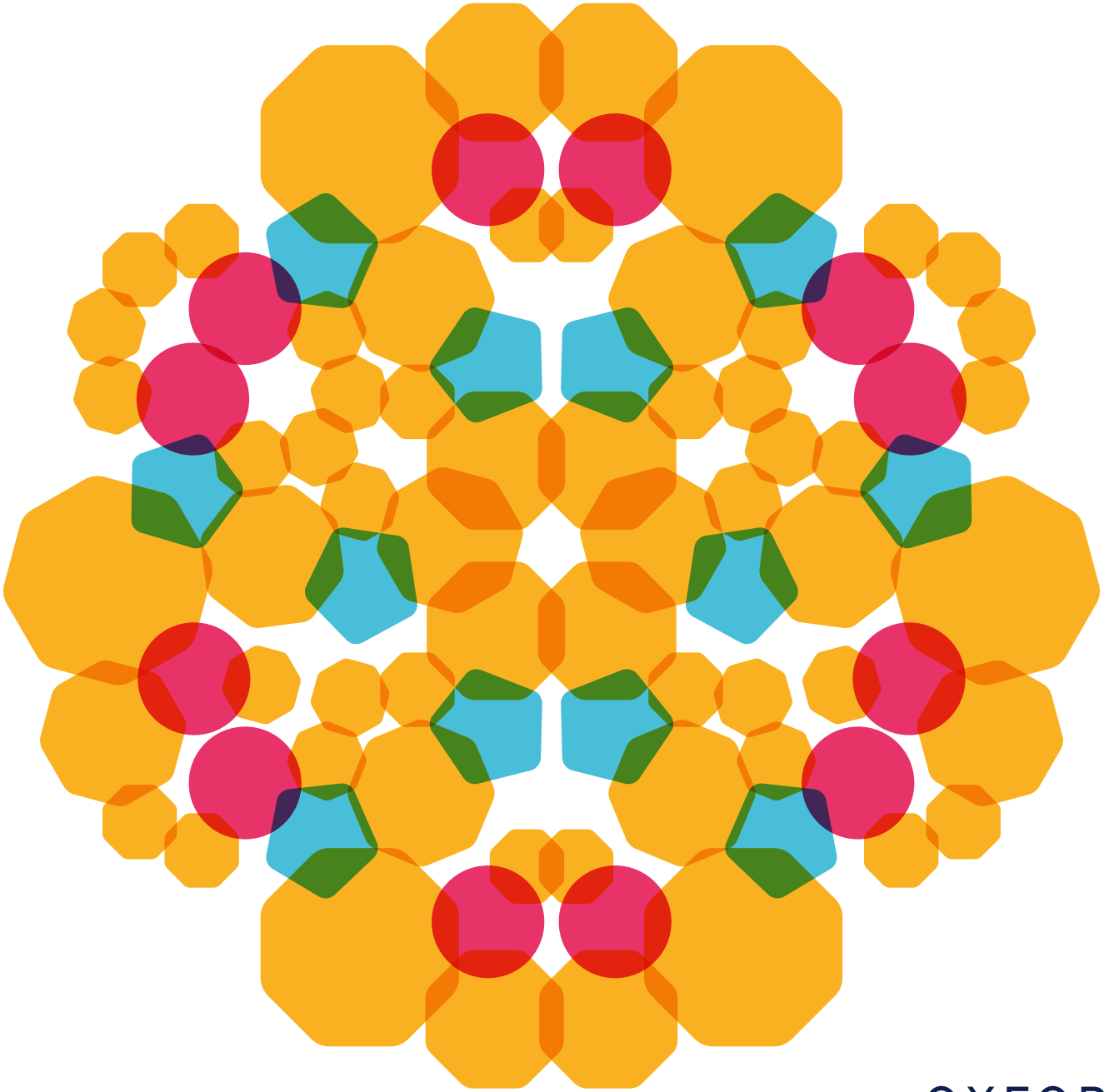
Oxford
International
Curriculum

Primary & Lower Secondary

Computing



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I see learners equipped with the skills they need in a rapidly evolving digital world

The joy of learning

Oxford University Press is a department of the university, publishing to further the university's objectives of excellence in scholarship, research, and education.

Nurturing creativity, inspiring curiosity, shaping the future

At Oxford University Press, we are committed to enriching the lives of learners across the world through education by developing the highest quality academic and educational resources and services. That's why we invest 100% of the money we make back into education and research.

As part of the University of Oxford, we combine a deep knowledge and understanding of pedagogy to provide quality resources that impact positively on learning. We are trusted by leaders and practitioners to raise levels of attainment all over the world – this is our passion and motivation.

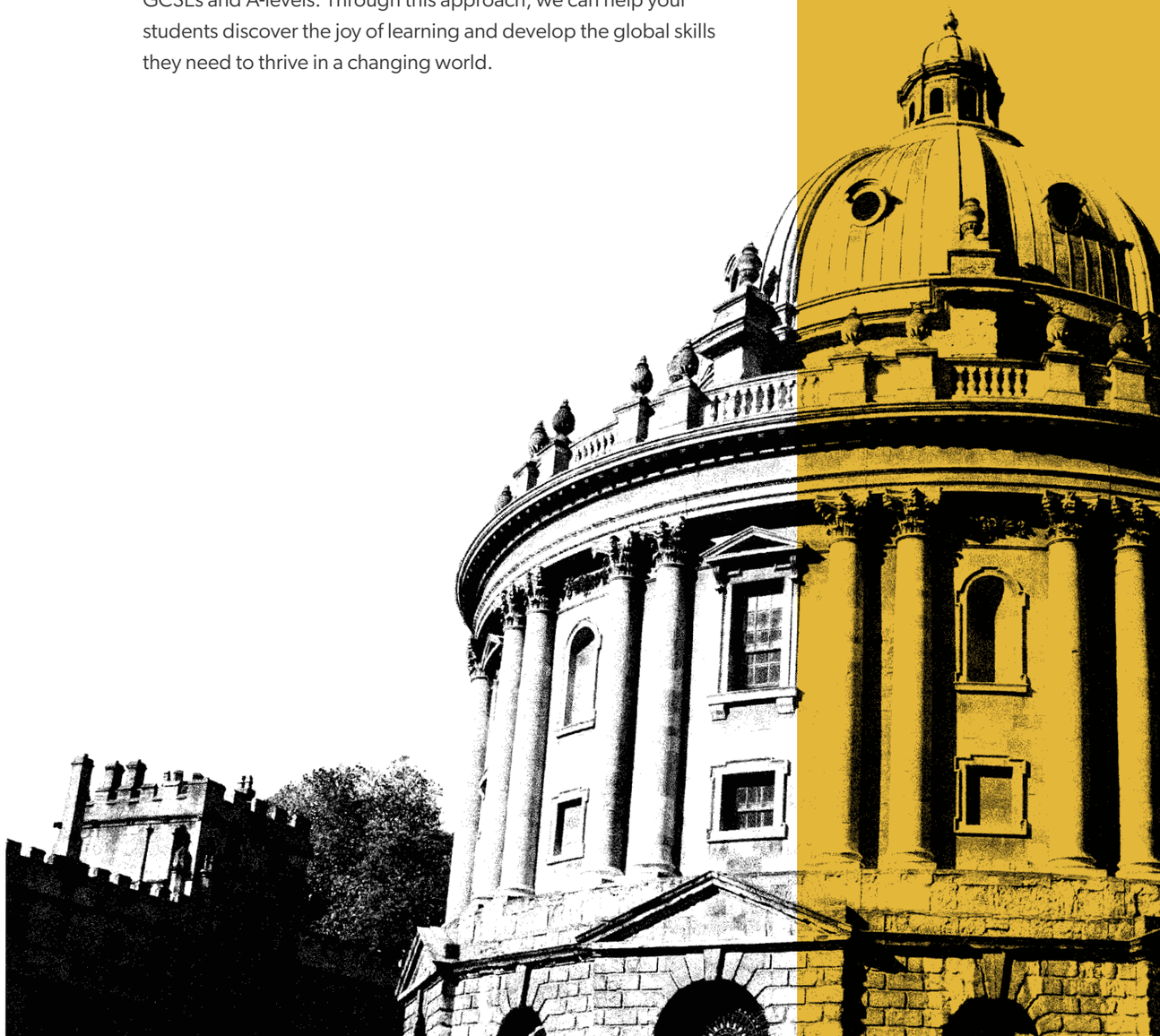
At Oxford University Press, we recognize that we are living in an ever-changing world, where the way we work, live, learn, communicate and relate to one another is constantly shifting. In this climate, we need to instil in our learners the skills to equip them for every eventuality so they are able to overcome challenges, adapt to change and have the best chance of success. To do this, we need to evolve beyond traditional teaching approaches and foster an environment where students can start to build lifelong learning skills for success. Students need to learn how to learn, how to problem solve, be agile and work flexibly. Going hand in hand with this is the development of self-awareness and mindfulness through the promotion of wellbeing to ensure students learn the socio-emotional skills to succeed.

What's more, a focus on cultivating a growth mindset, where students learn to thrive on challenge and see failure as a way to stretch themselves, will act as a foundation to improve their performance.

That's why we have developed the Oxford International Curriculum. The curriculum offers a new approach to teaching and learning focused on wellbeing, which places joy at the heart of the curriculum and develops the global skills your learners need for their future academic, personal and career success.

Through six subjects – English, Maths, Science, Computing, Wellbeing and Global Skills Projects – the Oxford International Curriculum offers your school a coherent and holistic approach to ensure continuity and progression across every student's educational journey, equipping them with the skills to shape their own future and progress seamlessly to studying for International GCSEs and A-levels. Through this approach, we can help your students discover the joy of learning and develop the global skills they need to thrive in a changing world.

