



Y11 – Y12

## A Level Computer Science

SIL

**Tasks 1 - 7** are compulsory exercises to help prepare you for the course. Some of these tasks will feature on your initial assessment.

**Tasks 8 - 15** are optional programming exercises. These will be very helpful if you lack confidence in programming and will help you with the compulsory Task 6.

**Tasks 16 - 19** are optional research exercises. These tasks will allow you to investigate some of the great computing pioneers and increase your understanding and history of the subject.

**Task 20** is an optional opportunity to take a look at two past papers for the course. It is really useful to see the format of the exam and the style of questions used.

If there are any issues completing the SIL please contact me by email [matt.hunt@nclt.ac.uk](mailto:matt.hunt@nclt.ac.uk)

**Task 1 – Who are you**

In this task, you get to tell me a little bit about yourself.

**Name:**

1. What are your main interests in school? What subjects and clubs do you enjoy and why?

2. What are your interests outside of school?

3. Why did you choose Computer Science?

4. What are your plans after College? What would like to get out of studying Computer Science?

## Task 2 – The course

In this task, I would like you to research about the course and answer the following questions - <https://www.ocr.org.uk/qualifications/as-and-a-level/computer-science-h046-h446-from-2015/>

1. What is the name of the first exam paper and how long is the exam?

2. How many marks is the exam out of and what percentage of the course is it worth?

3. What are the 16 topics covered in paper 1?

4. What is the name of the second exam paper and how long is the exam?

5. How many marks is the exam out of and what percentage of the course is it worth?

6. What are the 8 topics covered in paper 2?



### Task 3 – 1.1.1 Structure and function of the processor

In this task, I would like you to complete a series of questions on the first topic of the course. Try your best to use existing knowledge before researching the answers. A useful resource is [Isaac Computer Science](#).

1. What is the CPU?

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2. What are the following components of the CPU and what do they do?

Acronym	Name	Purpose
PC		
MAR		
MDR		
CIR		
ACC		
ALU		
CU		

3. What are the names of the three buses and what do they do?

Name	Purpose

4. What are the three factors that affect the performance of the CPU and why?

Factor	Explanation

5. What are the differences between Von Neumann and Harvard architecture?

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6. In PowerPoint or Word create a labelled diagram that breaks the fetch decode execute cycle to a series of steps. Insert an image of your diagram here:

#### Task 4 – 1.1.3 Input, output and storage

In this task, continue to use your prior knowledge to answer the questions. Only research if you are really stuck!

1. What is an input device?

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2. Name and describe three input devices for a user with specialist needs:

Device	Description

3. What is an output device?




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4. Name and describe three output devices for a user with specialist needs:

Device	Description



5. Complete the table for the three main types of secondary storage mediums:

<b>Image:</b>			
<b>Name:</b>			
<b>Description:</b>			
<b>Positives:</b>			
<b>Negatives:</b>			
<b>Scenario you would use this:</b>			

6. What is the function of primary storage?

7. What are the differences between RAM and ROM?

### Task 5 – 1.3.3 Networks

For this task, please use the following Craig n Dave videos to help: [https://youtu.be/lx\\_uKqI0sxxk](https://youtu.be/lx_uKqI0sxxk) & <https://youtu.be/7GHL5CP-ahs>

1. What are the advantages of networks?

2. What are the disadvantages of networks?

3. Name the following protocols called and explain what they do:

Protocol	Full name	Explanation
TCP		
UDP		
IP		
FTP		
HTTP		
HTTPS		
SMTP		
IMAP		
POP		

4. What is the difference between an IP address and a MAC address?



5. In PowerPoint or Word create a labelled diagram that explains how DNS works. Insert an image of your completed diagram here:

## Task 6 – Programming

In this task, I would like you to complete **one** of the three programming challenges below. As an optional challenge you could try and complete them all!

I recommend using an online IDE such [Repl](#) to develop your code. You can sign up for free and there is a variety of languages to choose. We will use Repl extensively throughout the course.

If you are stuck, you can complete the optional programming **tasks 8 - 15**. These will help you to develop your skills for this task.

Paste your completed code here:

### **Challenge 1**

Noel is creating a music quiz game.

The game stores a list of song names and their artist (e.g. the band or solo artist name). The player needs to try and guess the song name.

