



Willingdon

COMMUNITY SCHOOL

CURRICULUM BOOKLET

Computer Science and IT

Sept 2023

"It's about problem solving, not just computers"

"It's about problem solving, not just computers."

Our School Curriculum Intent

The curriculum at Willingdon Community School offers a broad, balanced, personalised and challenging educational experience, which builds on students' experiences in the primary phase of their education.

It aims to provide all students with the knowledge, understanding, skills and attitudes which are necessary if they are to become successful learners who enjoy learning, make progress and achieve the best they are capable of.



Subject Vision for Computer Science

Computer Science and IT are about problem solving, not just about computers. Our vision is to equip students with problem solving and computational thinking skills needed to thrive in the digital world. The art of coding is to inspire learners to create innovative and unique solutions rather than be a consumer of existing products.

Our GCSE in Computer Science is engaging and practical, encouraging creativity and problem solving. It encourages students to develop their understanding and application of the core concepts in computer science. Students also analyse problems in computational terms and devise creative solutions



Our BTEC DIT course is for learners interested in taking a hands-on course alongside their GCSEs that will offer them an insight into what it is like to work the Digital sector. Digital skills span all industries, and almost all jobs in the UK today require employees to have a good level of digital literacy, putting it increasingly on a par with English and maths skills.

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Key Concepts in IT & Computer Science

In both disciplines, our aim is to inspire students to become pioneers of technology and to gain a love of this subject. As technology pervades every aspect of our lives, students need to understand the wider picture and to relate their learning to the real world and possible career paths. Digital literacy and digital resilience are paramount developing skills that are in demand by every type of industry.



E-Safety is taught consistently at the start of each year: learning how to be safe, considerate and mindful of others’ actions on-line. In the e-safety unit, we teach students how to limit their exposure to, and minimise risk from, both viruses and unwanted content. Students are taught how their actions affect other people online and the future impact of your digital footprint.

The key computational thinking skills of decomposition and abstraction are emphasised through game design that focuses on problem-solving. Students explore different coding languages and formats, as well as how to plan algorithms using flowcharts. These skills develop coding skills as preparation for their GCSE. Along the way, they practice design, testing, and iteration, as they come to see that failure and debugging are an expected and valuable part of the programming process. Students are supported to become independent and resilient by learning from mistakes.

At KS3, students code games in Scratch and Python to learn the fundamental programming techniques, beginning with block-based coding and progressing to industry standard language Python. Computer hardware and software are introduced at KS3, to gain understanding of the main hardware features and how data is represented. This includes exploring the concept of binary and how it is used to represent text, image and sound.



Students will develop their ability to plan and produce interactive and engaging products within a variety of modern scenarios. They will link interactive and dynamic products using a variety of game design and App development skills. Students will learn how to use App development programs that utilize the same hardware inputs and outputs that we see in many modern smart devices, and they get to see how a rough prototype can lead to a finished product.

In order to best prepare them for the data driven, digital world, that we live in, students also develop skills in Excel and Google Sheets used for data interrogation and analysis.

Programme of Study Key KS3

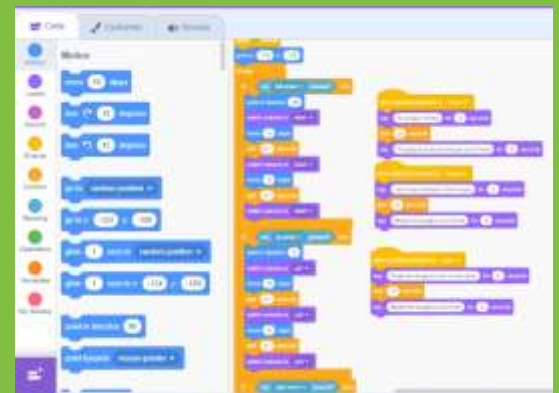
Y7 Outline of units

- E-safety Online Gaming
- I want to be a Games designer
- I want to be a Data Analyst
- I want to be a Programmer
- I want to be a Researcher - History and Pioneers in Computing