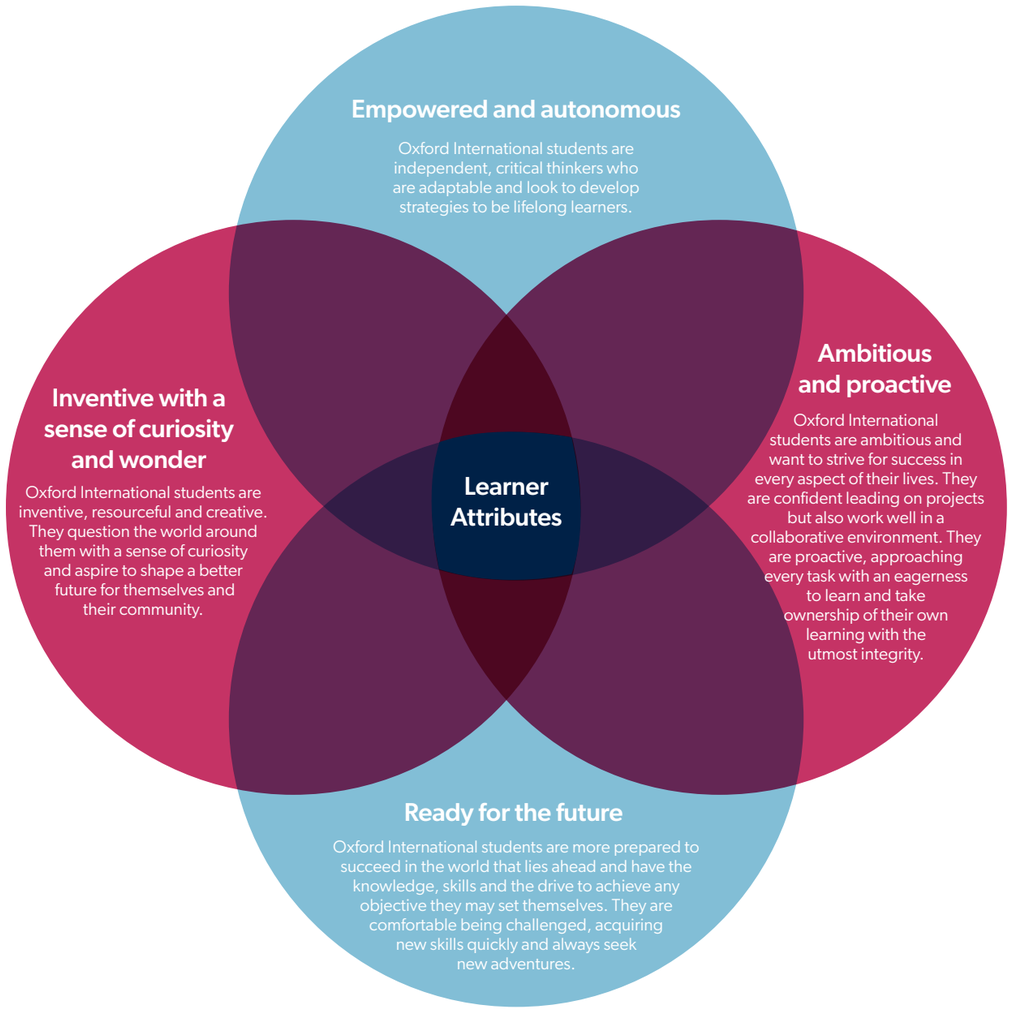
> **Thinking together so we can act together to make the futures we want.**
>
> UNESCO Futures of Education initiative



Challenge seekers, problem solvers, next leaders

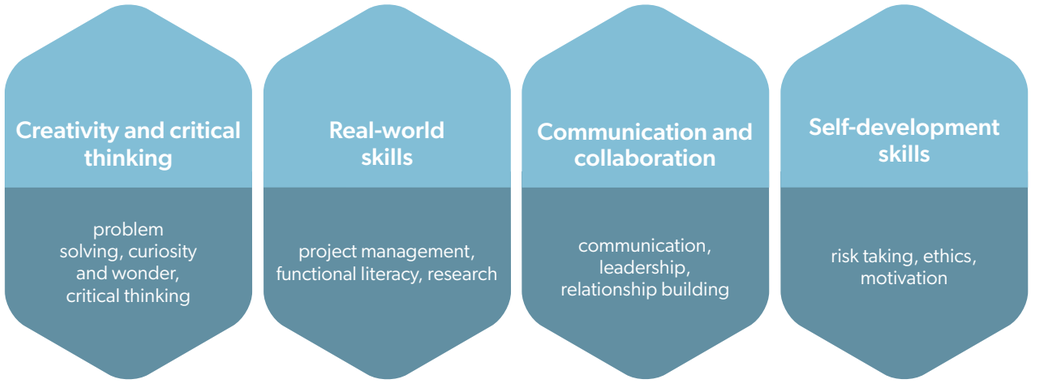
The Oxford International Curriculum aims to deliver the wellbeing and global skills that will be needed in future, to the learners of today, providing them with a firm foundation for future employment and participation in society.

The Oxford International Curriculum helps to develop:



A classroom culture that fosters lifelong learning and wellbeing

The Oxford International Curriculum enables students to succeed by recognizing that lasting success is contingent on both academic performance and emotional wellbeing. The curriculum aims to foster a classroom environment where students develop the skills for success:



The Oxford International Curriculum also promotes teachers' and learners' resilience, agency and self-regulation to cope in the world of tomorrow. This focus on wellbeing aims to promote good mental health to enhance students' lives inside and outside of the classroom. Key themes of wellbeing include:

The Oxford International Curriculum offers a practical, robust and effective continuous professional development programme specifically designed for international schools to support the implementation of its pedagogy.

By promoting wellbeing and developing global life-skills, the Oxford International Curriculum will prepare your students for success in an ever changing world, giving them the springboard to achieve academically and nurturing them to shape a better future.

Contents

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Preface

The Oxford International Curriculum for Computing is designed to prepare students for future employment and participation in the digital world, whether or not they are destined to become digital specialists. And it is a practical framework that will leave no one behind – no teacher and no learner.

The key features of Oxford International Curriculum for Computing are that it is:

- **Relevant:** The framework of skills and understanding is directly tailored to meet students' needs as future participants in work and society.
- **Realistic and deliverable:** Learning outcomes can be achieved with the resources that exist right now in schools throughout the world, by the educators who are already in place.
- **Flexible:** The curriculum is designed to be adaptable as technology changes and to be flexible between communities where different types of technology are in everyday use.
- **Transparent:** A key feature of this curriculum is clear communication: all teachers, working with any age group, will understand what they need to teach and what students need to learn.
- **Measurable:** The curriculum is linked to an assessment framework that will enable teachers to evaluate, measure and record individual students' progress.

Our approach to Computing

This curriculum is structured as a simple matrix with an associated assessment framework and supporting schemes of work and lesson plans.

The curriculum matrix has learning outcomes for every year from Year 1 (ages 5–6 years) to Year 9 (ages 13–14 years). The learning outcomes are organized into four themes:

- Programming and computational thinking
- Productivity and creativity
- The nature of technology
- Digital literacy

The assessment framework provides measurable and unambiguous criteria against each learning outcome. These criteria describe how teachers can confirm that learners have achieved the outcomes set out in the curriculum.

Curriculum at a glance (page 12)

The four strands

The four strands encompass the full spectrum of skills and understanding that young learners will need to develop to prepare them to use technology effectively and with understanding in later life.

1

Programming and computational thinking: Students will learn programming skills, using a professional text-based language. They will learn the computational skills that underpin the creative and conceptual basis of program development and artificial intelligence (AI).

2

Productivity and creativity: Students will learn to use software to analyze data and to create text and multimedia content. Students will not be tied to particular applications or types of software but will learn to use available and up-to-date technologies to fulfil tasks and meet the needs of particular audiences.

3

The nature of technology: Students will learn how technology works, the different types of technology that are available and the concepts that underpin future developments, including robotics and control systems. They will understand the advantages and limitations of technology and how it is used both in and out of work.

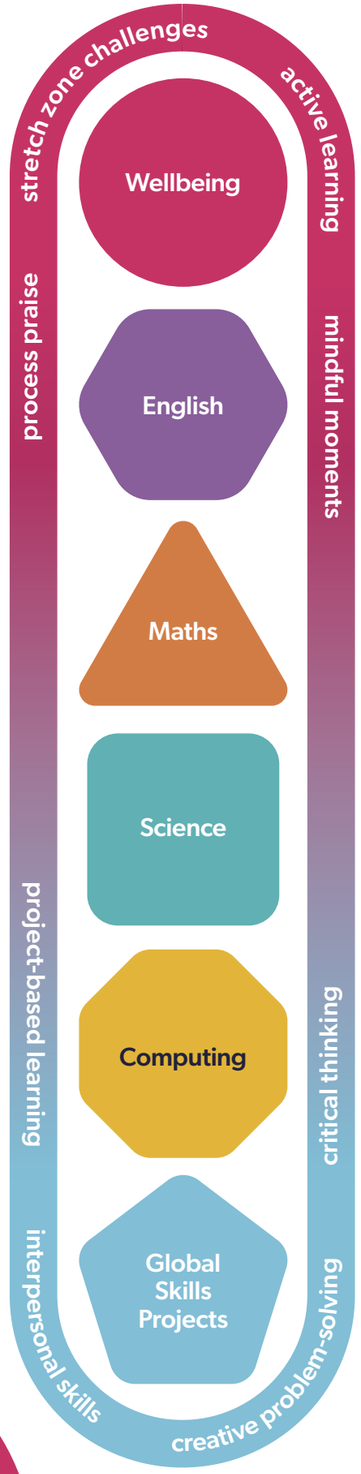
4

Digital literacy: Students will be prepared for participation in the online world. They will be able to interact respectfully and safely with other users and make use of a range of technologies that make up our online world.

