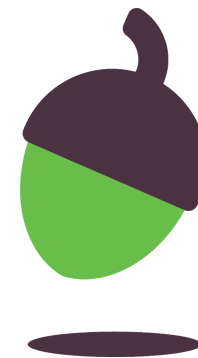


# Computing

Secondary: Key Stage 3, Key Stage 4

Curriculum plan 2020-21



**OAK**  
NATIONAL  
ACADEMY

# 1. Curriculum Principles

## Coherence and flexibility

The computing curriculum is structured in units. For the units to be coherent, the lessons within them must be taught in order. However, the curriculum is flexible in terms of the order in which you teach units within a year group, except for programming, where concepts and skills rely on prior knowledge and experiences.

## Knowledge organisation

The curriculum applies to the National Centre for Computing Education's computing taxonomy. This has been developed through a review of the KS1-4 computing programme of study, and the GCSE and A Level computer science specifications, across all awarding bodies. All learning outcomes can be described through a top-level taxonomy of ten topics, ordered alphabetically as follows:

- Algorithms
- Computer Networks
- Computer Systems
- Creating Media
- Data & Information



- Design & Development
- Effective use of tools
- Impact of technology
- Programming
- Safety & Security

The taxonomy categorises and organises content into strands which encapsulate the discipline. Whilst all strands are present at all phases, they are not always taught explicitly.

## **Inclusive and ambitious**

We want Oak to be able to support all children. Our units will be pitched so that pupils with different starting points can access them. Our lessons will be sequenced so that each builds on prior learning. Our activities will be scaffolded so all children can succeed. We use unplugged or real world activities to unpack difficult concepts in computing as part of a semantic wave of learning. We also use a range of scaffolding approaches when teaching programming, ranging from copying code, exploring some commands or functions, fixing code with bugs to solving specific problems with code.



## **Application through software**

We need pupils to be thinking during their lessons - both to engage with the subject and to strengthen memory of what is being learnt. Some of our lessons require practical application of concepts and skills on a computer using appropriate software. We supplement our lessons with guidance on how to use such software to reinforce the learning from the lesson.

## **Motivation through learning**

We believe that computing is inherently interesting, and seek to motivate pupils through the subject matter. Where possible, we draw on real world experiences to provide an engaging viewpoint on computing concepts. Every pupil should have the opportunity to implement their skills and knowledge and ultimately feel a sense of achievement. We provide opportunities for pupils to be creative and solve problems by building their own programmes and applications for example.



## 2. Subject structure overview

Key stage	Unit title	Length of unit
KS3	Collaborating Online Respectfully	6 lessons
KS3	Gain support for a cause	6 lessons
KS3	Networks: from semaphores to the Internet	6 lessons
KS3	Spreadsheets	6 lessons
KS3	Programming essentials in Scratch: part I	6 lessons
KS3	Programming essentials in Scratch: part II	6 lessons
KS3	Media: Design Vector Graphics	6 lessons
KS3	Computing systems	6 lessons
KS3	Networks 2	6 lessons
KS3	Representations: from clay to silicon	6 lessons
KS3	Mobile app development	6 lessons
KS3	Intro to Python programming	6 lessons
KS3	3D graphics, animation, video editing	6 lessons
KS3	Data Science	6 lessons
KS3	Cybersecurity	6 lessons



KS3	Representations: going audiovisual	6 lessons
KS3	Python programming with sequences of data	6 lessons
KS3	Physical Computing Programming	6 lessons
KS4	Data Representation	12 lessons
KS4	Computer Systems	13 lessons
KS4	Networks	8 lessons
KS4	Security	7 lessons
KS4	Impacts on society	8 lessons
KS4	Algorithms	12-14 lessons
KS4	Programming	50 lessons
KS4	Object-oriented programming	5 lessons
KS4	HTML	6 lessons
KS4	Databases and SQL	5 lessons
KS4	Online Safety	10 lessons
KS4	Project management	10 lessons
KS4	Spreadsheets	6 lessons
KS4	IT and the world of work	6 lessons
KS4	Media	6 lessons



## Key stage 3

Unit Name	Year	Algorithms	Programming	Data and Information	Computing Systems	Network	Creating Media	Design and Development	Effective use of tools	Impact of Technology	Safety and Security
Networks: from semaphores to the Internet	7				✓	✓				✓	✓
Spreadsheets	7		✓	✓					✓		
Programming essentials in Scratch: part I	7	✓	✓					✓			
Programming essentials in Scratch: part II	7	✓	✓					✓			
Impact of Technology - Collaborating Online Respectfully	7						✓	✓	✓	✓	✓
Gaining support for a cause	7						✓	✓	✓	✓	
Design Vector Graphics	8			✓			✓	✓	✓		
Computing systems	8		✓	✓	✓					✓	
Networks 2	8				✓	✓					
Intro to Python programming	8	✓	✓		✓						
Mobile app development	8	✓	✓					✓	✓	✓	
Representations: from clay to silicon	8			✓	✓						