Y8 Outline of units

- I want to be a Cyber Security specialist - E-safety Digital footprint
- I want to be a Hardware Engineer
- I want to be a Graphic Designer
- I want to be an App Developer



Y9 Outline of units

- E-safety Cyber Security
- I want to be a Software Engineer - Python
- I want to be a cybersecurity engineer
- I want to be a Data analyst
- I want to be a network manager

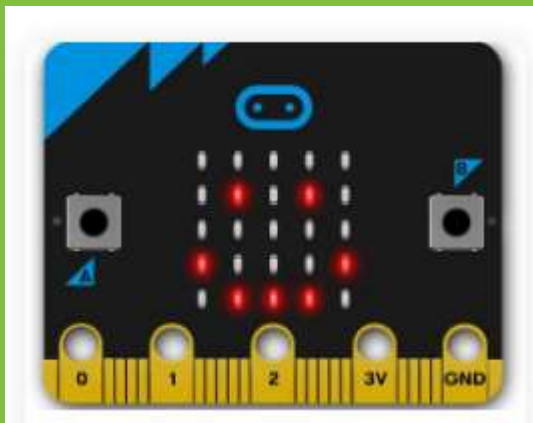
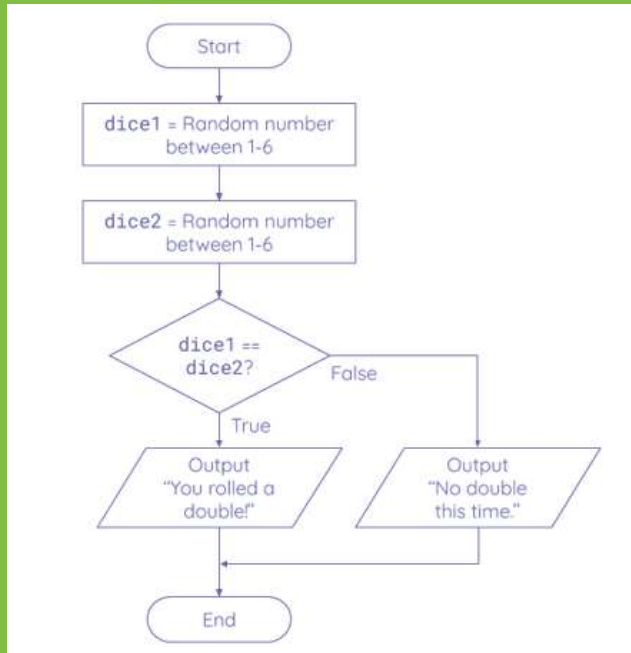


Flowchart symbols			
	Line		Input/Output
	Process		Decision
	Sub program		Terminal

```
print("What is your first initial?")
initial = input()
print("What is your surname")
surname = input()
print("What is your age?")
age = int(input())
print("True or False - you like marmite")
likes_marmite = input()
marmite = "True"
decades = float((age / 10))
print(f"We'll hello {initial} {surname}.")
print(f"It is {likes_marmite==marmite} that you like marmite.")
print(f"This is probably because you are {decades} decades old")
```

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Assessment Plan for Key Stage 3



Students receive live verbal feedback and marking to make improvements to their work based on the feedback given.

Towards the end of each project or unit, students receive feedback in one of three ways – either by using a given set of success criteria to self-evaluate or providing peer feedback to a classmate. In other units, students will receive teacher feedback on their task.

Each of these types of feedback will provide students with an improvement target alongside praise for work that shows achievement at their working level. Students are then expected to use these improvement targets as the starting point to make further improvements to their work. Students will also receive literacy feedback on their written work to ensure correct understanding of technical words.

Knowledge and understanding are tested in a variety of ways: using online tests, end of unit tests or by the quality of their solutions to the various tasks.

Before each project, students are provided with an exemplar and a set of success criteria are agreed so that students know what they are expected to include and the quality they are expected to meet.

