

Surname	Centre Number	Candidate Number
First name(s)		0

**GCSE**



C500U10-1



**MONDAY, 2 NOVEMBER 2020 – AFTERNOON**

**COMPUTER SCIENCE – Component 1**  
**Understanding Computer Science**

1 hour 45 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	5	
2.	6	
3.	14	
4.	9	
5.	8	
6.	7	
7.	5	
8.	6	
9.	12	
10.	6	
11	6	
12	6	
13	10	
<b>Total</b>	<b>100</b>	

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen.  
 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 page 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 use of calculators is not permitted in this examination.  
 The total number of marks is 100.  
 Some questions will require you to draw on knowledge from multiple areas of your course of study.

1. Give an example of data that could be stored for each data type.

[5]

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Data Type	Example Data
Integer	
Boolean	
Real	
Character	
String	

2. (a) Tick (✓) one box only to match each description with a contemporary secondary storage technology. [3]

Description	Magnetic	Optical	Solid State
Laser beams are projected onto a CD/ DVD or Blu-ray disc and if light is reflected back, then data is read as a 1 and if light is not reflected back, data is read as a 0.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This technology is used in hard disks and tapes. Data is stored on a medium by writing data using a write-head. Data can then be read by the read-head.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Used in storage media such as flash memory sticks. This technology does not have any moving parts, such as a read-head in magnetic storage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(b) Compare external hard disks and flash memory sticks in terms of durability, portability and speed. [3]

**Durability**

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**Portability**

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**Speed**

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3. A secondary school is considering purchasing new computer systems for its staff and pupils. They are considering the following specification.



- Desktop
- Processor:
  - o Dual-core
  - o 2.8GHz / 3.0GHz (Turbo Core)
  - o 1 MB cache
- 4 GB DDR4 RAM (2400 MHz)
- 1 TB HDD, 7200 rpm
- Motherboard
- 116dB Gaming Sound Card
- 1080 DVI/DP/HDMI PCI Graphics Card
- Wireless-AC
- Gigabit Ethernet port (10/100/1000)
- Bluetooth 4.0
- USB 3.0 × 2
- USB 2.0 × 4
- HDMI × 1
- VGA × 1
- USB keyboard
- USB mouse
- 3.5 mm jack
- DVD/RW
- 90 W AC power adapter
- 90 × 344 × 297 mm (H × W × D)
- 4.3 kg
- 1 year guarantee

- (a) Using the components from the specification, complete the following sentences about the computer system being considered by the secondary school.
- (i) The ..... is the main circuit board of the computer. [1]
- (ii) The ..... will convert analogue input signals into digital data and reverse this process for output. [1]
- (iii) The ..... will be used for the temporary storage of currently running programs and data. [1]
- (iv) The ..... memory is used for the temporary storage of frequently accessed data and instructions. [1]
- (b) The computer has a certain amount of main memory. Calculate the amount of main memory this specification has in Megabytes (MB) and in Terabytes (TB). [2]

**Megabytes:** ..... MB

**Terabytes:** ..... TB

(c) Suggest **two** specific upgrades to the specification and state the impact of each upgrade. [4]

**Upgrade 1:**

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**Upgrade 2:**

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(d) Describe the difference between an integrated GPU and a dedicated GPU. [4]

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4. (a) Draw truth tables for the NOT and XOR logical operators.

(i) NOT

[2]

(ii) XOR

[2]

(b) Construct a truth table which uses **one** AND logical operator and **one** OR logical operator in a Boolean expression of your choice.

[5]

**Boolean Expression:**.....

5. (a) (i) Convert  $0110101101011101_2$  into hexadecimal. [2]

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(ii) Convert  $BE_{16}$  into denary. [2]

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(b) State the effect of performing arithmetic shifts on the following 8 bit register, identifying errors where appropriate.

0	1	0	1	1	0	0	0
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(i) Two arithmetic shifts right. [2]

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(ii) Two arithmetic shifts left. [2]

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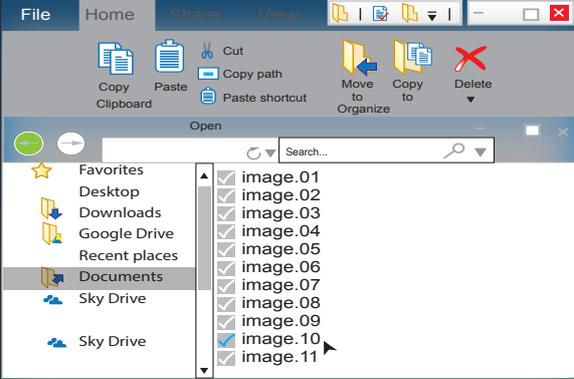
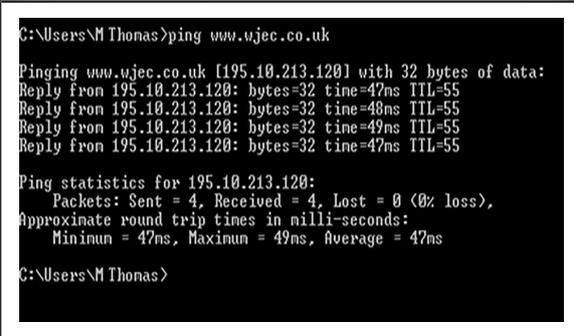
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6. Human-computer interaction (HCI) is the term used to describe the communication between people and computer systems.

(a) Name the types of HCI shown below.

[2]

	<p>HCI: .....</p>
	<p>HCI: .....</p>



7. Clearly showing each step, simplify the following Boolean expression using Boolean identities and rules. [5]

$$P(0 + R) + \bar{P}R$$

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9. (a) Tick (✓) the boxes to show if the statements about compilation are **True** or **False**. [5]

Statement	True	False
Compilers convert each line of source code into machine code, and execute it as each line of code is run.	<input type="checkbox"/>	<input type="checkbox"/>
At the lexical analysis stage of compilation, comments and unneeded spaces are removed.	<input type="checkbox"/>	<input type="checkbox"/>
Tokens are checked to see if they match the spelling and grammar expected, using standard language definitions during the code generation stage of compilation.	<input type="checkbox"/>	<input type="checkbox"/>
At semantic analysis stage of compilation, variables are checked to ensure that they have been properly declared and used.	<input type="checkbox"/>	<input type="checkbox"/>
Compilers translate a program written in one language into an equivalent program written in a different language.	<input type="checkbox"/>	<input type="checkbox"/>

(b) Describe the purpose of an assembler. [3]

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(c) Describe and give an example of **one** syntax and **one** logical programming error. [4]

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**Syntax**

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**Logical**

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10. Computer systems that are used to store data require good data management.

(a) Explain the need for file backups and generations of files.

[4]

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(b) Explain the need for archiving files.

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11. Describe the characteristics and purpose of high-level and low-level languages, identifying situations that require the use of each. [6]

**High Level**

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**Low Level**

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