How the curriculum works

Six subjects, one approach

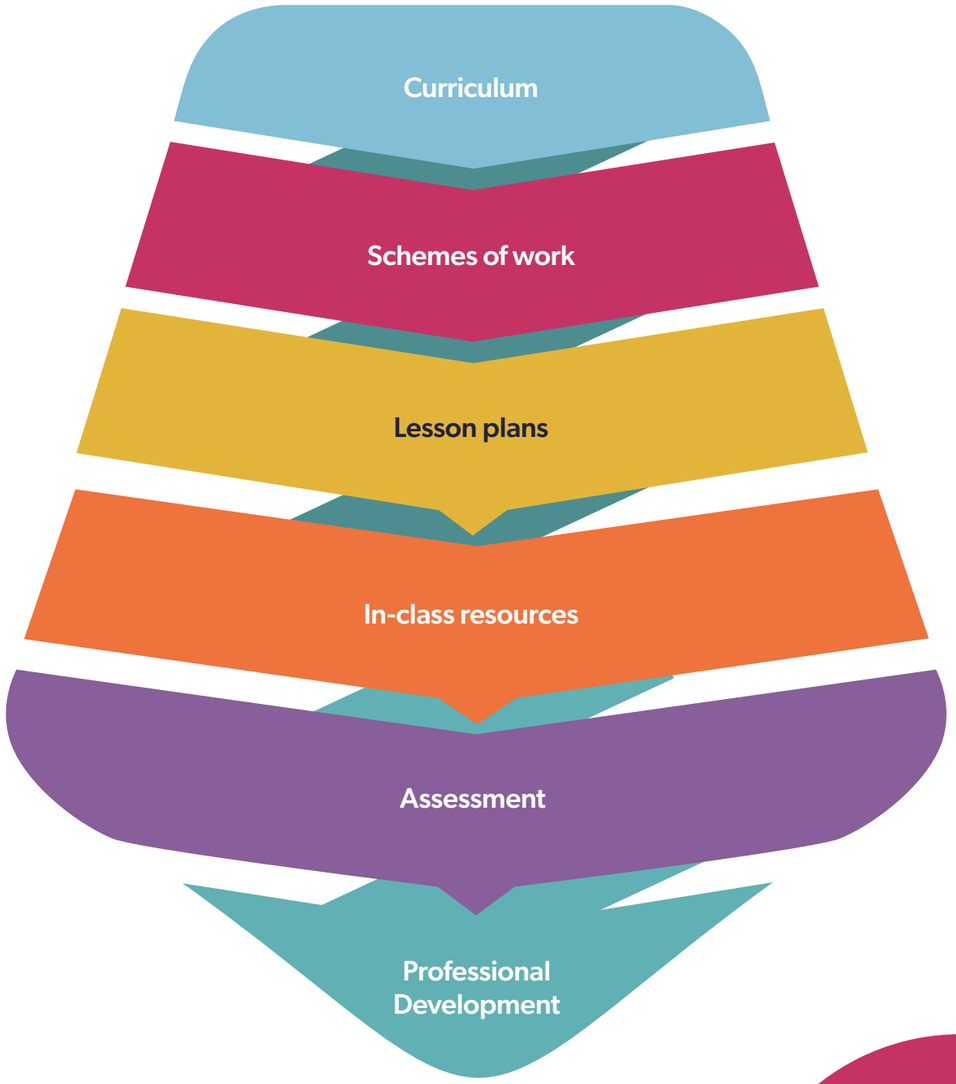
The Oxford International Curriculum spans six subjects, which all have the same approach to the joy of learning. Wellbeing and Global Skills Projects are at the heart of the four core subjects of English, Maths, Science and Computing, and the development of the Oxford International Curriculum for Computing has been guided by the wellbeing and global skills philosophy. Lesson plans highlight points at which the Global Skills Projects and Wellbeing curricula can be integrated into the teaching of core subjects. The curriculum takes a spiral approach, revisiting key topics to consolidate and support progression in learning.



Building the curriculum

The Oxford International Curriculum for Computing offers end-to-end teaching and learning support, and is composed of:

- Curriculum at a glance: a year-on-year progression of learning outcomes for every year group
- Schemes of work: overview and detailed schemes of work provide timetabling options by year group, and week-by-week teaching suggestions
- Lesson plans: provide a blueprint for each lesson, ensuring coverage of specific learning outcomes; the plans link to recommended resources and worksheets where relevant
- Assessment framework: assessment criteria linked to every learning outcome in the curriculum.

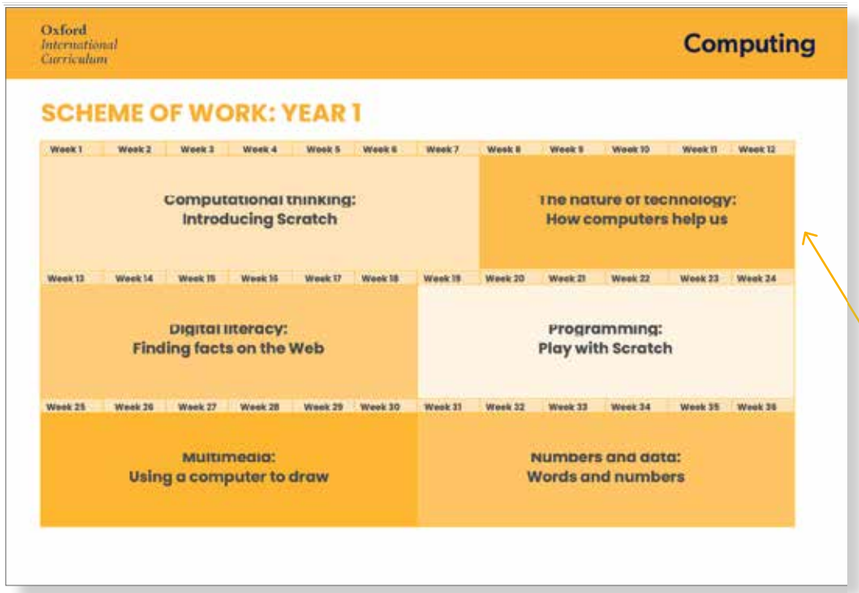


Curriculum at a glance

Strand	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
	Students can:	Students can:	Students can:	Students can:	Students can:	Students can:	Students can:	Students can:	Students can:
1 Programming and computational thinking	**1.1a:** Run and use a simple program made by somebody else **1.1b:** Describe a program by saying what its inputs and outputs are **1.1c:** Edit a program and say how that will change what it does	**2.1a:** Say what an algorithm is and what running a program means **2.1b:** Say what a program will do by looking at its commands **2.1c:** Create a simple program and remove errors so it runs	**3.1a:** Describe a simple plan for a program that changes inputs into outputs **3.1b:** Create a program that produces varied outputs in response to user inputs **3.1c:** Find and correct the errors in a program so it works the way you want	**4.1a:** Plan and create a program that uses a named variable **4.1b:** Plan and create a program that uses a conditional structure **4.1c:** Create a program to meet a given purpose **4.1d:** Make programs with different types of input and output	**5.1a:** Create and describe an algorithm that includes a loop **5.1b:** Create a program with a loop controlled by an exit condition **5.1c:** Adapt a program to meet a new requirement	**6.1a:** Make an algorithm to solve a problem using logical reasoning **6.1b:** Write a program that controls or simulates physical movement **6.1c:** Solve a problem by breaking it into smaller parts or modules	**7.1a:** Describe how program commands are stored and executed **7.1b:** Use more than one programming language **7.1c:** Write programs in a text-based language **7.1d:** Remove a range of errors to improve a program	**8.1a:** Write a program that processes a data structure (for example, a list) **8.1b:** Compare alternative algorithms to solve a problem (for example, searching) **8.1c:** Write a modular program that uses procedures or functions	**9.1a:** Design an abstract model based on a real-world system **9.1b:** Use a program to find solutions to a real-world problem **9.1c:** Describe some computational techniques that enable artificial intelligence (AI)
2 Productivity and creativity	**1.2a:** Make simple images using computer software **1.2b:** Enter words and numbers into the computer	**2.2a:** Make a document with words and pictures **2.2b:** Enter numbers into a computer and find the answer to a sum **2.2c:** Save your work as a file in storage	**3.2a:** Use software to improve the appearance of a document that includes text and images **3.2b:** Use software to enter number data and make calculations	**4.2a:** Use software to format a document and fix mistakes **4.2b:** Use software tools to process numerical data and see summary results, including a graph	**5.2a:** Make and share images to suit an audience and a purpose **5.2b:** Amend an image to increase its impact **5.2c:** Use a spreadsheet to answer questions by finding out what happens when numbers change	**6.2a:** Use technology to collect or record data **6.2b:** Use software to structure, sort and filter data **6.2c:** Work as a team using technology (for example, to give a group presentation)	**7.2a:** Create digital media **7.2b:** Improve digital media for an audience **7.2c:** Create a single-table data file **7.2d:** Check data input for accuracy	**8.2a:** Select and use suitable technology for a given purpose **8.2b:** Use technology creatively **8.2c:** Use technology to analyze data	**9.2a:** Use software to plan a project and track its progress **9.2b:** Create and combine multimedia content
3 The nature of technology	**1.3a:** Say what a computer is **1.3b:** Say some things that can be done with a computer in school and out of school	**2.3a:** Name the main parts of a typical computer and say what they are for **2.3b:** Say some things a computer can do and some things a computer cannot do	**3.3a:** Describe a range of familiar digital devices **3.3b:** Describe tasks where computers can be helpful	**4.3a:** Describe what storage is and why it is important **4.3b:** Identify a range of modern devices which contain computer processors (for example, embedded processors) **4.3c:** Describe how computers may be used in the world of work	**5.3a:** Explain that digital devices can be connected by communication links **5.3b:** Explain what the internet is and some internet services such as the World Wide Web **5.3c:** Describe some ways the internet helps us work together in the modern world	**6.3a:** Describe the technology of robotics and control systems **6.3b:** Discuss the potential and the limitations of robotics and control systems	**7.3a:** Describe how different types of data can be represented in binary digital form **7.3b:** Convert between decimal and binary integers **7.3c:** Perform simple binary additions	**8.3a:** Explain how computers communicate **8.3b:** Describe internet services (for example, cloud storage)	**9.3a:** Use or describe simple electronic logic gates (for example, AND, OR and NOT gates) **9.3b:** Outline the structure of a processor, its components and how they work together **9.3c:** Describe some technical innovations that enable modern robotics
4 Digital literacy	**1.4a:** Find something out using the computer **1.4b:** Be safe and polite in the computer room **1.4c:** Say who can help you if you are worried	**2.4a:** Download useful words or images **2.4b:** Use computers safely to help with learning **2.4c:** Keep personal information private	**3.4a:** Use technology to send and receive messages **3.4b:** Describe the parts of a message **3.4c:** Explain how to respond to an unsuitable communication	**4.4a:** Find information using a web search **4.4b:** Describe how to spot unsuitable internet content and behaviour **4.4c:** Describe several ways you can report your concerns	**5.4a:** Obtain information from online sources and describe the sources used **5.4b:** Choose information from online sources and give reasons for choices **5.4c:** Explain how online searches select and show useful information	**6.4a:** Create a simple web page with text and images **6.4b:** Review web content to check if appropriate, and amend if needed **6.4c:** Act responsibly and with respect for others when using the computer	**7.4a:** Use content from online sources responsibly **7.4b:** Explain risks associated with internet use **7.4c:** Discuss how data may be collected when working online	**8.4a:** Carry out an online research project **8.4b:** Explain how computers can help with learning and discovery	**9.4a:** Understand how to use social media safely, responsibly and with regard to others

