

Year 7

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Using computers safely, effectively and responsibly	Introduction to coding through Kodu	Understanding Computers	Introductions to Python using Microbit	Computer crime and cyber security	Graphics

Computer Science GCSE

Pupils in Computer Science will learn how computer systems work, from the physical, such as the hardware, to the software, or apps and programs that users interact with. Pupils learn how to create and manipulate computer systems, and how to apply these skills and approaches to tackle real-life problems creatively. Computer Science introduces pupils to how to make computers work for them, rather than using the basic systems the computer provides. There is also a strong focus on the ever-changing risks to personal information held electronically, and how to keep this safe, avoiding security risks, while reducing the impact of online threats. Computer Science provides students with a wide range of skills that can be applied to other subjects. Computer Science teaches logical thinking skills and problem-solving abilities, which will be of benefit to any future careers. ICT skills are essential to any office-based job. An ability to write programs, and manipulate data, are skills that potential employers will value.

Year 7

Knowledge (Topics / contexts) Pupils will know	Skills acquired Pupils will be able to	Concept Pupils will understand	Assessment
<p>1. Using computers safely, effectively and responsibly</p> <ul style="list-style-type: none"> - what is responsible use - who to report concerns to - know how a computer system is made up - how computers communicate with each other 	<ul style="list-style-type: none"> - identify ways to protect themselves online - report concerns - Identify hardware and software components used in a computer system 	<ul style="list-style-type: none"> - Online privacy, digital footprint and identity 	<p>Online assessment</p> <p>Class feedback</p>
<p>2. Understanding Computers</p> <ul style="list-style-type: none"> - how to keep your identity secure on the Internet - how to create a secure, memorable password - how to avoid being a victim of an email scam - of the advantages and disadvantages of email - Define the term “search engine” and name examples 	<ul style="list-style-type: none"> - manage files in File Explorer, to keep their files in well organised and appropriately named folders - list some of the dangers and drawbacks of social networking sites - list some possible responses to cyberbullying - use a search engine efficiently to find information 	<ul style="list-style-type: none"> - the importance of making backups - how to protect your identity online - that there is no guarantee that the information on the Internet is accurate 	<p>Online assessment</p> <p>Class feedback</p>

Knowledge (Topics / contexts) Pupils will know	Skills acquired Pupils will be able to	Concept Pupils will understand	Assessment
3. Introductions to Python using Microbit	Programmes, selections, iteration, conditions.	<ul style="list-style-type: none"> - what is meant in programming by the term iteration 	Project work Class feedback
4. Computer crime and cyber security <ul style="list-style-type: none"> - what is meant by hacking - what is meant by malware - ways to protect yourself from malware & hacking - how to minimise the chance of identity theft - Learn about some of the common health and safety problems associated with computer use 	<ul style="list-style-type: none"> - Name the major Acts concerning computer use - Identify common types of computer crime - Recognise the signs of fraudulent emails - Compare copyright infringement with plagiarism - List some of the Health and Safety hazards associated with computer use - Describe how to safely dispose of an old computer 	<ul style="list-style-type: none"> - about different types of email scams - the Computer Misuse Act – which makes certain activities illegal - who might hold personal data about you - the possibility of identity theft - the Copyright law, what it says and what it means - Understand the damage that illegal copying does to individuals, companies and society 	Online assessment
5. Graphics <ul style="list-style-type: none"> - The difference between bitmap and vector images - That bitmap images are made up of individual pixels - Understand that text characters are vector-based 	<ul style="list-style-type: none"> - Create and manipulate a simple group of objects to form a logo design - Change the saturation, brightness and contrast in an image - Add text to a graphic - Use a graphics package to create an artwork; for example, a movie poster 	<ul style="list-style-type: none"> - the characteristics of a vector graphic and how it is stored - how fonts, colours and images convey meaning - that using too many different fonts dilutes the message and looks messy 	