Homework is set to reinforce learning or test specific vocabulary.

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Personal Skills in Computer Science



Team Work

Resilience



Creativity



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Specification Overview

GCSE Computer Science

Component 1: Computer Systems

Focuses on the components that make up digital systems, and how they communicate with one another and with other systems

It explores the impacts of digital technology to the individual and to wider society.

Substantive content (end points which children will learn):

- 1.1 Systems architecture
- 1.2 Memory and storage
- 1.3 Computer networks, connections and protocols
- 1.4 Network security
- 1.5 Systems software
- 1.6 Ethical, legal, cultural and environmental impacts of digital technology

Paper 1 is a 1 hour 30 minutes written paper worth 50% of the final mark.

Component 2: Computational thinking, algorithms and programming

Students will learn how to apply the fundamental principles and concepts of Computer Science, including abstraction, decomposition, logic, algorithms, and data representation.

Practical coding skills will be learnt through analysis of problems in computational terms including designing, writing and debugging their own programs.

Substantive content (end points which children will learn):

- 2.1 Algorithms
- 2.2 Programming fundamentals
- 2.3 Producing robust programs
- 2.4 Boolean logic
- 2.5 Programming languages and Integrated Development Environments

Paper 2 is a 1 hour 30 minutes written paper worth 50% of the final mark.

BTEC Digital Information Technology:

Unit 1. Exploring user interface design principles and project planning techniques

(Internally assessed and externally moderated)

Students will develop their understanding of what makes an effective user interface and how to effectively manage a project. They will use this understanding to plan, design and create a user interface.

Learning outcomes:

- A. Understand interface design for individuals and organisations
- B. Be able to use project planning techniques to plan, design and develop a user interface
- C. Be able to review a user interface.

Unit 2. Collecting, presenting and interpreting data

(Internally assessed and externally moderated)

Students will understand the characteristics of data and information and how they help organisations in decision making. They will use data manipulation methods to create a dashboard to present and draw conclusions from information.

Learning outcomes:

- A. Understand how data is collected and used by organisations and its impact on individuals
- B. Be able to create a dashboard using data manipulation tools
- C. Be able draw conclusions and review data presentation methods.

Unit 3. Effective digital working practices

(Externally assessed)

This external component builds on knowledge, understanding and skills acquired and developed across the qualification. It requires learners to select and integrate knowledge and understanding synoptically from all components. It is assessed through an external assessment that is set and marked by Pearson.

Questions will require learners to apply knowledge and understanding to the given scenarios or context.

An exam worth 60 marks will be completed under supervised conditions. The supervised assessment period is 1 hour and 30 minutes.

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How to help your child at home

Websites to study curriculum content:

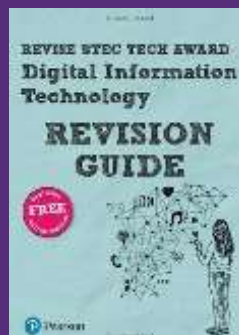
OCR Computer Science J277 Course

1. Theory based content for Component 1: Computer Systems
<https://isaacomputerscience.org/>
<https://www.knowitallninja.com/courses-overview/>
2. Code tutorials for learning to code python for Component 2: Programming
<https://www.codecademy.com/> (log in using your school google account)
3. Theory videos that are OCR endorsed:
<https://student.craigndave.org/gcse-ocr-j277-computer-science-videos>

BTEC Digital Information Technology

<https://www.knowitallninja.com/> (school subscription for resources)

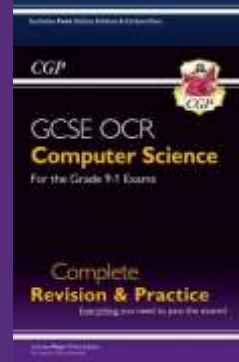
Recommended Course books Available on Parent Pay



Revision Guide for the Btec Tech Award Digital Information Technology Course



Python Programming Guide for GCSE Computer Science



GCSE Computer Science OCR Complete Revision & Practice

Enrichment:

Films

Imitation game - based on the 1983 biography Alan Turing: The Enigma by Andrew Hodges.