Schemes of work

Schemes of work provide a clear structure for the delivery of the curriculum in each academic year, mapping out scope and sequence, and providing a teaching route which students can follow. They are available at both an overview (week-by-week) and detailed (lesson-by-lesson) level.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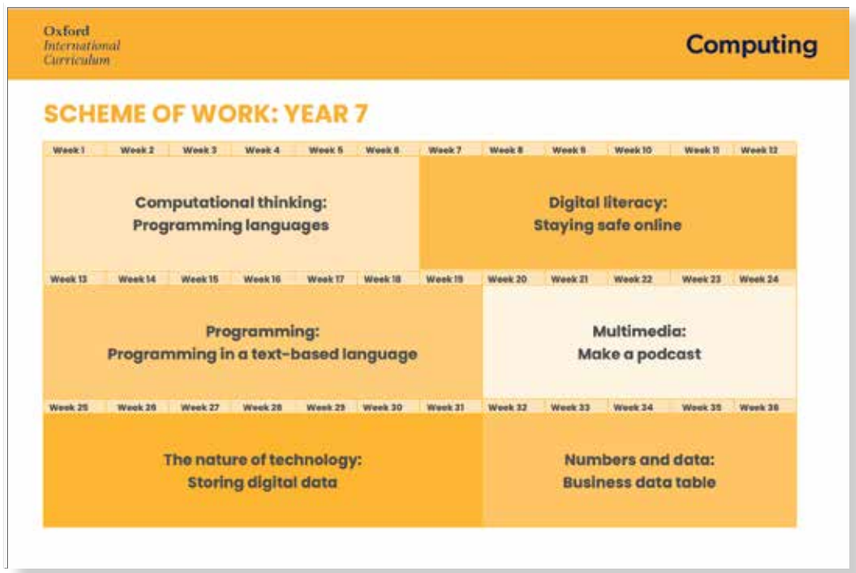
Computing

SCHEME OF WORK: YEAR 1

Weeks 1–12	Weeks 13–24	Weeks 25–36
Computational thinking: Introducing Scratch	The nature of technology: How computers help us	
	Digital literacy: Finding facts on the Web	Programming: Play with Scratch
	Multimedia: Using a computer to draw	Numbers and data: Words and numbers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Computing

SCHEME OF WORK: YEAR 7

Weeks 1–12	Weeks 13–24	Weeks 25–36
Computational thinking: Programming languages	Digital literacy: Staying safe online	
	Programming: Programming in a text-based language	Multimedia: Make a podcast
	The nature of technology: Storing digital data	Numbers and data: Business data table

Curriculum aligned
Every learning objective mapped on to a week-by-week, lesson-by-lesson teaching plan

Multiple views
Schemes of work provided at both weekly and lesson-by-lesson level, for ease of planning

Lesson plans
Lesson titles link in to individual lesson plans

Oxford International Curriculum

Computing

SCHEME OF WORK: YEAR 7

Week	Lesson title	Learning outcomes
	Computational thinking: Programming languages	
1	Calculations in Scratch	**7.1a**: Describe how program commands are stored and executed **7.1b**: Use more than one programming language
2	Starting Python – input and output	
3	Create a Python program file	
4	Calculations in Python	
5	Scratch versus Python	
6	Check what you know	
	Digital literacy: Staying safe online	
7	How data is collected online	**7.4a**: Use content from online sources responsibly **7.4b**: Explain risks associated with internet use **7.4c**: Discuss how data may be collected when working online
8	Online security risks	
9	Protecting your computer online	
10	Protect yourself from cyberbullying	
11	Use online content responsibly	
12	Check what you know	
	Programming: Programming in a text-based language	
13	Using selection in a program	**7.1c**: Write programs in a text-based language **7.1d**: Remove a range of errors to improve a program
14	Using a counter loop in a program	
15	Using a conditional loop in a program	
16	Programming to solve a problem	
17	Adapting a program	
18	Programs that are easy to use	
19	Check what you know	
	Multimedia: Make a podcast	
20	Outline and script a podcast	**7.2a**: Create digital media **7.2b**: Improve digital media for an audience
21	Recording digital audio files	
22	Mixing digital audio files	
23	Publish and review a podcast	
24	Check what you know	
	The nature of technology: Storing digital data	
25	What is digital data?	**7.3a**: Describe how different types of data can be represented in binary digital form **7.3b**: Convert between decimal and binary integers **7.3c**: Perform simple binary additions
26	How to read a binary number	
27	Binary addition	
28	Converting decimal to binary	
29	How text and numbers are stored	
30	How images and sound are stored	
31	Check what you know	
	Numbers and data: Business data table	
32	Select and collect business data	**7.2c**: Create a single-table data file **7.2d**: Check data input for accuracy
33	Design a data table	
34	Using data types and formats	
35	Data validation	
36	Check what you know	

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Lesson plans

Oxford International Curriculum — Computing

Year 1 The nature of technology: How computers help us
Week 8: Working safely
Learning outcome: 1.4b

Context

- In this lesson, children focus on one of the most important aspects of computer use – staying safe in the computer room. They learn that the safety of people is the most important issue, but it is also important to look after computer equipment.
- This lesson should take around 45 minutes to an hour, although the timing is flexible to suit different timetables.

Materials

Resources: drawing and writing materials; large pieces of paper
Optional: drawings/photos of safe and unsafe ways to work in the computer room

Suggested series
Oxford International Primary Computing Student Book 1
pp.8–9
1.2 'Staying safe'

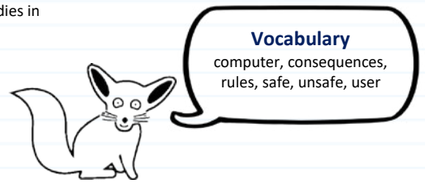
Lesson summary

In this lesson, children make posters to show how to use a computer safely.

Joy of Learning

GSP Global Skills Projects
- **1.1b:** Ask questions about causes and consequences

WB Wellbeing
- **1.1c:** Move their bodies in different ways



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Curriculum aligned
Every lesson highlights the learning outcomes it covers, linking back to the curriculum-at-a-glance document

Flexible
Indicative timings are given, but additional activities allow for customization, and differentiation suggestions are provided

Step-by-step guidance
Guidance structured to navigate through the delivery of the lesson

Joy of Learning
Opportunities to link to the Global Skills Projects and Wellbeing curricula are highlighted

Oxford International Curriculum — Computing

Preparation

- Does your school have a list of rules for children about how to work safely in the computer room? If so, make sure you are familiar with it. Use this lesson as an opportunity to reinforce the behaviour policies that apply in your school.
- Think about the safety rules that you are going to focus on in this lesson, for example why children shouldn't disconnect cables, arguing over shared equipment, trying to lift or move equipment, drinking/eating while using a computer.
- Consider how you can present these safety rules in a way that is easy for the youngest children to understand and follow. For example, you could show images of safe and unsafe ways to work with a computer.

Introductory activity

Teacher-led:

- Explain that we need to use the computer in a way that is safe for everyone and does not break the computer equipment.
- GSP Tell the children the classroom rules about working safely with a computer. Explain the reasons for the rules. Ask children to reflect on possible consequences of not following each rule.

Main activity

Student activity:

- GSP Ask children to work on their own or in pairs to create a poster that shows what they should and should not do when they are working with computers.
- Make a classroom display with the posters that the children have made.

Assessment and differentiation

- While the children are working on their posters, circulate and check understanding about the consequences of not working safely with computers.
- If children need support in this lesson, show them drawings or photos that show safe and unsafe ways of working with the computer. Ask them to sort them into two groups – good or bad.
- Or show children a series of photos that represent rules and ask them to rank the photos in order of importance.

Variety, enrichment, and extension

- WB Invite children to do a miming activity. Each child sits on a chair, with plenty of space around them. Ask them to mime sitting sensibly at a computer. Then ask them to mime something they should not do (such as eating, facing the wrong way, banging on the keyboard).
- WB Using the keyboard or looking at a screen for long periods can lead to eye or wrist strain. Introduce children to some stretching and loosening exercises to ease stress.
- Encourage children with good writing skills to label their posters with key words about safety.

Learning review

- Children drew posters to learn how to work safely in the computer room.

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Assessment information

Our assessment framework provides a structured way for teachers and students to measure their progress against the learning outcomes, through projects, observations, written work and group work. Year-end tests serve to help teachers assess the student's achievement over the course of any full year of study.

Formative assessment: Assessment for learning is signposted within lesson plans, and teachers are provided with the tools to deliver ongoing, flexible formative assessment through quizzes and question items that can be customized by both level and topic.

Summative assessment: Achievement tests at the end of Year 6, 7, 8, 9.

We envisage that progress will be assessed using a range of tools and settings, including group projects, observations and activities. Learning may be integrated with other subject areas, including the Global Skills Projects and Wellbeing curricula.

The spiral model

The underlying structure of the curriculum has a spiral development model. This means that each learning theme is analyzed into skills areas. These are revisited each year at higher levels of complexity and depth.

The spiral development model reinforces learning and builds on previous achievement. It makes it easier for students to develop and gives coherence and structure to the learning journey.

Preparation for external exams

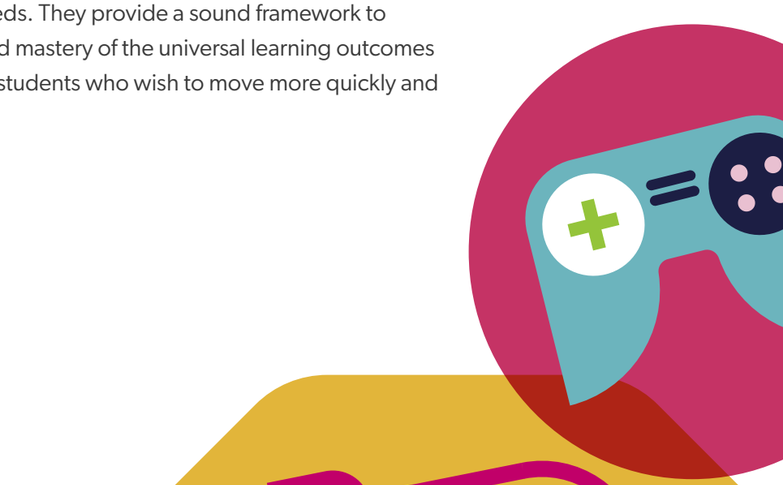
At the end of the Lower Secondary stage, students will choose their subjects for external or public examination, for example, the International GCSE Computer Science. Students who wish to study for computer science qualifications will be well prepared. The Oxford International Curriculum for Computing is aligned to the requirements of the computer science examination syllabus. During Lower Secondary study, students will be introduced to topics – such as binary maths, programming, data structures and Boolean logic – which are central to the exam syllabus. However, those students who wish to specialize in other areas will complete Lower Secondary computing with a good general grounding in the computing skills that they will need to support other subject areas and future employment.

Computing assessment framework

Students can be assessed at one of three levels:

- **Developing:** The student has made some progress but has not yet achieved the specified learning outcome.
- **Secure:** The student has fully achieved the learning outcome.
- **Extending:** The student has exceeded the learning outcome and achieved additional skills or deeper understanding beyond those specified.

These criteria allow the teacher to acknowledge the achievement of all students including those with additional learning needs. They provide a sound framework to confirm that the class as a whole has reached mastery of the universal learning outcomes and a route to exceptional achievement for students who wish to move more quickly and extend their skills and understanding.



