

AS/A Level Computer Science Y11 into Y12 Preparation Pack



Name

Course Information

Paper 1:

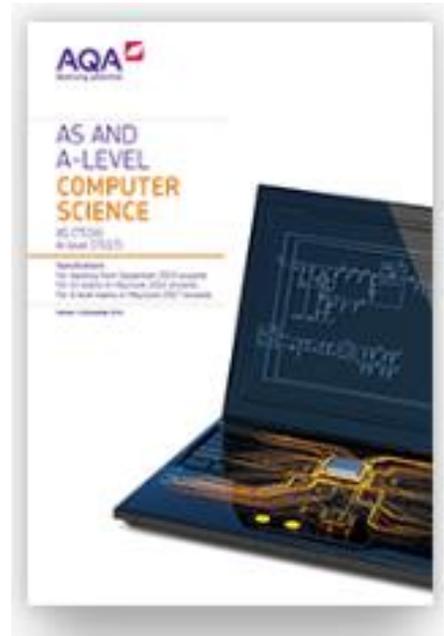
Covers algorithms, computation and programming.

Paper 2:

Covers data representation, hardware, software, databases & SQL, computer networks & cybersecurity and the legal, ethical and environmental concerns of computing.

Non-Exam Assessment:

Involves creating a program to either solve an issue or task or investigate a more complex problem. Evidenced with a written report.



Term	Topic
12.1	Data Representation
12.2	Programming
12.3	Advanced Algorithms & Computation
12.4	Hardware
12.5	Software
12.6	Databases & SQL
13.1	Non-Exam-Assessment
13.2	Computer Networks & Cybersecurity
13.3	Legal, Ethical and Environmental concerns of computing

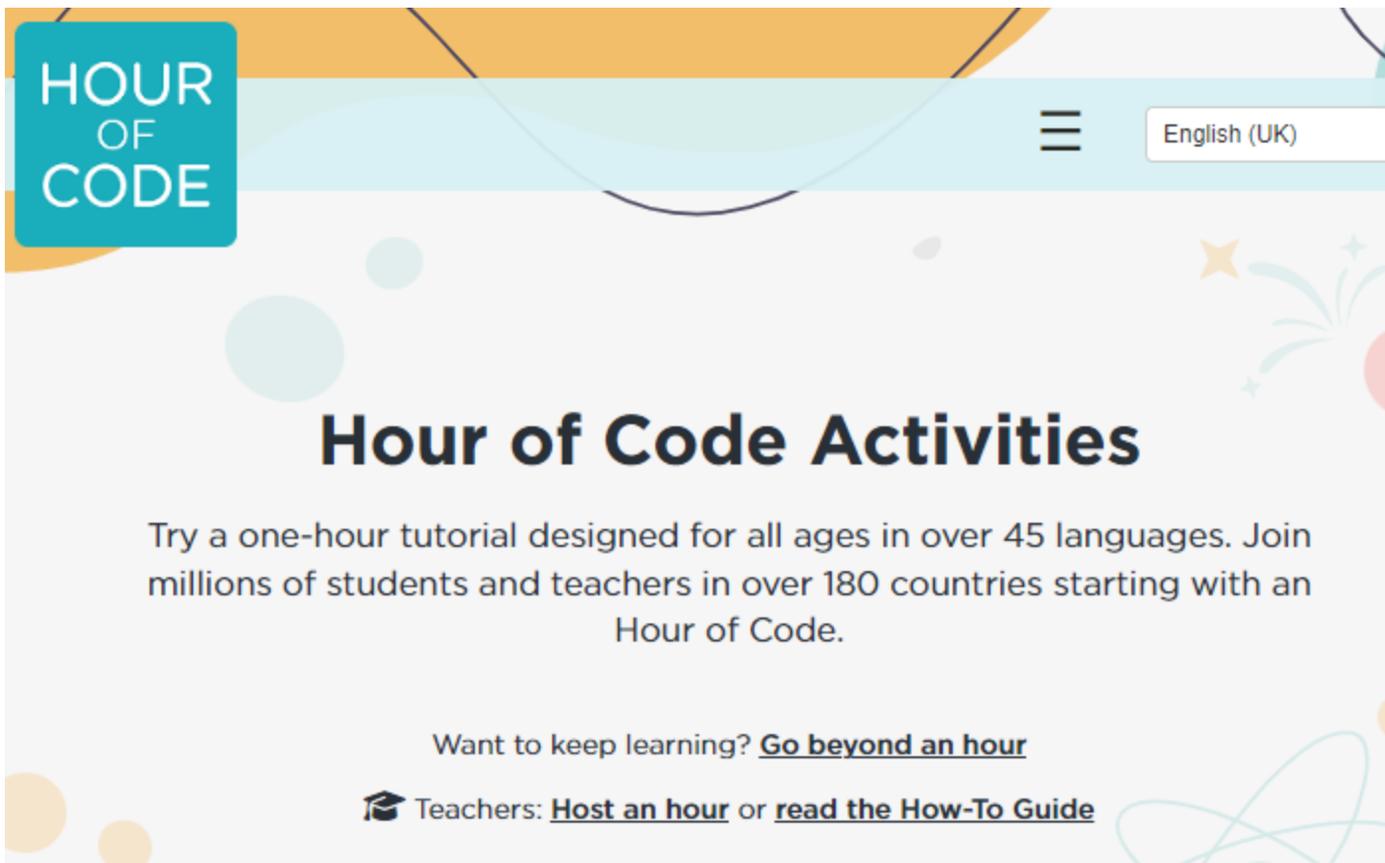
Activity 1: Hour of Code

Hour of Code have a selection of self-led tutorials, each taking approximately an hour, to introduce beginners to programming concepts.