Computer Science GCSE

Knowledge (Topics / contexts) Pupils will know	Skills acquired Pupils will be able to:	Concept Pupils will understand	Assessment
<ul style="list-style-type: none"> • Programming and programming concepts - Programs are written using sequence, selection, and iteration - The difference between constants and variables - The different structures for arrays - that subroutines may use local variables which are accessible only within the subroutine - differences between low and high levels of programming language: - that all programming code must be translated into machine code before it is executed - the differences between and use of three types of translator: interpreter, compiler and assembler 	<p>Writing programs using Python that:</p> <ul style="list-style-type: none"> - Declare and use constants and variables - Use input, output and assignment statements - Use arithmetic operators - Use string handling and conversion functions - Use selection and nested selection statements - Use NOT, AND and OR when creating Boolean expressions - Use in-built functions - Use random number generation - Write algorithms in pseudocode involving sequence, selection and iteration - Use one- and two-dimensional arrays in the design of solutions to simple problems - Define the terms field, record and file - Read from and write to a text file - write simple procedures and functions - use parameters to pass data to procedures and functions - List validation checks that can be used on input data - write simple data validation routines - write a simple authentication routine involving a username and password 	<ul style="list-style-type: none"> - How to use data types: integer, real, Boolean, character and string - How to use iteration in an algorithm - the concept of subroutines - why it is good practice to use local variables - the advantages of using subroutines in programs - the importance of validating input - how to determine the correct output of an algorithm for a given set of data - how to identify and correct errors in algorithms 	<ul style="list-style-type: none"> - Level of engagement with written and practical tasks set within lessons. - Actions taken by pupils in the light of verbal feedback. - Topic Tests. - Quality of homework tasks designed to check for understanding of topics covered. - Performance in Yr10 exam against good progress target. - Performance in Yr11 mock exam against good progress target. - Verbal feedback during practical programming tasks <p>Final assessment: Paper 1, 2hrs, 50% of GCSE</p>

Knowledge (Topics / contexts) Pupils will know	Skills acquired Pupils will be able to:	Concept Pupils will understand	Assessment
	<ul style="list-style-type: none"> - Write a test plan to test an algorithm - Use a trace table to trace through a program 		
<ul style="list-style-type: none"> • Fundamentals of algorithms - the different data types: integer, real, Boolean, character, string - how to develop algorithms using flowcharts. - how to develop algorithms using pseudocode - the different search algorithms - the different sorting algorithms 	<ul style="list-style-type: none"> - explain the terms: algorithm, decomposition, abstraction - Use standard arithmetic operators - Use totalling and counting - Use standard flowchart symbols - use sequence, selection and iteration in an algorithm - Compare and contrast merge sort and bubble sort algorithms. 	<ul style="list-style-type: none"> - how to create an algorithm to solve a particular problem. - sequence, selection and iteration in an algorithm - how binary and linear search algorithms work: - how bubble and merge sort algorithms work. 	<ul style="list-style-type: none"> - Level of engagement with written and practical tasks set within lessons. - Actions taken by pupils in the light of verbal feedback. - Topic Tests. - Quality of homework tasks designed to check for understanding of topics covered. - Performance in Yr10 exam against good progress target. - Performance in Yr11 mock exam against good progress target. <p>Final assessment: Paper 1, 2hrs, 50% of GCSE</p>
<ul style="list-style-type: none"> • Data Representation - A bit is a unit of information - The names and values of kB, MB, GB, TB - How a bitmap represents an image - What data compression is and that there are different methods (lossy and lossless) - How data can be compressed using Run Length encoding 	<ul style="list-style-type: none"> - Convert between number bases - Perform binary arithmetic - Calculate bitmap image file size - Calculate sound file sizes - Interpret Huffman trees 	<ul style="list-style-type: none"> - Decimal, binary and hexadecimal number bases - ASCII and Unicode characters and their purpose - That sound must be converted to digital form for storage - Why data is compressed - How data is compressed using Huffman coding 	<ul style="list-style-type: none"> - Level of engagement with written and practical tasks set within lessons - Actions taken by pupils in the light of verbal feedback. - Topic tests - Quality of homework tasks designed to check for understanding of topics covered. - Performance in Yr10 exam against good progress target. - Performance in Yr11 mock exam against good progress target. <p>Final assessment: Paper 2, 1hr 45 mins, 90 marks, 50% of GCSE</p>