Books – Ready player one -by Ernest Cline, about a teenage that devotes his life to puzzles hidden within this world's digital confines, puzzles that promise massive power and fortune to whoever can unlock them.



Places to visit – Bletchley Park, visit the home of code breaking during WW2 and discover the fascinating stories that remained untold for fifty years, as they were covered by the official secrets act.



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Assessment Plan for Key Stage 4

Computer Science

Paper 1 – Computer Systems

Component 1 content will primarily be assessed in class through a combination of completing student workbooks and end of topic assessments. Students will complete end of term topic quizzes using OCR resources. Technical terminology and key word definitions will be regularly tested using online learning platforms like Quizlet live in class. Homework will comprise of flipped learning activities using online videos to explain key concepts that will be explained further in class. Exam questions will be used regularly to inform pupil progress.

Written paper: 1 hour and 30 minutes
50% of total GCSE
80 marks

Paper 2 Computational thinking, algorithms and programming

Programming skills will be taught through short challenges that will build understanding of algorithms and computational thinking. Students will use the PRIMM approach (Predict, Run, Investigate, Modify and Make) to build up programming skills. Technical terminology will be regularly tested using online platforms like Quizlet in class. Homework will comprise of completing assignments using online quiz platforms to remember topics better.

Mock Exams based on past papers for both Years 10 and 11 help prepare our students for the demands of the final exam.

Written paper: 1 hour and 30 minutes
50% of total GCSE
80 marks

BTEC Digital Information Technology

Unit 1

In this component, you will learn different project planning techniques that can be used to plan and deliver a project that meets a set of user requirements. You will learn the different design principles that can be used to design effective user interfaces and apply appropriate project planning techniques to create a user interface that meets user requirements.

Internal Assessment (PSA) with 4 tasks. 6 hours supervised sessions.
Externally moderated. 30% of Qualification weighting.

Unit 2

Students will understand the characteristics of data and information and how they help organisations in decision making. They will use data manipulation methods to create a dashboard to present and draw conclusions from information.

Internal Assessment (PSA) with 3 tasks. 7 hours supervised sessions.
Externally moderated. 30% of Qualification weighting.

Unit 3

Students will explore how organisations use digital systems and the wider implications associated with their use. Students will have 3 hours per week class time with weekly homework's to test and reinforce key vocabulary and understanding. Online learning platforms such as Know it all Ninja and Quizzes are used. Students use personal learning checklists to best prepare for end of unit tests. Furthermore, PPEs in both Years 10 and 11 help prepare our students for the demands of the final exam.

External written exam externally marked.
1 hour 30 minutes. 40% of Qualification

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Literacy in IT & Computing

Students are provided with a list of keywords for each topic and are given regular spelling and explanation tests to embed these words. Students are also taught how to find and fix errors in their programming, which requires learning a completely new syntax and logic.

Students are taught how to compose answers to longer questions which expect high levels of literacy.

Numeracy in IT and Computer Science

Students learn about number bases, specifically binary and hexadecimal. They learn how to manipulate numbers in these bases and how to convert between different number bases. Students learn to use mathematical operators and formulas in programming and data analysis, including some not covered in maths lessons and use logic gates to create solutions. Students also learn about unit sizes and perform calculations around file sizes and required storage amounts.

Raising aspirations in IT and Computer Science

Each unit at KS3 is designed to inform students about the technology jobs available and to develop the knowledge and skills required to pursue one of these jobs. The skills developed in Python coding are in high demand in many areas, such as software design, game design and computer control. While the photo and video editing skills open up the world of graphic design and the creative industry to students. Many of our students go on to be very successful at 6th form and university.

Broadening horizons in IT & Computing

Activities to try at home.

KS3 Students complete the Inspiring Digital Enterprise Award, known as iDEA. This is an international award-winning programme that helps you develop and demonstrate your digital, enterprise and employability skills for free. Students complete a record of achievement.