YEAR **ONE**

Introduction

The Year 1 syllabus is designed to introduce the early skills and understanding that will support further learning over the years to come.

Learning outcomes can be delivered in any order and integrated with play and the development of reading and number skills. Students will get used to sitting at the computer and using simple tools such as the mouse and keyboard. They will learn to work safely and sensibly.

Learning outcomes

These learning outcomes set out a programme of study in computing for Year 1.
During the year, every student will:

- **1.1a:** Run and use a simple program made by somebody else
- **1.1b:** Describe a program by saying what its inputs and outputs are
- **1.1c:** Edit a program and say how that will change what it does
- **1.2a:** Make simple images using computer software
- **1.2b:** Enter words and numbers into the computer
- **1.3a:** Say what a computer is
- **1.3b:** Say some things that can be done with a computer in school and out of school
- **1.4a:** Find something out using the computer
- **1.4b:** Be safe and polite in the computer room
- **1.4c:** Say who can help them if they are worried

Assessment criteria

The assessment criteria allow the teacher to assess the level of achievement of each student.

1.1a: *Run and use a simple program made by somebody else*

Developing:	The student sits quietly and safely at the computer. The student uses input and output devices.
Secure:	The student runs a program. The student provides inputs and observes outputs.
Extending:	The student controls a program, working independently.

1.1b: *Describe a program by saying what its inputs and outputs are*

Developing:	The student talks about what they did when they ran the program.
Secure:	The student says what they did and what the program did in response.
Extending:	The student describes how to control a program and how to choose what the program does.

1.1c: *Edit a program and say how that will change what it does*

Developing:	The student has made changes to a program.
Secure:	The student has made changes and the edited program runs. The student can explain the changes made.
Extending:	The student changes the program to meet a given requirement.

1.2a: *Make simple images using computer software*

Developing:	The student makes lines or shapes.
Secure:	The student makes simple images out of lines or shapes.
Extending:	The student makes simple changes to images (for example, adding new colours).

1.2b: *Enter words and numbers into the computer*

Developing:	The student uses the keyboard and mouse.
Secure:	The student types words and numbers into a file.
Extending:	The student makes changes to words and numbers in a file.

1.3a: *Say what a computer is*

Developing:	The student can use the computer for simple tasks.
Secure:	The student shows they know what a computer is and can name it correctly.
Extending:	The student can draw a simple sketch of a computer and write in labels to indicate devices such as screen and keyboard.

1.3b: *Say some things that can be done with a computer in school and out of school*

Developing:	The student can say some things they have done at school using the computer.
Secure:	The student can say some things that are done outside of school using a computer.
Extending:	The student can explain how using a computer can make tasks easier, and why people might decide to use a computer.

1.4a: *Find something out using the computer*

Developing:	The student looks at images and/or text on the screen with attention.
Secure:	The student can express what they found out from the computer.
Extending:	The student selects and evaluates content to pick the best or most useful examples.

1.4b: *Be safe and polite in the computer room*

Developing:	The student attempts to work with care but may need to develop further.
Secure:	The student uses equipment with care. The student works sensibly and safely with others.
Extending:	The student helps keep the classroom safe by being an example of good behaviour and/or helping others.

1.4c: *Say who can help them if they are worried*

Developing: The student confirms or agrees that they will tell a suitable adult such as a teacher if they see something that worries or upsets them when using the computer.

Secure: The student can identify a suitable adult and say that they will tell the adult if they see something that worries or upsets them.

Extending: The student helps to create a communication about staying safe online, such as a poster or a play.

YEAR **TWO**

Introduction

In Year 2, students continue to develop their skills and understanding so they can approach computing in later years with confidence and interest.

Learning outcomes can be delivered in any order and integrated with play and other learning activities in the classroom. Students will learn to name the parts of a computer and use a computer to make documents and run programs. Students will develop their computing skills alongside maturing literacy and numeracy.

Learning outcomes

These learning outcomes set out a programme of study in computing for Year 2.

During the year, every student will:

- **2.1a:** Say what an algorithm is and what running a program means
- **2.1b:** Say what a program will do by looking at its commands
- **2.1c:** Create a simple program and remove errors so it runs
- **2.2a:** Make a document with words and pictures
- **2.2b:** Enter numbers into a computer and find the answer to a sum
- **2.2c:** Save their work as a file in storage
- **2.3a:** Name the main parts of a typical computer and say what they are for
- **2.3b:** Say some things a computer can do and some things a computer cannot do
- **2.4a:** Download useful words or images
- **2.4b:** Use computers safely to help with learning
- **2.4c:** Keep personal information private

Assessment criteria

The assessment criteria allow the teacher to assess the level of achievement of each student.

2.1a: *Say what an algorithm is and what running a program means*

Developing: The student says that running a program means making the computer carry out the commands in the program.

Secure: The student also explains that an algorithm is a plan setting out actions to solve a problem or complete a task.
The student explains that an algorithm can be turned into a program.

Extending: The student creates a simple algorithm that can be turned into a program.

2.1b: *Say what a program will do by looking at its commands*

Developing: The student gives some description of what a program does, perhaps after running the program.

Secure: The student can point to or describe the sequence of commands of a program.
The student can describe what the program will do, before running it.

Extending: The student can amend a program to make it do something different.

2.1c: *Create a simple program and remove errors so it runs*

Developing: The student assembles some or all of the parts of a program.

Secure: The student makes a program and the program runs.
The student removes errors from a program they have written or someone elsehas written.

Extending: The student makes a program that matches an algorithm.

2.2a: *Make a document with words and pictures*

Developing: The student uses a keyboard to type words.

Secure: The student enters text accurately into a document.
The student inserts an image into a document.

Extending: The student fixes errors in a document or makes edits to improve it.

2.2b: *Enter numbers into a computer and find the answer to a sum*

Developing: The student enters some number values into a spreadsheet.

Secure: The student enters some numbers into the correct places in a spreadsheet.
The student reports or identifies the result of a calculation from these numbers.

Extending: The student changes the numbers in a spreadsheet and explains how this changes the outputs.

2.2c: *Save their work as a file in storage*

Developing: The student saves work using the default file name.

Secure: The student saves a file using a suitable file name.

Extending: The student opens a file they made, makes changes and saves it again.

2.3a: *Name the main parts of a typical computer and say what they are for*

Developing: The student names or draws peripherals such as keyboard, mouse or screen (or equivalent parts of a device such as a tablet).

Secure: The student describes computer devices or parts and explains how they are used.
The student explains the difference between input and output devices or parts.

Extending: The student compares the way we use devices or parts (for example, comparing a keyboard with a 'touchscreen').

2.3b: *Say some things a computer can do and some things a computer cannot do*

Developing: The student says some things a computer can do.

Secure: The student expresses a range of things a computer can and cannot do.

Extending: The student evaluates whether a computer will help with different tasks.
The student expresses ways in which computers might be used in future.

2.4a: *Download useful words or images*

Developing: The student looks with attention at remote content such as a web page.

Secure: The student obtains or reads information from a web page by downloading content.

Extending: The student selects information or content from a web page, making good choices with reference to a requirement.

2.4b: *Use computers safely to help with learning*

Developing: The student works with care for the physical safety of self and others.

Secure: The student uses resources for appropriate learning activities.

Extending: The student explains how to use computers safely to help with learning.

2.4c: *Keep personal information private*

Note: Personal information is often collected when we work online. Sometimes this is for good reason, for example when we fill in a form or give bank details to an e-commerce site. Older learners will develop a nuanced understanding of when information can be legitimately asked for and provided. However, as these youngest students venture online they should learn not to share personal data unless they have discussed it with a responsible adult (reinforcing this message from Year 1). This is an appropriate working approach at this age.

Developing: The student agrees to keep their name and address private when working online, and acts accordingly.

Secure: The student identifies personal information and keeps it safe when working online.

Extending: The student explains that personal information should be kept private when working online.

YEAR **THREE**

Introduction

In Year 3, students can draw on developing literacy and numeracy skills to support their use of computers, so they can make more progress and take on bigger challenges.

Learning outcomes can be delivered in any order. Typically, one well-developed computing activity could provide evidence to confirm achievement against multiple outcomes. Students will learn to use computers to find and correct errors, to send and receive messages and to carry out calculations.

Learning outcomes

These learning outcomes set out a programme of study in computing for Year 3.
During the year, every student will:

3.1a: Describe a simple plan for a program that changes inputs into outputs

3.1b: Create a program that produces varied outputs in response to user inputs

3.1c: Find and correct the errors in a program so it works the way they want

3.2a: Use software to improve the appearance of a document that includes text and images

3.2b: Use software to enter number data and make calculations

3.3a: Describe a range of familiar digital devices

3.3b: Describe tasks where computers can be helpful

3.4a: Use technology to send and receive messages

3.4b: Describe the parts of a message

3.4c: Explain how to respond to an unsuitable communication

Assessment criteria

The assessment criteria allow the teacher to assess the level of achievement of each student.

3.1a: *Describe a simple plan for a program that changes inputs into outputs*

Developing: The student writes a description of what they want a program to do.

Secure: The student makes a written plan of three or four short steps in a correct sequence.
The student makes a plan that includes inputs and outputs.

Extending: The student plans a program with several different inputs.

3.1b: *Create a program that produces varied outputs in response to user inputs*

Developing: The student assembles some program components in sequence.

Secure: The student makes a simple working program with inputs and outputs.

Extending: The student makes several versions of a program that work in different ways.

3.1c: *Find and correct the errors in a program so it works the way they want*

Developing: The student finds and removes at least one error from a program.

Secure: The student removes all errors from a program, which then works correctly.

Extending: The student describes how they found and fixed errors in a program.

3.2a: *Use software to improve the appearance of a document that includes text and images*

Developing: The student enters text into software such as a word-processing application.

Secure: The student uses software tools to format, reorganize and correct a document.

Extending: The student produces several versions of a document by varying formatting features.

3.2b: *Use software to enter number data and make calculations*

Developing: The student enters number values into a software application such as a spreadsheet.

Secure: The student enters formulas to produce a calculated result.

Extending: The student explains or shows the meaning of calculated results.

3.3a: *Describe a range of familiar digital devices*

Developing: The student names or indicates some digital devices such as tablets, smartphones and laptops.

Secure: The student describes the features and uses of familiar digital devices.

Extending: The student evaluates and compares familiar digital devices (for example, for usability or portability).

3.3b: *Describe tasks where computers can be helpful*

Developing: The student identifies at least one task where the computer has helped.

Secure: The student describes a range of tasks where computers can help.

Extending: The student explains the types of task where a computer may be helpful or less helpful.

3.4a: *Use technology to send and receive messages*

Developing: The student receives and reads an email or similar message.