Knowledge (Topics / contexts) Pupils will know	Skills acquired Pupils will be able to:	Concept Pupils will understand	Assessment
<ul style="list-style-type: none"> • Computer Systems - the role and operation of the major components of a CPU: - Factors affecting the performance of a CPU - The purpose of RAM and ROM in a computer system - the advantages and disadvantages of cloud storage - 	<ul style="list-style-type: none"> - Construct truth tables for AND, OR, NOT gate and simple logic circuits, - Create, modify and interpret simple logic circuit diagrams - Explain the terms hardware and software - Explain what is meant by system software and application software and give examples of each - Explain the operation of solid state, optical and magnetic storage and discuss the advantages and disadvantages. 	<ul style="list-style-type: none"> - that the OS handles management of the processor, memory, I/O devices, applications and security - the need for and functions of operating systems (OS) and utility program - the Fetch-execute cycle and what happens at each stage - the difference between RAM and ROM - the differences between main memory and secondary storage - why secondary storage is required - the term “embedded system” and where these are used 	<ul style="list-style-type: none"> - Level of engagement with written and practical tasks set within lessons Actions taken by pupils in the light of verbal feedback. - Topic tests - Quality of homework tasks designed to check for understanding of topics covered. - Performance in Yr10 exam against good progress target. - Performance in Yr11 mock exam against good progress target. <p>Final assessment: Paper 2, 1hr 45 mins, 90 marks, 50% of GCSE</p>
<ul style="list-style-type: none"> • Computer Networks - what a computer network is - the different network topologies and transmission protocols - the need for network security 	<ul style="list-style-type: none"> - Describe a Wide Area Network - Explain the use and function of routers, switches and Network Interface Cards - Discuss the benefits and risks of computer networks - Explain the advantages and disadvantages of various transmission media - Explain the purpose and uses of communications protocols including - Describe the four layers of the TCP/IP model, Application, Transport, Network, Data link 	<ul style="list-style-type: none"> - the concept of packet switching - that networks can be wired or wireless - the use of MAC addressing - the different types of security measures, Authentication, Encryption, Firewall, MAC address filtering 	<ul style="list-style-type: none"> - Level of engagement with written and practical tasks set within lessons Actions taken by pupils in the light of verbal feedback. - Topic tests - Quality of homework tasks designed to check for understanding of topics covered. - Performance in Yr10 exam against good progress target. - Performance in Yr11 mock exam against good progress target. <p>Final assessment: Paper 2, 1hr 45 mins, 90 marks, 50% of GCSE</p>
<ul style="list-style-type: none"> • Cyber Security 			

Knowledge (Topics / contexts) Pupils will know	Skills acquired Pupils will be able to:	Concept Pupils will understand	Assessment
<ul style="list-style-type: none"> - the different cyber security threats - the different types of social engineering - the threats faced by malicious code - ways to detect and prevent cyber security threats 	<ul style="list-style-type: none"> - Discuss threats to programs and data from attack, damage or unauthorised access - Explain the following forms of social engineering, phishing, pharming, blagging, shouldering, and how they can be avoided - Describe the following forms of malware: computer virus, Trojan, spyware, adware - Explain what Password systems, Biometric measures, and CAPTCHA are. 	<ul style="list-style-type: none"> - cyber security threats can be from weak and default passwords or from misconfigured access rights - what penetration testing is and what it is used for - the term cyber security - Describe what social engineering is and how it can be protected against - what malware is and how it can be protected against 	<ul style="list-style-type: none"> - Level of engagement with written and practical tasks set within lessons - Actions taken by pupils in the light of verbal feedback. - Topic tests - Quality of homework tasks designed to check for understanding of topics covered. - Performance in Yr10 exam against good progress target. - Performance in Yr11 mock exam against good progress target. <p>Final assessment: Paper 2, 1hr 45 mins, 90 marks, 50% of GCSE</p>
<ul style="list-style-type: none"> • Impact of digital technology - The ethical, legal, cultural, environmental and privacy issues related to computer science technologies (mobile devices Cyber security, Cloud storage, Artificial intelligence, Computer-based implants) - The risks of digital technology on society 	<ul style="list-style-type: none"> - Discuss our total dependence on computers in the modern world - Discuss latest trends such as wearable technologies - Discuss issues around copyright of algorithms and theft of computer code 	<ul style="list-style-type: none"> - privacy issues associated with wearable technologies - the environmental impact of computer science - the laws regarding data protection, computer misuse and copyright 	<ul style="list-style-type: none"> - Level of engagement with written and practical tasks set within lessons - Actions taken by pupils in the light of verbal feedback. - Topic tests - Quality of homework tasks designed to check for understanding of topics covered. - Performance in Yr10 exam against good progress target. - Performance in Yr11 mock exam against good progress target. <p>Final assessment: Paper 2, 1hr 45 mins, 90 marks, 50% of GCSE</p>
<ul style="list-style-type: none"> • Relational databases and structured query language (SQL) 			

Knowledge (Topics / contexts) Pupils will know	Skills acquired Pupils will be able to:	Concept Pupils will understand	Assessment
<ul style="list-style-type: none"> - Difference between a database and a relational database - SQL is the language used in databases. 	<ul style="list-style-type: none"> - use SQL to retrieve data from a relational database, using the commands: SELECT, FROM, WHERE ORDER BY...ASC DESC - use SQL to insert data into a relational database using the commands. 	<ul style="list-style-type: none"> - These database concepts: table, record, field, primary key, foreign key. - that the use of a relational database facilitates the elimination of data inconsistency and data redundancy. 	<ul style="list-style-type: none"> - Level of engagement with written and practical tasks set within lessons - Actions taken by pupils in the light of verbal feedback. - Topic tests - Quality of homework tasks designed to check for understanding of topics covered. - Performance in Yr10 exam against good progress target. - Performance in Yr11 mock exam against good progress target. <p>Final assessment: Paper 2, 1hr 45 mins, 90 marks, 50% of GCSE</p>