<https://code.org/athome> - Try an Hour of Code
Watch a short video series about the basics of CS
Take an introductory, self-paced course

<https://scratch.mit.edu/> – join the world's largest coding community by exploring and creating digital stories, games and animations.

<https://www.codecademy.com/learn> - Teach yourself python for free. Many different courses to choose from covering a wide range of job-ready skills and real-world projects.

<https://microbit.org/code/> - start programming and learn the features of a tiny computer.

The image shows a 'RECORD OF ACHIEVEMENT' certificate for the iDEA award. It includes fields for Name, Points (250), Award Level (Bronze), and Passed Date (05/07/2023). The certificate lists various Citizen Badges and Worker Badges with their respective topics and completion dates. The iDEA logo is prominently displayed in the center.

RECORD OF ACHIEVEMENT		
Name:	POINTS: 250	
AWARD LEVEL: BRONZE	PASSED: 05/07/2023	
CITIZEN BADGES		
Digital awareness, safety and ethics		
Brain Hack	Learning, Understanding	MAY 2023
Digital Ethics	Citizenship, Ethics, Safeguarding, Equality	JUL 2023
E-Safety & Online Etiquette	Safety, Reputation, Etiquette, Responsibility, Ethics, Problem Solving	MAY 2023
Fake News	Citizenship, Equality, Ethics, Etiquette, Cyber, Data, Information	MAY 2023
Farm Tech	Technology, Careers, SDGs, Digital Creativity, Farming, Sustainability	JUL 2023
GDPR	Citizenship, Compliance, Data Responsibility, Due Diligence, Governance	MAY 2023
Global Gosh	Citizenship, Innovation, Coding, Sustainability, Problem Solving, Amazing High Technology	JUL 2023
Safe Online	Safety, Reputation, Etiquette, Responsibility, Ethics	MAY 2023
Social Media Ethics	Ethics, Equality, Fake News, Social Media, Safeguarding	MAY 2023
Social Media Set-Up	Social Media, E-Learning, Communication, Marketing, Responsibility	MAY 2023
What is the Cloud?	Cloud Computing, Collaborating, Data	JUL 2023
WORKER BADGES		
Tools and techniques which are useful in the workplace		
Collaboration	Collaboration, Digital Careers, Sharing, E-commerce	JUN 2023
Digital Portfolios	E-Learning, Digital Careers, Planning	MAY 2023
Digital Research	Surfing, Data, Organisation	MAY 2023
Image Specialist	Design, Bridge	JUN 2023
Interviews	Interview Skills, Employability Skills, Raising Aspirations, Research, Listening, Career Development, Etiquette, Communication	JUN 2023

iDEA.org.uk Verification Code: RTUG8U9H96 Page 1


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Ambition



Alan Turing

"Sometimes it is the people no one can imagine anything of who do the things no one can imagine."



ALAN TURING

WJJO	BZIBU	HZQVQ	MPHCD	KUEAn	S
CVDW	BVLWA	WDDQJ	MOGZO	MQYLL	
SRGZ	BSQPU	ZGUWR	VJFVF	AMUC	
eXQG	NFSNG	UAWBM	RFAMV	DQW	
UYKD	ZFCF	TQRYE	LALRY	UAAQ	
wBGR	VLVCH	TKRVY	SPIT	ZGYT	
ALZT	KLHFI	YJLHJ	YJLHJ	YJLHJ	
FDCN	MNBDX	YJLHJ	KZGMH	RLQNK	
UMDM	RLXCB	BAYCV	RDDVZ	QVST	
TQTV	GTYRW	ODEYX	NPDRI	EDY	
JKRC	LOJAA	VBSAP	CUFTC	LU	
ALGR	KPPWS	JOQCK	RABC		
TCWB	IJKLM	NOPQR	S		
EFGH	YZABC	DEFG			
UVWX	MNOPQ	R			
IJKL					
TUVW	XYZ				



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