The game is played as follows:

- A random song name and artist are chosen.
- The artist and the first letter of each word in the song title are displayed.
- The user has two chances to guess the name of the song.
- If the user guesses the answer correctly the first time, they score 3 points. If the user guesses the answer correctly the second time they score 1 point. The game repeats.
- The game ends when a player guesses the song name incorrectly the second time.

Only authorised players are allowed to play the game.

Where appropriate, input from the user should be validated.

#### **Develop a program that:**

1. Allows a player to enter their details, which are then authenticated to ensure that they are an authorised player.
2. Stores a list of song names and artists in an external file.
3. Selects a song from the file, displaying the artist and the first letter of each word of the song title.
4. Allows the user up to two chances to guess the name of the song, stopping the game if they guess a song incorrectly on the second chance.
5. If the guess is correct, add the points to the player's score depending on the number of guesses.
6. Displays the number of points the player has when the game ends.
7. Stores the name of the player and their score in an external file.
8. Displays the score and player name of the top 5 winning scores from the external file.

## Challenge 2

Katarina is developing a two-player dice game.

The players roll two 6-sided dice each and get points depending on what they roll. There are 5 rounds in a game. In each round, each player rolls the two dice.

The rules are:

- The points rolled on each player's dice are added to their score.
- If the total is an even number, an additional 10 points are added to their score.
- If the total is an odd number, 5 points are subtracted from their score.
- If they roll a double, they get to roll one extra die and get the number of points rolled added to their score.
- The score of a player cannot go below 0 at any point.
- The person with the highest score at the end of the 5 rounds wins.
- If both players have the same score at the end of the 5 rounds, they each roll 1 die and whoever gets the highest score wins (this repeats until someone wins).

Only authorised players are allowed to play the game.

Where appropriate, input from the user should be validated.

### Develop a program that:

1. Allows two players to enter their details, which are then authenticated to ensure that they are authorised players.
2. Allows each player to roll two 6-sided dice.
3. Calculates and outputs the points for each round and each player's total score.
4. Allows the players to play 5 rounds.
5. If both players have the same score after 5 rounds, allows each player to roll 1 die each until someone wins.
6. Outputs who has won at the end of the 5 rounds.
7. Stores the winner's score, and their name, in an external file.
8. Displays the score and player name of the top 5 winning scores from the external file.

### Challenge 3

Louise is creating a card game for two players.

The game uses a deck of cards. There are 30 cards in a deck.

Each card has one colour (red, black or yellow). Each card has a number (1, 2, 3, 4, 5, 6, 7, 8, 9, 10) for each colour. Each card is unique.

The 30 cards are shuffled and stored in the deck.

The rules are:

- Player 1 takes the top card from the deck.
- Player 2 takes the next card from the deck.
- If both players have a card of the same colour, the player with the highest number wins.
- If both players have cards with different colours, the winning colour is shown in the table.

Card	Card	Winner
Red	Black	Red
Yellow	Red	Yellow
Black	Yellow	Black

- The winner of each round keeps both cards.
- The players keep playing until there are no cards left in the deck.

Only authorised players are allowed to play the game.

Where appropriate, input from the user should be validated.

#### Develop a program that:

1. Allows two players to enter their details, which are then authenticated, to ensure that they are authorised players.
2. Shuffles the 30 cards in the deck.
3. Allows each player to take a card from the top of the deck. Play continues until there are no cards left in the deck.
4. Calculates the winner and allocates both cards to the winner.
5. Displays which player wins (the player with the most cards).
6. Lists all of the cards held by the winning player.
7. Stores the name and quantity of cards of the winning player in an external file.
8. Displays the name and quantity of cards of the 5 players with the highest quantity of cards from the external file

### Task 7 – Extended writing

As part of the exam element of the course, you will be required to provide extended writing responses to some questions (9 marks). When considering longer mark questions, the exam board recommends that we practice thinking about it using the following framework:

<b>Stakeholder:</b> <ul style="list-style-type: none"><li>• Anybody involved either directly or indirectly</li><li>• How are they effected and to what extent?</li><li>• Who is financially involved?</li><li>• Does it affect the public/private sector?</li></ul>	<b>Technology involved:</b> <ul style="list-style-type: none"><li>• Any technology and how it relates to the problem/topic</li><li>• Different technologies that are related</li><li>• How the technology works within the context</li><li>• Comparisons</li></ul>
<b>Moral/Social/Cultural/Legal Issues:</b> <ul style="list-style-type: none"><li>• How the issue relates to any moral, social or cultural context</li><li>• What are the legal issues?</li><li>• How are the stakeholders affected?</li><li>• How does the technology relate?</li><li>• Is the technology helping or causing a problem, for whom and to what extent?</li></ul>	<b>Solutions:</b> <ul style="list-style-type: none"><li>• Have you answered the question?</li><li>• Any technological or other solution, and how it solves the problem</li><li>• Analysis of the solution and its effects on stakeholders</li><li>• How it all fits together</li></ul>

Using this framework will help you to write a full and balanced response to one of these styles of questions.

The exam board also checks the quality of your written communication, so by planning a response you should be able to access the higher mark bands.

I would like you to attempt to answer the following question:

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**A gaming company decides to release a new video games console. The console will use a modified version of an operating system called Linux.**

**\* “Video games have a negative effect on those who play them.”**

**Discuss whether or not you agree with this statement showing you have considered both points of view. [9]**



Before attempting your answer, complete the framework to plan your response:

Stakeholder:	Technology involved:
Moral / Social / Cultural / Legal issues:	Solutions:

Answer here:

**Task 8 (optional) – Hello World!**

[https://www.learnpython.org/en/Hello%2C\\_World%21](https://www.learnpython.org/en/Hello%2C_World%21)

1. Have a go at each of the warm up tasks, be sure to read them carefully
2. Paste your code for the final exercise below:

**Task 9 (optional) – Variables and types**

[https://www.learnpython.org/en/Variables\\_and\\_Types](https://www.learnpython.org/en/Variables_and_Types)

1. Have a go at each of the warm up tasks, be sure to read them carefully
2. Paste your code for the final exercise below:

### Task 10 (optional) – Lists

<https://www.learnpython.org/en/Lists>

1. Have a go at each of the warm up tasks, be sure to read them carefully
2. Paste your code for the final exercise below:

**Task 11 (optional) – String formatting**

[https://www.learnpython.org/en/String\\_Formatting](https://www.learnpython.org/en/String_Formatting)

1. Have a go at each of the warm up tasks, be sure to read them carefully
2. Paste your code for the final exercise below:

## Task 12 (optional) – String operations

[https://www.learnpython.org/en/Basic\\_String\\_Operations](https://www.learnpython.org/en/Basic_String_Operations)

1. Have a go at each of the warm up tasks, be sure to read them carefully
2. Paste your code for the final exercise below:

### Task 13 (optional) – Branching

<https://www.learnpython.org/en/Conditions>

1. Have a go at each of the warm up tasks, be sure to read them carefully
2. Paste your code for the final exercise below:



### Task 14 (optional) – Iteration

<https://www.learnpython.org/en/Loops>

1. Have a go at each of the warm up tasks, be sure to read them carefully
2. Paste your code for the final exercise below:

### Task 15 (optional) – Functions

<https://www.learnpython.org/en/Functions>

1. Have a go at each of the warm up tasks, be sure to read them carefully
2. Paste your code for the final exercise below:

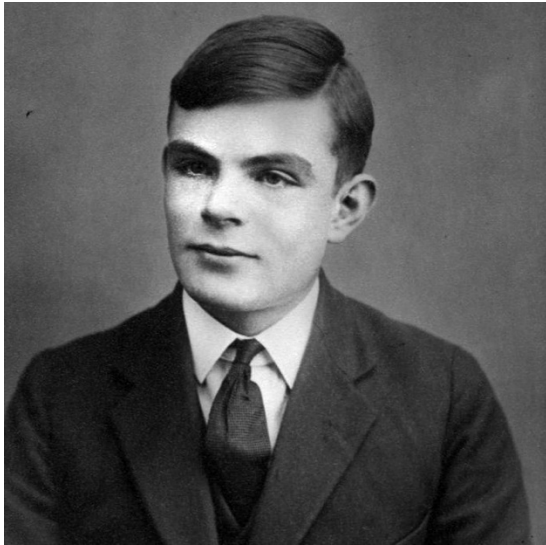
**Task 16 (optional) – Who is John Von Neumann and what was his impact on computing?**



- [https://en.wikipedia.org/wiki/John\\_von\\_Neumann](https://en.wikipedia.org/wiki/John_von_Neumann)
- <https://www.famousscientists.org/john-von-neumann/>
- <https://www.geeksforgeeks.org/computer-organization-von-neumann-architecture/>
- <https://youtu.be/QhBvuW-kCbM>
- <https://youtu.be/MI3-kVYLNr8>

A large empty rectangular box, likely intended for a student to write their answer to the task question.