<https://hourofcode.com/uk/learn>

You can choose to explore any that takes your fancy or try out the selected one below.

<https://compute-it.toxicode.fr/?hour-of-code&progression=python>

The image shows a screenshot of the Hour of Code website. At the top left, there is a teal square with the text "HOUR OF CODE" in white. To the right of this is a hamburger menu icon and a language selection dropdown menu showing "English (UK)". The main heading is "Hour of Code Activities" in a large, bold, black font. Below this, there is a paragraph of text: "Try a one-hour tutorial designed for all ages in over 45 languages. Join millions of students and teachers in over 180 countries starting with an Hour of Code." At the bottom, there is a call to action: "Want to keep learning? [Go beyond an hour](#)". Below that, there is a graduation cap icon followed by the text "Teachers: [Host an hour](#) or [read the How-To Guide](#)". The background is light blue and white with decorative elements like circles and stars.

Activity 2: Sudoku Challenge

SUDOKU - 133

Hard

		3	7					
			1			6	7	8
8	7	1	6	9				5
							9	
	4		9	1	8			6
		6			7			
2							8	
	5		8			1	6	
6						9	5	2

SUDOKU - 134

Hard

			1	4		2	9	8
4		1	8					6
	9	8			6		4	
			5			6		
6								
1		9						
	4			1		5		
9		7			8		6	2
8					2	9		4

SUDOKU - 135

Hard

7		6		9			5	
9		2		5				7
		3	2	7			9	
	7		4					
2	1		8	6	3		7	
	6	8					4	3
					9			
	3							
		1	5		2			6

SUDOKU - 136

Hard

		3		5			7	6
		1						
5		9			2			
			2	3	7		5	
6					8		3	
		2	1	6	5	7	4	
	2	5	6				9	4
		6						
4	1							7

SUDOKU - 137

Hard

8		7				4		
5		9						8
2	4					6	3	
					1			
4		3	8				7	
	5		2		7			
1	2			7				
	7	8	5	2		3	9	
	9	4		8				

SUDOKU - 138

Hard

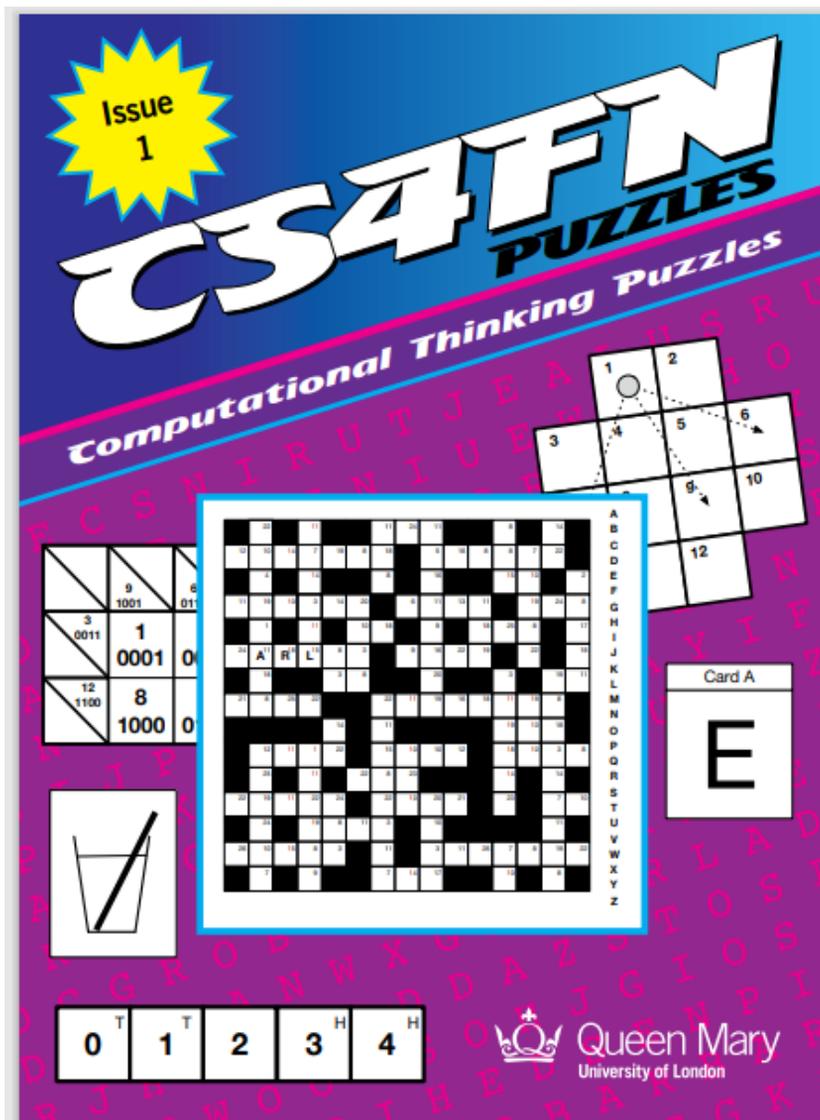
5			4					8
6				3		5		
	5	7	8				2	3
1			7					4
2					3			
3	2	9		8				
4	1	5	3	7		2		
				4	5	9	3	