Secure: The student receives, replies to and forwards an email or similar message. The student composes and sends a new email or similar message.

Extending: The student sends an email or similar message with additional material such as a file attachment or an embedded image.

3.4b: *Describe the parts of a message*

Developing: The student reads an email and can say what it is about.

Secure: The student identifies the subject, the sender, the date and the body text of an email (or similar parts of an electronic message of another kind).

Extending: The student recognizes, saves and reuses contact details.

3.4c: *Explain how to respond to an unsuitable communication*

Developing: The student uses email responsibly in class.

Secure: The student explains how to respond to an unsuitable email message – principally to mention it to a responsible adult, to ignore it without response and not to open any attachments.

Extending: The student discusses some of the risks associated with email, such as computer viruses.

YEAR **FOUR**

Introduction

In Year 4, the learning outcomes are more challenging than in previous years, to reflect the development of students' computing knowledge and skills.

Learning outcomes may be delivered in any order. Learning could be integrated with work in other subject areas. Students will use computers to do internet research, to process number data and to format documents. They will plan and create programs with variables and conditional structures.

Learning outcomes

These learning outcomes set out a programme of study in computing for Year 4.
During the year, every student will:

4.1a: Plan and create a program that uses a named variable

4.1b: Plan and create a program that uses a conditional structure

4.1c: Create a program to meet a given purpose

4.1d: Make programs with different types of input and output

4.2a: Use software to format a document and fix mistakes

4.2b: Use software tools to process numerical data and see summary results, including a graph

4.3a: Describe what storage is and why it is important

4.3b: Identify a range of modern devices which contain computer processors (for example, embedded processors)

4.3c: Describe how computers may be used in the world of work

4.4a: Find information using a web search

4.4b: Describe how to spot unsuitable internet content and behaviour

4.4c: Describe several ways they can report their concerns

Assessment criteria

The assessment criteria allow the teacher to assess the level of achievement of each student.

4.1a: *Plan and create a program that uses a named variable*

Developing: The student creates and runs a working program that uses at least one variable – it may use a default name.

Secure: The student makes a simple program plan that includes storing at least one value as a variable.
The student makes a working program that matches the plan they made and uses a named variable.

Extending: The student chooses suitable identifying names for variables used in work.

4.1b: *Plan and create a program that uses a conditional structure*

Developing: The student creates and runs a working program that includes a condition such as 'if … then'.

Secure: The student makes a program plan that includes at least one logical test, with a conditional structure depending on the result of the test.
The student makes a working program that matches the plan they made.

Extending: The student makes a plan and program using an 'if … then … else …' structure.

4.1c: *Create a program to meet a given purpose*

Developing: The student creates a working program.

Secure: The student makes a program that meets a simple brief or given requirement.

Extending: The student adapts or repurposes a program to meet a new requirement.

4.1d: *Make programs with different types of input and output*

Developing: The student makes working programs with user controls (for example, keyboard, mouse or 'touchscreen').

Secure: The student creates working programs with more than one type of output (for example, sound and visual (screen) output).

Extending: The student investigates a range of outputs that can be used in programs (for example, sounds they have recorded or control of physical systems).

4.2a: *Use software to format a document and fix mistakes*

Developing: The student makes a document using software.

Secure: The student makes a document that is well laid-out, with headings or titles, and with spelling mistakes corrected.

Extending: The student uses 'search and replace', advanced spelling tools or other features to make blanket changes to a document.

4.2b: *Use software tools to process numerical data and see summary results, including a graph*

Developing: The student enters number values into a spreadsheet accurately and in the right position.

Secure: The student creates a spreadsheet that calculates and shows summary values.
The student creates a spreadsheet that includes a chart or graph of numerical data.

Extending: The student selects chart features to ensure that key facts are communicated.

4.3a: *Describe what storage is and why it is important*

Developing: The student saves and retrieves their work using a suitable method.

Secure: The student saves and retrieves their work regularly.
The student explains why they save their work and how their work is saved.

Extending: The student evaluates a range of alternative storage methods.

4.3b: *Identify a range of modern devices which contain computer processors (for example, embedded processors)*

Developing: The student names and briefly describes familiar examples of digital technology such as computers, mobile devices and smartphones.

Secure: The student names and briefly describes further examples of digital technology such as those used in factories, shops or hospitals.

Extending: The student explains the benefits of using digital technology in a range of contexts.

4.3c: *Describe how computers may be used in the world of work*

Developing: The student joins in discussions or activities about how computers are used at work.

Secure: The student expresses some of the ways computers are used in the world of work.

Extending: The student explains how computers can make people more effective at their job.

4.4a: *Find information using a web search*

Developing: The student follows links and reads web content to find things out.

Secure: The student uses a web search to find out about a given topic.
The student selects content and information from a web page, such as text and images.
The student describes or shows what they found.

Extending: The student uses local features such as menus or local searches to find useful information inside a website.
The student bookmarks useful pages in a website.

4.4b: *Describe how to spot unsuitable internet content and behaviour*

Developing: The student listens carefully to advice about unsuitable or upsetting internet content and behaviour online.

Secure: The student confirms understanding of advice about unsuitable or upsetting internet content and behaviour, and acts accordingly if needed.

Extending: The student critically evaluates the different types of experience one may have with internet content.

4.4c: *Describe several ways they can report their concerns*

Developing: The student outlines or states a process for reporting concerns about internet content or behaviour.

Secure: The student confirms their understanding of school policy about unsuitable or upsetting internet content and behaviour.
The student follows school policy about use of the internet.

Extending: The student identifies online features that allow them to report unsuitable content.
The student can take a record of an online event to support a report of concerns.

YEAR **FIVE**

Introduction

In Year 5, students will use computers with increasing understanding and skill.

Students will develop problem-solving skills. They will create algorithms and programs that use loops. They will use technology to explore, to find out and to communicate with impact. As always, learning outcomes may be delivered in any order and one activity may support multiple outcomes.

Learning outcomes

These learning outcomes set out a programme of study in computing for Year 5.
During the year, every student will:

- **5.1a:** Create and describe an algorithm that includes a loop
- **5.1b:** Create a program with a loop controlled by an exit condition
- **5.1c:** Adapt a program to meet a new requirement
- **5.2a:** Make and share images to suit an audience and a purpose
- **5.2b:** Amend an image to increase its impact
- **5.2c:** Use a spreadsheet to answer questions by finding out what happens when numbers change
- **5.3a:** Explain that digital devices can be connected by communication links
- **5.3b:** Explain what the internet is and some internet services such as the World Wide Web
- **5.3c:** Describe some ways the internet helps us work together in the modern world
- **5.4a:** Obtain information from online sources and describe the sources used
- **5.4b:** Choose information from online sources and give reasons for choices
- **5.4c:** Explain how online searches select and show useful information

Assessment criteria

The assessment criteria allow the teacher to assess the level of achievement of each student.

5.1a: *Create and describe an algorithm that includes a loop*

Developing: The student describes what they want a program to do before they start work.

Secure: The student makes a plan for a program.
The student creates a plan that includes actions repeated inside a loop and a condition to stop the loop.

Extending: The student explains the difference between a loop controlled by a counter and a loop controlled by a condition or test.

5.1b: *Create a program with a loop controlled by an exit condition*

Developing: The student uses a loop without an exit condition in a program.

Secure: The student makes a program with a loop that includes an exit condition.

Extending: The student creates programs that use loops of different kinds, with different exit conditions.

5.1c: *Adapt a program to meet a new requirement*

Developing: The student creates a working program to meet a requirement.

Secure: The student amends a program to produce a required change.

Extending: The student chooses the most suitable from a range of ways to meet a requirement.

5.2a: *Make and share images to suit an audience and a purpose*

Developing: The student creates images using a digital device.

Secure: The student creates images using a digital device that are relevant to a specified audience and purpose.
The student selects images and presents them in an accessible format.

Extending: The student uses images as part of a structured communication such as a presentation or report.

5.2b: *Amend an image to increase its impact*

Developing: The student makes some changes to an image.

Secure: The student edits one or more images to improve their appeal to an audience or suitability to a purpose.

Extending: The student explains how amendments to an image have increased its appeal or suitability.

5.2c: *Use a spreadsheet to answer questions by finding out what happens when numbers change*

Developing: The student makes a spreadsheet with values and formulas.

Secure: The student changes some of the stored values in a spreadsheet.
The student answers questions by checking the effect of changes on calculated results.

Extending: The student uses the analysis of a scenario to support a decision, giving reasons.

5.3a: *Explain that digital devices can be connected by communication links*

Developing: The student identifies devices that are connected via a communication link.

Secure: The student explains how devices are connected in simple terms.
The student expresses understanding that communication links are needed for computers and other devices to send messages and share data.

Extending: The student explains how devices are connected and what must be in place to establish a network.

5.3b: *Explain what the internet is and some internet services such as the World Wide Web*

Developing: The student identifies that the internet is a global network that connects computers together.

Secure: The student explains the World Wide Web as a service provided over the internet.

Extending: The student describes some features of the internet (for example, that it has no overall controlling body and how hyperlinks connect websites together).

5.3c: *Describe some ways the internet helps us work together in the modern world*

Developing: The student describes some ways the internet affects our lives.

Secure: The student describes how the internet helps people to communicate, share multimedia content and work together.

Extending: The student evaluates some of the positive and negative impacts of the internet on the modern world.

5.4a: *Obtain information from online sources and describe the sources used*

Developing: The student carries out an internet search on a given topic, obtaining information from at least one source.

Secure: The student obtains information from multiple sources.
The student records the sources they have used.

Extending: The student uses information with correct attribution to sources.

5.4b: *Choose information from online sources and give reasons for choices*

Developing: The student obtains information on a topic by searching the internet.

Secure: The student carries out an internet search and selects good-quality information relevant to a topic.
The student reviews the information selected and gives reasons.

Extending: The student discusses some of the criteria used to evaluate the quality of information.

5.4c: *Explain how online searches select and show useful information*

Developing: The student explains how to use a search engine to find information.

Secure: The student explains in basic terms how a search engine finds and compiles links.
The student gives some reasons why some links are displayed by the search engine with higher priority (for example, more current and relevant sites, and sponsored content).

Extending: The student describes in basic terms how search engines rank or prioritize web links.

YEAR **SIX**

Introduction

Year 6 students will work with confidence on the computer if they have followed the programme of study set out for previous years.

Students will produce more complex and creative work, including studying robotics, designing and creating a web page and writing a program that simulates physical movement. Learning outcomes may be delivered in any order, perhaps through projects and group work.