**Task 17 (optional) – Who is Alan Turing and what was his impact on computing?**



- [https://en.wikipedia.org/wiki/Alan\\_Turing](https://en.wikipedia.org/wiki/Alan_Turing)
- <https://mathshistory.standrews.ac.uk/Biographies/Turing/>
- <https://www.bbc.co.uk/teach/alan-turing-creator-of-modern-computing/zhwp7nb>
- <https://www.youtube.com/watch?v=7TycxwFmdB0>
- <https://youtu.be/XQMXOCTG2Gw>

A large empty rectangular box, likely intended for a student to write their answer to the task question.

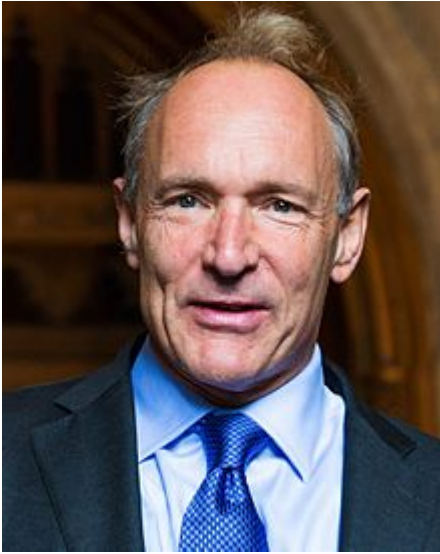
**Task 18 (optional) – Who is Ada Lovelace and what was her impact on computing?**



- [https://en.wikipedia.org/wiki/Ada\\_Lovelace](https://en.wikipedia.org/wiki/Ada_Lovelace)
- <https://www.britannica.com/biography/Ada-Lovelace>
- <https://www.famousscientists.org/ada-lovelace/>
- <https://youtu.be/1QQ3gWmd20s>
- <https://youtu.be/wnHHzBY1SPQ>



**Task 19 (optional) – Who is Tim Berners-Lee and what was his impact on computing?**



- [https://en.wikipedia.org/wiki/Tim\\_Berners-Lee](https://en.wikipedia.org/wiki/Tim_Berners-Lee)
- <https://webfoundation.org/about/sir-tim-berners-lee/>
- <http://www.computinghistory.org.uk/det/2489/Tim-Berners-Lee/>
- [https://youtu.be/OM6XIIcm\\_qo](https://youtu.be/OM6XIIcm_qo)
- <https://youtu.be/ykCPFUlasFk>

A large empty rectangular box, likely intended for a student to write their answer to the task question.

## Task 20 (optional) – Past papers

In this task, you get the chance to look at some past papers for A Level Computer Science. It is a great opportunity to see the format of the exam and the style of questions.

Links:

Paper 1 -

Paper 2 -

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### Great resources to help with A Level Computer Science

<https://isaacomputerscience.org/>

<https://replit.com>

<https://www.physicsandmathstutor.com/computer-science-revision/a-level-ocr/>

[https://www.amazon.co.uk/OCR-AS-Level-Computer-Science/dp/1910523054/ref=sr\\_1\\_1?dchild=1&keywords=computer+science+ocr+a+level&qid=1623154253&sr=8-1](https://www.amazon.co.uk/OCR-AS-Level-Computer-Science/dp/1910523054/ref=sr_1_1?dchild=1&keywords=computer+science+ocr+a+level&qid=1623154253&sr=8-1)

<https://www.youtube.com/channel/UC0HzEBLIJxlrwBAHJ5S9JQg>

<https://www.youtube.com/playlist?list=PLH2l6uzC4UEW0s7-KewFLBC1D0l6XRfye>

<https://www.youtube.com/user/Computerphile>

<https://www.youtube.com/channel/UCsBxhDfwURg-vQASN2ZeHwg>

Please ensure your SIL is complete in time for your first lesson in September.

You will submit it electronically, so there is no need to print.

Thanks,

Matt Hunt  
matt.hunt@nclt.ac.uk