

Candidate Name	Centre Number					Candidate Number				
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GCSE

COMPUTER SCIENCE

COMPONENT 1

Understanding Computer Science

SAMPLE ASSESSMENT MATERIAL

1 hour 45 minutes



INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use pencil or gel pen. Do not use correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

If you run out of space, use the continuation pages at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the need for good English and orderly, clear presentation in your answers.

The total number of marks is 100.

Some questions will require you to draw on your knowledge from multiple areas of your course of study.

GCSE COMPUTER SCIENCE Sample Assessment Materials 4

1. (a) Describe the purpose of the CPU. [2]

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- (b) The CPU uses different registers to store data resulting from the fetch-decode-execute cycle.

PC	CIR	ACC	MAR	MDR
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Choose **two** registers and state their purpose.

- (i) [1]

Register:

Purpose:

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- (ii) [1]

Register:



Purpose:

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2. Jordan is a gamer considering purchasing a new computer system.

Jordan is considering the following two specifications:

Specification A	Specification B
	
<ul style="list-style-type: none"> • Processor: <ul style="list-style-type: none"> • Quad-core • 2.5 GHz • 1 MB cache • 4 GB RAM • 1 TB Hard Disk Drive • 136dB Gaming Sound Card • 1080p Integrated GPU 	<ul style="list-style-type: none"> • Processor: <ul style="list-style-type: none"> • Dual-core • 3.5 GHz • 2 MB cache • 8 GB RAM • 128GB Solid State Drive • 116dB Gaming Sound Card • 1080p Dedicated GPU

- (a) Give **one** reason for choosing Specification A or B based on the following aspects alone:

- (i) Number of cores [1]

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- (ii) Main memory [1]

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- (iii) Graphics card [1]

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- (b) Describe the functional characteristics of the secondary storage technologies used **either** in a Hard Disk Drive **or** a Solid State Drive. [4]

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3. (a) State the logical operator used in the following truth table: [1]

Input		Output
A	B	C
0	0	0
1	0	1
0	1	1
1	1	0

- (b) Tick (✓) **one box only** to show the Boolean expression that represents the function described by the truth table. [1]

Input		Output
P	Q	R
0	0	0
1	0	1
0	1	0
1	1	0

$$R = P \oplus Q$$

$$R = \overline{P} \cdot \overline{Q}$$

$$R = P \cdot \overline{Q}$$

$$R = P + Q$$

- (c) Complete the truth table. [4]

A	B	A . B	$\overline{A} \cdot \overline{B}$	\overline{B}	$\overline{A} \cdot \overline{B} + \overline{B}$
0	0				
0	1				
1	0				
1	1				

4. (a) High and low level languages are used in programming.

Tick (✓) **one box only** for each statement that applies to a high level or low level language. [3]

STATEMENT	HIGH LEVEL	LOW LEVEL
They are easier to understand, learn and program as commands are similar to natural language.	<input type="checkbox"/>	<input type="checkbox"/>
They require less time for translation into machine code.	<input type="checkbox"/>	<input type="checkbox"/>
They are preferred when the execution speed is critical.	<input type="checkbox"/>	<input type="checkbox"/>

(b) Describe how each type of program translator works.

(i) Assembler [2]

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(ii) Interpreter [2]

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5. (a) Describe the OSI 7-layer model. [3]

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(b) Name the missing layers in the OSI 7-layer model. [3]

LAYER	
7	
6	Presentation
5	Session
4	
3	Network
2	
1	Physical

(c) Describe the purpose of each of the following layers:

(i) Physical layer [2]

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(ii) Network layer [2]

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GCSE COMPUTER SCIENCE Sample Assessment Materials 10

6. A local sports club wants to store the details of its members on a computer system. A partially complete data structure design is shown below. [6]

Complete the table, suggesting:

- **Three** most suitable data types
- **Three different** methods of validation.

FIELD NAME	DATA TYPE	EXAMPLE DATA	VALIDATION CHECK
Member ID	Integer	12345	
Title	String	Miss	Look-up list
First name	String	Mary	Presence check
Surname	String	Johnson	Presence check
Gender		F	Presence check
Date of birth	Date	23/04/1984	
Address	String	123 Park Avenue	Presence check
Post code	String	E1 7AE	
Telephone number		020 7946 0914	Length check
Membership paid		Yes	Presence check

7. (a) Complete the table, converting between denary, binary and hexadecimal numbers as necessary. [3]

DENARY	BINARY	HEXADECIMAL
	11111100 ₂	FC ₁₆
184 ₁₀		B8 ₁₆
54 ₁₀	00110110 ₂	

- (b) Show how -92₁₀ can be represented using two's complement in an 8-bit register. [1]

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- (c) Perform an arithmetic shift left by one place on the number below and name the error caused by the shift. [2]

10110111₂.

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Error:

GCSE COMPUTER SCIENCE Sample Assessment Materials 12

8. Clearly showing each step, simplify the Boolean expression using Boolean algebra and identities. [4]

$$A.(B + A)$$

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10. Graphics can be represented and stored on computer systems.

(a) Explain how bitmap graphics are stored and the effects of different colour depths. [4]

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(b) Lossy and lossless are two types of data compression used to compress digital graphics.

A certain method achieves the following compression ratios:

Lossy	5:2
Lossless	10:9

Calculate the resulting file size using each compression type for a 200 KB graphic. [2]

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Lossy file size: **Lossless file size:**

11. The Internet allows access to a wealth of resources and services, such as webpages and applications of the World Wide Web.

(a) (i) State the role of a web browser. [1]

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(ii) Explain the structure of this URL. [4]

<https://www.eduqas.co.uk/qualifications/compsci>

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- 12. The operating system is a suite of system programs that manages a computer's resources.

Explain how the operating system manages:

- (a) Multi-tasking [3]

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- (b) Interrupts [2]

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13. (a) **Tick (✓) one box only** for each description that is relevant to the named legislation. [4]

Description	General Data Protection Regulation	Copyright Designs and Patents Act 1988	Regulation of Investigatory Powers Act 2000	Creative Commons Licensing
Allows interception of communication in the interests of national security.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When a programmer gives people the right to share and modify their work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ensures protection against unauthorised or unlawful processing of data.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protects intellectual property in software development.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(b) Give **three** principles of the Computer Misuse Act 1990. [3]

Principle 1:

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Principle 2:

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Principle 3:

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14. Cybersecurity ensures that computer systems are protected against the threats of criminal activity using electronic data.

(a) Describe the characteristics of the following threats to computer systems:

(i) Malware [2]

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(ii) Brute force attacks [2]

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(b) Describe the following ways of protecting against threats:

(i) Penetration testing [4]

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(ii) Double authentication [3]

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END OF PAPER