Learning outcomes

These learning outcomes set out a programme of study in computing for Year 6.
During the year, every student will:

6.1a: Make an algorithm to solve a problem using logical reasoning

6.1b: Write a program that controls or simulates physical movement

6.1c: Solve a problem by breaking it into smaller parts or modules

6.2a: Use technology to collect or record data

6.2b: Use software to structure, sort and filter data

6.2c: Work as a team using technology (for example, to give a group presentation)

6.3a: Describe the technology of robotics and control systems

6.3b: Discuss the potential and the limitations of robotics and control systems

6.4a: Create a simple web page with text and images

6.4b: Review web content to check if appropriate, and amend if needed

6.4c: Act responsibly and with respect for others when using the computer

Assessment criteria

The assessment criteria allow the teacher to assess the level of achievement of each student.

6.1a: *Make an algorithm to solve a problem using logical reasoning*

Developing: The student creates an algorithm with some actions to solve a problem.

Secure: The student creates an algorithm that solves a simple problem (for example, finding the largest of a list of numbers or moving a sprite through a maze).
The student checks that an algorithm solves a problem.

Extending: The student improves or corrects an algorithm to solve a problem.

6.1b: *Write a program that controls or simulates physical movement*

Developing: The student writes code that makes an object move (for example, movement of a device or an on-screen sprite).

Secure: The student writes code to control movement (for example, detecting and reacting to real or on-screen obstacles).

Extending: The student controls movement of multiple parts or objects.

6.1c: *Solve a problem by breaking it into smaller parts or modules*

Developing: The student identifies and solves one part of a larger problem.

Secure: The student breaks a problem into smaller parts.
The student assembles smaller parts to solve a problem (for example, simple modules).

Extending: The student develops parts to solve a problem (for example, writing a simple module).

6.2a: *Use technology to collect or record data*

Developing: The student identifies technology that can be used to collect data.

Secure: The student collects real-life data using technology (for example, using a data logger or timer, or pressing a button on a hand-held device).

Extending: The student finds out about technology that can be used to collect and record data.

6.2b: *Use software to structure, sort and filter data*

Developing: The student puts data into a structure (for example, a table).

Secure: The student sorts data.
The student searches or filters data.

Extending: The student analyses data (for example, calculating or selecting a result to answer a question).

6.2c: *Work as a team using technology (for example, to give a group presentation)*

Developing: The student helps with a team activity that uses technology.

Secure: The student contributes fully to a team activity using technology.

Extending: The student takes a significant role in a team activity (for example, making decisions, using advanced skills or helping others).

6.3a: *Describe the technology of robotics and control systems*

Developing: The student identifies some features of robotics and control systems.

Secure: The student describes key features of the technology of robotics and control systems.

Extending: The student discusses the results of research into the technology of robotics and control systems.

6.3b: *Discuss the potential and the limitations of robotics and control systems*

Developing: The student gives some examples of the use of robotics and control systems in real life.

Secure: The student evaluates some advantages and limitations of robotics and control systems.

Extending: The student expresses the results of research into the uses of robotics and control systems (for example, current uses or future possibilities).

6.4a: *Create a simple web page with text and images*

Developing: The student uploads some content to a developing web page.

Secure: The student creates a web page that presents both text and images relevant to a chosen topic.

Extending: The student creates a web page with well-chosen content and formatting.

6.4b: *Review web content to check if appropriate, and amend if needed*

Developing: The student checks web content and corrects one or more errors.

Secure: The student reviews a web page and makes changes to improve it.

Extending: The student makes recommendations for further improvements to a web page.

6.4c: *Act responsibly and with respect for others when using the computer*

Developing: The student's interactions with others in person are polite and responsible when using the computer (for example, sharing access to equipment).

Secure: The student's interactions with others are polite and responsible when interacting online (for example, giving polite feedback).

Extending: The student provides supportive feedback to others using online technology.

YEAR **SEVEN**

Introduction

In Year 7, students will deepen their computing knowledge and learn a professional text-based programming language such as Python. They will use computers to carry out large projects and learn a wider range of technical terms.

Students will use computers to create multimedia digital content. They will learn how data is stored electronically and they will be introduced to binary number systems. Learning outcomes can be delivered through project work, and learning may be integrated with other subject areas.

Learning outcomes

These learning outcomes set out a programme of study in computing for Year 7.
During the year, every student will:

7.1a: Describe how program commands are stored and executed

7.1b: Use more than one programming language

7.1c: Write programs in a text-based language

7.1d: Remove a range of errors to improve a program

7.2a: Create digital media

7.2b: Improve digital media for an audience

7.2c: Create a single-table data file

7.2d: Check data input for accuracy

7.3a: Describe how different types of data can be represented in binary digital form

7.3b: Convert between decimal and binary integers

7.3c: Perform simple binary additions

7.4a: Use content from online sources responsibly

7.4b: Explain risks associated with internet use

7.4c: Discuss how data may be collected when working online

Assessment criteria

The assessment criteria allow the teacher to assess the level of achievement of each student.

7.1a: *Describe how program commands are stored and executed*

Developing: The student identifies what running a program means.

Secure: The student describes what source code is.
The student describes what executable code is.

Extending: The student explains how source code is translated into executable code.

7.1b: *Use more than one programming language*

Developing: The student identifies commands in more than one programming language.

Secure: The student writes programs using more than one programming language.

Extending: The student selects a suitable programming language for a task.

7.1c: *Write programs in a text-based language*

Developing: The student writes a program in a text-based language.

Secure: The student writes a program using loops and conditional structures.

Extending: The student selects the right program structure to meet a requirement.

7.1d: *Remove a range of errors to improve a program*

Developing: The student fixes syntax errors in a program.

Secure: The student finds and removes logical or run-time errors from a program.

Extending: The student makes programs more usable and readable.

7.2a: *Create digital media*

Developing: The student makes a digital recording (for example, photos, sound and/or video).

Secure: The student makes a digital recording to meet a purpose.

Extending: The student makes a digital recording that is well-suited to a purpose.

7.2b: *Improve digital media for an audience*

Developing: The student makes changes to digital media content.

Secure: The student makes improvements to digital media content.

Extending: The student can describe ways of improving digital media content.

7.2c: *Create a single-table data file*

Developing: The student inputs data into a table.

Secure: The student organizes data into fields and records.
The student uses a formula to calculate new data values in a table.

Extending: The student uses a key field to identify unique data records in a table.

7.2d: *Check data input for accuracy*

Developing: The student identifies inaccurate or invalid data.

Secure: The student creates checks to identify or screen input errors (for example, validation).

Extending: The student designs interface features to reduce input errors (for example, menus, error messages or input prompts).

7.3a: *Describe how different types of data can be represented in binary digital form*

Developing: The student states that the computer holds data in digital form.

Secure: The student describes how text data is held in digital form (for example, using ASCII or Unicode).
The student outlines how non-text data is held in digital form (for example, bitmap images).

Extending: The student explains how real-world data can be held by the computer.

7.3b: *Convert between decimal and binary integers*

Developing: The student states that binary is base two and decimal is base ten.

Secure: The student converts binary numbers to decimal (up to one byte).
The student converts decimal integers to binary (from 0 to 255).

Extending: The student explains that number value depends on place value.

7.3c: *Perform simple binary additions*

Developing: The student knows what a bit and a byte are.

Secure: The student adds two bytes (with no overflow).

Extending: The student adds two bytes, identifying overflow.

7.4a: *Use content from online sources responsibly*

Developing: The student identifies the source of online content.

Secure: The student uses online content legally and responsibly.
The student knows when online content may not be used.

Extending: The student describes issues affecting the right to use online content (for example, fair use, intellectual property rights or creative commons).

7.4b: *Explain risks associated with internet use*

Developing: The student protects their online identity.

Secure: The student identifies online risks (for example, malware, hacking or phishing).

Extending: The student describes how to avoid online risks (for example, by using virus checks and trusted websites).

7.4c: *Discuss how data may be collected when working online*

Developing: The student identifies examples of data collection (for example, filling in an online form).

Secure: The student identifies other examples of data that may be collected when browsing the internet (for example, location or browsing history).

Extending: The student discusses how data may be used by third parties online.

YEAR **EIGHT**

Introduction

In Year 8, students cover the fundamentals of using computers which will help them in their later studies and careers. Developing understanding of computing ensures that students will be able to participate in society as digital citizens.

Students will work creatively, selecting several different software applications. They will learn to process data structures using alternative algorithms. They will carry out an online research project. Some of this work may overlap with other subject areas and support learning across the curriculum.

Learning outcomes

These learning outcomes set out a programme of study in computing for Year 8.
During the year, every student will:

- **8.1a:** Write a program that processes a data structure (for example, a list)
- **8.1b:** Compare alternative algorithms to solve a problem (for example, searching)
- **8.1c:** Write a modular program that uses procedures or functions
- **8.2a:** Select and use suitable technology for a given purpose
- **8.2b:** Use technology creatively
- **8.2c:** Use technology to analyse data
- **8.3a:** Explain how computers communicate
- **8.3b:** Describe internet services (for example, cloud storage)
- **8.4a:** Carry out an online research project
- **8.4b:** Explain how computers can help with learning and discovery

Assessment criteria

The assessment criteria allow the teacher to assess the level of achievement of each student.

8.1a: *Write a program that processes a data structure (for example, a list)*

Developing:	The student writes a program that puts data into a simple structure (for example, a list).
Secure:	The student writes a program that processes a simple data structure (for example, traversing and printing the values in a list).
Extending:	The student writes a program that edits or reorganizes a data structure (for example, deleting or inserting values, or using sort functions).

8.1b: *Compare alternative algorithms to solve a problem (for example, searching)*

Developing:	The student identifies alternative algorithms to solve a problem (for example, linear and binary search algorithms).
Secure:	The student compares the advantages and limitations of alternative algorithms.
Extending:	The student implements at least one of the alternative algorithms.

8.1c: *Write a modular program that uses procedures or functions*

Developing:	The student writes a program that uses a procedure or function (for example, a predefined function).
Secure:	The student writes a program that defines a procedure or function. The student writes a program that calls a user-defined procedure or function.
Extending:	The student evaluates the advantages of using procedures or functions.

8.2a: *Select and use suitable technology for a given purpose*

Developing:	The student identifies a range of software and hardware options, explaining some key uses of each one.
Secure:	The student reviews a range of software and hardware options and selects suitable technology for a given task. The student uses more than one software application with suitable hardware to meet a requirement.
Extending:	The student imports or copies content between different software applications to meet a given purpose.

8.2b: *Use technology creatively*

Developing:	The student develops content using digital technology (for example, graphics, video or audio).
Secure:	The student uses technology creatively to produce new and original digital content.
Extending:	The student makes creative choices to produce well-developed digital content.

