

OCR GCSE Computer Science (J277)



Year 10 into Year 11

Summer Preparation Booklet

Name: _____

Class: _____

Help Available:

Seneca- OCR Computer Science

Craig and Dave videos on YouTube

Resources available on Teams

CSNewbs.com

Please ensure you have installed Python at home where possible- the link is on the posts in Teams

Module 1: Computer Systems (Component 1)

Topic 1.1: System Architecture & Memory

Question 1 (2 marks)

The CPU uses the Fetch-Execute cycle to process instructions.

Describe the specific role that the **Memory Address Register (MAR)** plays during the fetch phase of this cycle.

Question 2 (3 marks)

A smartphone manufacturer decides to upgrade its latest model by increasing the amount of **Cache memory** while keeping the RAM capacity identical. Explain how this hardware change will affect the overall performance of the smartphone.

Topic 1.2: Memory and Storage

Question 3 (4 marks)

A wildlife photographer uses a digital camera to capture high-definition photographs in remote outdoor locations. The camera can save images onto either a **Solid State Drive (SSD)** or a portable **Magnetic Hard Disk Drive (HDD)**.

Discuss why an SSD is more suitable than a Magnetic HDD for this specific scenario. You should refer to at least **two** physical characteristics of the storage technologies.

Topic 1.3: Data Representation

Question 4 (1 mark)

Convert the denary number 105 into an 8-bit binary number.

Working:

Answer: [____ _]

Question 5 (3 marks)

Add the following two 8-bit binary numbers together. State the final 8-bit result and explain any problem that arises from this calculation.

text

```
  1 1 0 0 1 0 0 0
+ 0 1 0 1 1 1 0 1
-----
```

Answer: [____ _]

Problem:

Question 6 (2 marks)

A video file has a size of 1.5 Gigabytes (GB). Calculate the size of the video file in **Megabytes (MB)**. Show your working. (Assume 1 GB = 1,000 MB).

Working:

Answer: _____ MB

Topic 1.4: Networks, Wired & Wireless, and Protocols

Question 7 (3 marks)

A school installs a Local Area Network (LAN) using a **Star Topology** with a central switch. State one advantage and one disadvantage of using a Star topology instead of a Mesh topology.

Advantage:

Disadvantage:

Question 8 (4 marks)

When a user visits a secure online shopping website, multiple application layer protocols are used to transmit data safely across the internet.

- **Identify** the protocol used to encrypt web traffic.
- **Explain** the overall purpose of the **Transmission Control Protocol (TCP)** when data is sent across the network.

Protocol: _____

Purpose of TCP:

Module 2: Computational Thinking & Programming (Component 2)

Topic 2.1: Computational Thinking Concepts

Question 9 (3 marks)

A programmer is developing a complex multiplayer racing video game. Before writing any code, they apply the computational thinking concepts of **Decomposition** and **Abstraction**. Describe one way the programmer could use **Abstraction** when designing the vehicles in this racing game.

Topic 2.2: Programming Fundamentals

Question 10 (4 marks)

An analyst reviews the following Python algorithm used to monitor temperature sensors in a server room.

python

```
1 alerts = 0
2 for hour in range(0, 24):
3     temp = float(input("Enter temperature: "))
4     if temp > 35.0:
5         print("Warning: Server room overheating!")
6         alerts = alerts + 1
7 print("Total daily alerts: " + str(alerts))
```

- **Identify** the data type of the variable temp on line 3. (1 mark)
- **State** the line number where **selection** is used. (1 mark)
- **Predict** the total number of times the message "Enter temperature: " will be displayed to the user during a full execution of the program. (2 marks)

Data Type: _____ Line Number: _____

Total Displays: _____

Question 11 (6 marks)

A delivery company calculates shipping costs based on package weight. Write an algorithm in **Python** that satisfies the following criteria:

- Inputs a package weight in kilograms (kg).
- If the weight is **less than or equal to 2kg**, the cost is **£3.50**.
- If the weight is **greater than 2kg but less than 10kg**, the cost is **£7.00**.
- If the weight is **10kg or more**, the cost is **£12.50**.
- Outputs the final cost to the screen in a user-friendly message.



Module 3: Algorithms & Logic (Component 2)

Topic 3.1: Boolean Logic Gates

Question 12 (1 mark)

Draw the **NOT** logic gate in the box below.

+-----+

+-----+

Question 13 (2 marks)

Complete the Truth Table below for a standard 2-input **AND** gate.

Input A Input B Output Q

0	0	[____]
0	1	[____]
1	0	[____]
1	1	[____]

Question 14 (3 marks)

A safety mechanism on a machine is controlled by the logic expression: **(NOT A) OR B = P**. Complete the truth table below to show the output Q for every possible input combination.

Input A Input B NOT A Output Q

0	0	1	[____]
0	1	1	[____]
1	0	0	[____]
1	1	0	[____]

Topic 3.2: Trace Tables

Question 15 (5 marks)

An engineer designs the following algorithm to process numerical data entries.

01 $x = 3$

02 $y = 1$

03 while $x < 15$

04 $y = y * 2$

05 $x = x + y$

06 endwhile

Complete the trace table below to show how the variable values change during the execution of this loop.

Line Number	Variable x	Variable y
Initial	3	1
03	3	1
04	3	[____]
05	[____]	2
06 / 03	5	2
04	5	[____]
05	[____]	4
06 / 03	9	4
04	9	[____]
05	[____]	8
06 / 03	17	8

Module 4: Databases & SQL (Component 2)

Topic 4.1: SQL Database Queries

The questions below refer to a database table named PRODUCTS:

ProductID	ItemName	Category	Price	StockLevel
-----------	----------	----------	-------	------------

P01	Wireless Mouse	Peripherals	19.99	45
P02	Mechanical Keyboard	Peripherals	59.99	12
P03	27-inch Monitor	Displays	149.99	8
P04	External SSD 1TB	Storage	85.00	25
P05	Gaming Headset	Audio	45.50	0

Question 16 (1 mark)

State the database term used to describe a single row of data inside the PRODUCTS table.

Answer: _____

Question 17 (2 marks)

An employee needs a list of all products that are completely out of stock so they can place a reorder. Write an SQL query to display the ItemName and Price for all items where the StockLevel is exactly 0.

Question 18 (3 marks)

Identify which specific item(s) from the PRODUCTS table will be returned by this query:

sql

```
SELECT ItemName, Price FROM PRODUCTS WHERE Category =  
'Peripherals' AND Price > 20.00
```

Answer: _____

Use code with caution.

Question 19 (3 marks)

The shop manager wants to view all details for items belonging to either the **Storage** category or the **Displays** category. Write an SQL query that will display **all fields** for products matching this criteria. _____

Programming challenges:

- 1 For loop Create an algorithm(Python) that asks user for a number 3 times and adds them – Output the total
- 2 Averages Write a program that:
 - asks the user to input two numbers
 - calculates the average
 - outputs the result

Write a program that:

converts and outputs marks into grades, using the following data:

<i>Greater than or equal to 75</i>	A
<i>Greater than or equal to 60</i>	B
<i>Greater than or equal to 35</i>	C
<i>Less than 35</i>	D

- 5 Game of Chance A user can bet on any number from 0 to 30.
 - If it's an even number, they get 2x their money back.
 - If it's a multiple of 10, they get 3x their money back.
 - If it's a prime number, they get 5x their money back.
 - If the number is below 5, they get a 2x bonus.

Create a program that allows the user to guess a number. A random number is generated. If the user guess is the same as the random number, then the user wins. After 10 goes, their name and score are written to a file.