Activity 3: Puzzle Book

Download the puzzle book at the below link.

https://cs4fndownloads.files.wordpress.com/2016/02/cs4fn_puzzlebook11.pdf

Work through as many as you can in an hour to develop your logical and computational thinking, puzzle solving skills.



Activity 4: AI Ethics

The below section was composed by Artificial Intelligence.

Choose one of the topics presented, conduct some internet research about the selected topic and then write about the issue. Explain the problem as you understand it and present your opinion about it or potential ideas/ solutions.

The use, development, and growth of artificial intelligence raise a multitude of ethical considerations. Here are a few engaging topics for discussion. Each of these topics offers much room for exploration, debate, and thoughtful consideration of how to navigate the benefits and challenges of AI development and use responsibly.

Privacy: As AI systems become more advanced, they can collect, analyse, and interpret vast amounts of data, including personal data. This poses significant privacy concerns that need addressing.

Bias and Fairness: AI systems can perpetuate or even amplify societal biases if they are trained on biased data, which can lead to unfair outcomes. This raises questions about how to ensure fairness in AI applications.

Transparency and Explain-ability: Often, the decision-making processes of AI systems (particularly in deep learning) are opaque and difficult to understand, even by their creators. This lack of transparency, or the "black box" problem, poses significant ethical challenges, especially when AI is used in critical areas like healthcare or criminal justice.

Accountability: If an AI system makes a mistake or causes harm, who is responsible? The developers of the AI? The users? Or the AI itself? This question of accountability is a significant ethical issue.

Autonomous Weapons: The potential use of AI in autonomous weapons systems brings up ethical concerns about the consequences of delegating life-and-death decisions to machines.

Job Displacement: As AI becomes more capable, it could potentially automate many jobs, leading to significant job displacement. The ethical implications of this economic shift are a point of concern.

AI and Surveillance: The use of AI in surveillance technologies can lead to unprecedented levels of monitoring, leading to a potential loss of freedom and civil liberties.

Superintelligence: Some speculate that AI could eventually surpass human intelligence. If this happens, how can we ensure that it aligns with human values and doesn't pose an existential threat to humanity?

Data Monopolies: Large tech companies who possess most of the data and advanced AI technologies could wield too much power, leading to anti-competitive practices and other issues.

Human Enhancement: The potential use of AI in enhancing human capabilities (e.g., cognitive enhancement, physical augmentation) raises ethical questions about the nature of being human and societal implications.

Activity 5: Five Part Fever

The first person to follow all five parts below will win a box of chocolates. The parts provide instructions on how to qualify for the prize!

Part	Instruction
1	<p><i>Caesar says, "It takes two!"</i></p> <pre>fvyq aqw ftcy encuutqqo fkuvtcev c kp vq dktf yjkvgdqctf ogcpv qp uocnngt ctg vjg qp yqtfu ockp vqtvqkug vjgug yjkvgdqctf c qh kp ftcy cnn fvyq</pre>
2	<p>I begin with a task that seems quite small, Arrange these items, one and all. Suddenly a voice comes with a twist, "Undo my order, don't resist!" Follow the voice, as it does insist.</p>
3	<p>Highlight every Xth word. $X + 2Y = 2X - 5$ $X - Y = 4$</p>
4	<pre>01010010 01100101 01101101 01101111 01110110 01100101 00100000 01100001 01101100 01101100 00100000 01110101 01101110 01101000 01101001 01100111 01101000 01101100 01101001 01100111 01101000 01110100 01100101 01100100 00100000 01110111 01101111 01110010 01100100 01110011 00101110 00100000 00001010</pre>
5	<p>I shall number the colour ye must use. <u>13th</u> <u>Reud</u> vegetables. Not a single <u>Ghre</u> in sight. <u>Blewe</u> is best, ideally Fun with 4 friends.</p>

Resources

GCSE Computer Science Topics

<https://isaacomputerscience.org/topics/gcse?examBoard=aqa&stage=all#aqa>

<https://student.craigndave.org/aqa-gcse-videos>

<https://www.khanacademy.org/computing/computer-science>

<https://classroom.thenational.academy/subjects-by-key-stage/key-stage-4/subjects/computing>

Programming Specific

<https://replit.com/learn/100-days-of-python>

<https://snakify.org/>

<https://www.w3schools.com/python/>