8.2c: *Use technology to analyse data*

Developing:	The student carries out calculations.
Secure:	The student analyses data (for example, to show summary values or trends).
Extending:	The student draws conclusions from analysis of data (for example, explaining the meaning or implications of results).

8.3a: *Explain how computers communicate*

Developing:	The student can connect to networks, including the internet.
Secure:	The student explains in basic terms a range of ways that computers can be connected to networks, for example via Wi-Fi or cabling. The student can explain what it means to connect to a network.
Extending:	The student can trouble-shoot simple problems with network connectivity.

8.3b: *Describe internet services (for example, cloud storage)*

Developing:	The student identifies that internet services are accessed through a remote connection.
Secure:	The student describes some internet services such as storage, software and web hosting.
Extending:	The student can distinguish remote and local content or services.

8.4a: *Carry out an online research project*

Developing: The student selects information found online with attention to relevance.

Secure: The student carries out an online investigation to collect information to meet a given requirement.
The student finds and selects data of suitable quality and relevance.

Extending: The student presents the results of an online research project with attention to audience impact.

8.4b: *Explain how computers can help with learning and discovery*

Developing: The student uses technology to learn and find things out (for example, in geography, music, chemistry or history).

Secure: The student discusses some ways that computers can help with learning (for example, in scientific investigations).

Extending: The student describes real-life examples of people using computers to make new discoveries.

YEAR **NINE**

Introduction

The learning outcomes in Year 9 provide a solid foundation for students who wish to move on to computing qualifications such as International GCSE Computer Science. For students who do not wish to specialize, Year 9 will ensure that they have a good understanding of what computers are, what they can do and how we use technology to shape our world. Students should conclude the year as active users rather than passive consumers of the products of technology.

Learning in Year 9 should be enjoyable, creative and fulfilling. Students will use multimedia tools to create a group project. They will use programming to model a real-life system. They will explore innovative techniques that underpin artificial intelligence (AI) and modern robotics. Students will finish the year confident and capable at using computers, whatever their future goals may be.

Learning outcomes

These learning outcomes set out a programme of study in computing for Year 9.
During the year, every student will:

9.1a: Design an abstract model based on a real-world system

9.1b: Use a program to find solutions to a real-world problem

9.1c: Describe some computational techniques that enable artificial intelligence (AI)

9.2a: Use software to plan a project and track its progress

9.2b: Create and combine multimedia content

9.3a: Use or describe simple electronic logic gates (for example, AND, OR and NOT gates)

9.3b: Outline the structure of a processor, its components and how they work together

9.3c: Describe some technical innovations that enable modern robotics

9.4a: Understand how to use social media safely, responsibly and with regard to others

Assessment criteria

The assessment criteria allow the teacher to assess the level of achievement of each student.

9.1a: *Design an abstract model based on a real-world system*

Developing: The student identifies some values used in an abstract model.

Secure: The student creates an abstract model by identifying how values are altered or processed.

Extending: The student evaluates some of the advantages and limitations of a model.

9.1b: *Use a program to find solutions to a real-world problem*

Developing: The student enters values into a model and notes the results.

Secure: The student creates a program to match an abstract model.
The student uses a model to create useful results.

Extending: The student changes the inputs to a model and evaluates the effects.

9.1c: *Describe some computational techniques that enable artificial intelligence (AI)*

Developing: The student can describe what AI means and some of its uses or potential uses.

Secure: The student can describe computational techniques used to develop AI systems (for example, heuristics, pattern matching, data mining, expert systems and learning).

Extending: The student can evaluate computational techniques (for example, their uses and limitations as techniques for AI development).

9.2a: *Use software to plan a project and track its progress*

Developing: The student identifies the outcomes and end date of a project.

Secure: The student uses software to record the end product(s) and end date of a project.
The student uses software to plan some tasks of a project.

Extending: The student uses software to record progress against the project plan.

9.2b: *Create and combine multimedia content*

Developing: The student creates multimedia digital content such as video or audio.

Secure: The student combines items of multimedia digital content to meet a requirement (for example, adding an audio track to a video).

Extending: The student produces multimedia content to meet a requirement and appeal to an identified audience.

9.3a: *Use or describe simple electronic logic gates (for example, AND, OR and NOT gates)*

Developing: The student draws diagrams to represent the AND, OR and NOT gates.

Secure: The student draws truth tables to match the AND, OR and NOT gates.

Extending: The student creates simple logic circuits using the AND, OR and NOT gates and describes their possible states.

9.3b: *Outline the structure of the processor, its components and how they work together*

Developing: The student labels a diagram to show the relationship between the processor, input, output and storage in a computer system.

Secure: The student draws a simple diagram to represent the structure of the processor, including the control unit, memory unit and arithmetic logic unit. The student briefly describes how these components work together during the fetch-execute cycle.

Extending: The student explains how the features of a computer system can be modified to affect performance.

9.3c: *Describe some technical innovations that enable modern robotics*

Developing: The student can describe what robotics means.

Secure: The student can describe innovative technologies used to develop robotic systems (for example, real-time operating system, embedded processors and use of sensors).

Extending: The student can evaluate the benefits and limitations of using robotics in the modern world.

9.4a: *Understand how to use social media safely, responsibly and with regard to others*

Developing: The student's behaviour online is generally sensible and polite.

The student identifies the need to treat others with respect.

Secure: The student interacts online with due regard to the safety and value of all individuals.

The student describes appropriate ways of using social media.

Extending: The student interacts with others constructively and cooperatively to promote positive online communities and interactions.

Resources

The Oxford International Curriculum for Computing has been devised to complement specific Oxford University Press resources. We recommend that schools following the Oxford International Curriculum for Computing use the *Oxford International Primary Computing* series at primary level. We recommend the *Oxford International Lower Secondary Computing* series at lower secondary level.

Oxford International Primary Computing
Oxford International Lower Secondary Computing

Together, these series provide a complete and integrated nine-year (Years 1–9) computing course that takes a real-life, project-based approach to teaching young learners the vital computing skills they will need for the digital world. *Oxford International Primary Computing* provides a solid foundation of skills to then progress to *Oxford International Lower Secondary Computing* resources. The two courses have been designed together to effortlessly facilitate the transition from primary to lower secondary aged students.

With a structured progression and a project-based approach to learning, the courses build digital literacy while giving students the confidence to apply their knowledge and skills to real-life situations.

- Project-based work promotes active learning, encouraging every student to participate in lessons.
- Key ideas and concepts are revisited at each level, building students' knowledge and competency as the course progresses.
- In-built differentiation allows you to cater to the needs of every student.
- A focus on computational thinking prepares students for the demands of the rapidly evolving digital landscape.
- Levels are evenly staged and progressively build on previous learning.

Using the resources with the Oxford International Curriculum

The recommended student books can be used alongside the Oxford International Curriculum for Computing schemes of work and lesson plans. Lesson plans signpost relevant pages in the student book.

The Oxford International Curriculum for Computing lesson plans and schemes of work have been designed to enable teachers to deliver the contents of one Student Book per year. Each unit in a Student Book builds a series of skills towards the creation of a final project, with topics ranging from designing your own robot to programming simple games and creating an online yearbook. As well as Student Books, the courses provide accompanying source files. These may include, for example, existing Scratch files for students to use, which help to reduce teacher workload. These files are editable and can be adapted to your specific teaching requirements.

To learn more about these resources, please see:
www.oxfordprimary.com/international-computing
www.oxfordsecondary.com/international-computing

Glossary

Assessment framework: a conceptual map indicating how learning outcomes will be assessed, with every learning outcome broken down into 'developing', 'secure' and 'extended' statements

Creative skills: skills that foster students' innate curiosity and creativity

Curriculum at a glance: a table-format overview providing a snapshot of learning outcomes for every year group

Developing: one of the three assessment statements that make up the Assessment Framework, this indicates that students are working towards the learning outcome

Differentiation: the creation of varied learning pathways through the curriculum, to enable teaching that caters to the needs of all learners

Emotional intelligence: the ability to understand one's own feelings and emotions, and also those of others, and regulate them skilfully

End-of-year assessment: tests developed to determine student progress and attainment at the end of each academic year

Enquiry-based learning: an approach to learning which invites students to actively shape their learning journeys, placing problem-solving and real-world applications at the heart of the curriculum

Extending: one of the three assessment statements that make up the Assessment Framework, this indicates that students are working beyond the learning outcome

Formative assessment: low stakes, continuous assessment for learning, which helps to guide future learning and interventions

Functional literacies: the numerical, digital, and language literacy our students need to succeed in the 21st century

Global Skills Projects: a-project-based, interdisciplinary course that seeks to develop thoughtful, innovative change-makers who are equipped with the skills to succeed in a changing world

Growth mindset: a belief that your intelligence and abilities can be developed by embracing challenges, sustaining effort, and trying new strategies – a growth mindset leads to greater motivation and achievement

Interpersonal skills: skills which support lifelong learning, through developing communication, relationship-building and leadership skills

Joy of Learning: an approach to teaching and learning focused on wellbeing, which places joy at the heart of the curriculum and develops global skills needed by learners to thrive throughout their lives

Learning outcomes: clear statements which describe what a student is expected to be able to do or understand after a specific period of study

Lesson plans: a programme of study for any given lesson, aligned to specific outcomes within the curriculum

Mindful moments: opportunities for students to refocus their attention on the present moment

Pedagogy: the approach to teaching and learning, guiding the way in which the curriculum is taught to students

Positive education: a combination of academics, character and wellbeing

Process praise: praising how students work, rather than only praising the outcome, for example, praising effort, perseverance, resilience, teamwork and strategies

Project-based learning: an active, enquiry-based pedagogy that allows rich interdisciplinary learning as students engage with real-life scenarios that demonstrate the relevance of skills and theories

Real-life skills: skills which support lifelong learning, including project management, functional literacies and research

Resilience: possessing the inner resources and the ability to withstand and overcome adversity and difficulties

Scheme of work: a week-by-week, lesson-by-lesson plan which details how to deliver the learning outcomes within the curriculum

Secure: one of the three assessment statements that make up the Assessment Framework – this indicates that students are secure in the learning outcome

Self-development skills: skills which support lifelong learning, including critical thinking, ethics and self-motivation

Spiral approach: the model by which underlying learning themes of the curriculum are revisited each year at higher levels of complexity and depth – the spiral development model reinforces learning and builds on previous achievement

Stretch zone: a visual metaphor to help explain that we learn the most when we do challenging work

Summative assessment: assessment of learning provided to evaluate student progress at the end of a given topic/unit/year

Wellbeing: both a curriculum subject and guiding principle, which supports the practice of healthy habits of body and mind to enhance the lives of teachers and learners, giving them skills that can apply in their lives today and in the future

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