Cybersecurity	9		✓	✓	✓	✓		✓	✓	✓	✓
Python programming with sequences of data	9	✓	✓					✓			
Representations: going audiovisual	9	✓		✓	✓		✓		✓	✓	
Data Science	9			✓			✓			✓	✓
Physical Computing Programming	9		✓	✓	✓						
3D graphics, animation, video editing	9		✓				✓	✓	✓		





## Key Stage 4

Unit Name	Course	Algorithms	Programming	Data and Information	Computing Systems	Network	Creating Media	Design and Development	Effective use of tools	Impact of Technology	Safety and Security
Data Representation	CS			✓							
Computer Systems	CS	✓	✓	✓	✓						
Networks	CS		✓			✓					
Security	CS										✓
Impacts on society	CS									✓	
Algorithms*	CS	✓	✓								
Programming*	CS	✓	✓					✓			
Object-oriented programming*	CS		✓					✓			
HTML*	CS		✓					✓			
Databases and SQL*	CS		✓	✓							
Online Safety**	Non-CS									✓	✓
Project management**	Non-CS						✓	✓	✓		
Spreadsheets**	Non-CS			✓					✓		
IT and the world of work**	Non-CS								✓	✓	✓
Media**	Non-CS						✓	✓	✓		



\*Under development and will be available from January 2021

\*\* All non-CS units are under development and will be available from November 2020



### 3. Suggested sequence

#### Key Stage 3

<b>Y7</b>	Impact of Technology - Collaborating Online Respectfully	Gaining support for a cause	Networks: from semaphores to the Internet	Spreadsheets	Programming essentials in Scratch: part I	Programming essentials in Scratch: part II
<b>Y8</b>	Design Vector Graphics	Computing systems	Networks 2	Representations: from clay to silicon	Mobile app development	Intro to Python programming
<b>Y9</b>	3D graphics, animation, video editing	Data Science	Cybersecurity	Representations: going audiovisual	Python programming with sequences of data	Physical Computing Programming



## GCSE

<b>GCSE Theory</b>	Data Representation	Computer Systems	Networks	Security	Impacts
<b>GCSE programming</b>	Algorithms	Programming	Databases & SQL	HTML (Optional unit)	Object Oriented Programming (Optional unit)

GCSE programming units are under development and will be available from January 2021.

## Non GCSE KS4

No suggested order for non GCSE KS4 units, they can be taught independently of each other.

Non GCSE units are under development and will be available from November 2020.



## 4. Unit specifics

### Key Stage 3

Year 7	Collaborating Online Respectfully	Media Unit: Gain support for a cause	Networks 1	Spreadsheets	Programming 1	Programming 2
	Lab introduction Responsible Use Cyberbullying Security Presentations	Word Processing Licensing Plagiarism Source Credibility Blog Creation	Networks Internet Web Cybersecurity Safety	Basic Formulas Basic Functions Formtating (incl. conditional)	Scratch PRIMM Form Assessment Misconceptions Reinforce Concepts	Scratch Lists Subroutines Deeper dive
Year 8	Media Unit	Computing Systems	Networks 2	Representations 1	Programming 3	Programming 4
	E.g. vector graphics (inkscape)	Programs Hardware components Logic Gentrle overview of AI and ML	Web HTML, CSS Search	Representations Binary Numbers Text Units	AppLab Pair Programming Product Design GUI Design	Intro to Python



<b>Year 9</b>	<b>Media Unit</b>	<b>Data Science</b>	<b>Cyber Security</b>	<b>Representations 2</b>	<b>Programming 5</b>	<b>Programming 6</b>
	E.g. animations (blender) E.g. video editing	Global and local data sets Interrogating, interpreting and visualising data following the investigative cycle	GDPR Social Engineering Network security Malware and hacking Brute Force, DDOS	Images Sounds Manipulation	Lists and strings in Python	Physical computing Python on the micro:bit Project design



## Key Stage 4

<b>Theory oriented</b>	<b>Data Representation</b>	<b>Computer Systems</b>	<b>Networks</b>	<b>Security</b>	<b>Impacts</b>
	Binary, Hex Conversions & Ops Text Images & Sound Data Capacity Compression	Components Architecture Storage Software Boolean logic	Components Classifications Protocols Layers	Vulnerabilities Forms of Attack Techniques for: Identification Protection	Ethical Legal Environmental (inc. privacy and cyber security)
<b>Algorithms Programming</b>	<b>Algorithms</b>	<b>Programming</b>	<b>Databases &amp; SQL</b>	<b>HTML</b>	<b>Object Oriented Programming</b>
	Tracing & Exec. Representation Searching Sorting Efficiency Comp. Thinking	Tracing & Exec. Prog. constructs Data types, structs Modularity Quality Translators	Relational databases SQL (Select, Insert, Update, Delete)	Images, links, CSS (DIVS, classes and box model)	Classes, Objects, Attributes, Methods, Encapsulation, Inheritance, Structured programming, Software design
	<b>Online Safety</b>	<b>Project Management</b>	<b>Spreadsheets</b>	<b>IT and the world of work</b>	<b>Media</b>

