td></tr>
<tr><td>19-May</td><td>B</td><td>32</td></tr>
</table>

			Year 9 KS3 NC – use two or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions	Year 10 KS4 NC – develop and apply their analytic, problem-solving, design, and computational thinking skills or functions	KS5 – Chapters 1 - 4 Learning to program effectively. Chapters 13 - 14 Planning and completing a programming project.

Unit 4 Outcomes

Prior	Current	Next
Year 9 KS3 NC – understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct and know how to report concerns.	Year 10 KS4 NC – understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns.	KS5 – Chapters 5 - 12 Foundations of Computer Science

Read lines from text files
Close a file
Split lines on commas
Store items in lines as records in two-dimensional structure
Open files for writing
Construct comma-separated value line from record in two-dimensional structure
Write comma separated text (records) to a file
Close a file

- ***Equality Diversity and Inclusion (EDI) links?***

Good Friday 18/4
Easter Sunday 20/4
Autism and stress awareness month.
25/4 World Malaria Day
26/4 Lesbian visibility day
UK national walking month.
1/5-7/5 Deaf awareness week
23/05 Vesak

Topic 4: Networks – understanding of computer networks and network security.

Define what is meant by the term 'cyberattack'
Describe the financial, reputational and legal damage that a cyberattack can cause
Describe the characteristics of and threat posed by different types of malware
Describe how anti-malware works
Explain why it is important to keep anti-malware up-to-date

Links to history, culture, vocabulary:

October 29, 1969, the first ARPAnet (later to be known as the Internet) link was established between UCLA and SRI. March 1989, Tim Berners-Lee circulated a proposal for "Mesh" (later to be known as the World Wide Web) to his management at CERN. This timeline highlights the major (and some minor) developments in the evolution of these twin flowers of the digital age, one (the Internet) a network infrastructure, the other (the Web) a software infrastructure layered on top of it. Together, they have so far connected more than a third of the world's population and have made millions of people both new consumers and new creators of information.

Gil Press Senior Contributor Forbes

Network – noun

a group or system of interconnected people or things.

Internet - noun

a global computer network providing a variety of information and communication facilities, consisting of interconnected networks using standardized communication protocols.

Origin 1970s (denoting a computer network connecting two or more smaller networks): from inter- 'reciprocal, mutual' + network.

Careers: Network and Computer Systems Administrator, Information Systems Manager, Computer Network Architect, Computer Systems Analyst, Computer Network Support Specialist, IT security Analyst, Network Operations Engineer.

Half-Term			7 weeks (?? lessons) (34 Days)	
2-Jun	A	33	**Unit 5 Outcomes**	**Topic 5: Issues and impact** – awareness of emerging trends in computing technologies, and the impact of computing on
9-Jun	B	34		
16-Jun	A	35		

Prior	Current	Next

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23-Jun	B	36	Year 9 KS3 NC – understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct and know how to report concerns	Year 10 KS4 NC – understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns.	KS5 – Chapters 5 - 12 Foundations of Computer Science	individuals, society and the environment, including ethical, legal and ownership issues. Define what is meant by the term 'hacker' Explain why unpatched software is a target for hackers Explain the function of a firewall Explain how ethical hacking and penetration testing help identify vulnerabilities **Links to history, culture, vocabulary:** Although digital technology has been hugely beneficial to mankind, it can be argued it has also had a negative impact on some sections of society and the environment. Society has reacted to many of these issues by creating legislation that governs the use of digital technology and puts in place penalties if rules or laws are broken. Laws like: The Copyright Designs and Patents Act (1988) The Federation Against Software Theft (FAST) Data Protection Act (1998) Computer Misuse Act (1990) Waste Electrical and Electronic Equipment recycling (WEEE) **Careers:** Infrastructure Technician, Technical Services Manager, IT Development Manager • ***Equality Diversity and Inclusion (EDI) links?*** *LGBTQ+ pride month.* *Gypsy, Roma and Traveller history month.* *12/6 world day against child labour* *18/6 autistic pride day* *20/6 World refugee day*
30-Jun	A	37				
7-Jul	B	38				
14-Jul	A	39				
(Total: 189 Days)						

Overview of Year 10	
	By the end of Year 10, students will have learned
GW: *(E.g. Grade 1-3)*	Demonstrate knowledge and understanding of the key concepts and principles of computer science
BI: *(E.g. Grades 4-6)*	Apply knowledge and understanding of key concepts and principles of computer science.
EW: *(E.g. Grades 5-9)*	Analyse problems in computational terms: to make reasoned judgements to design, program, evaluate and refine solutions.