Cambridge Assessment International Education

Cambridge O Level

COMPUTER SCIENCE **3175/12**

Paper 1 Theory **May/June 2021**

MARK SCHEME

Maximum Mark: 75

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2021 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

PUBLISHED

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

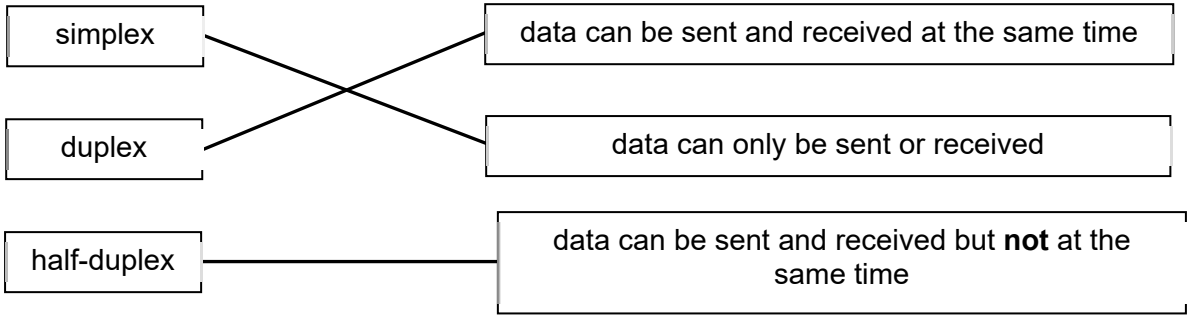
Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks
1	**One** mark for each sensor.	**3**

Application	Sensor
monitoring flow of liquid in a pipe	pressure // motion // magnetic field
counting the number of vehicles using a road	infrared/motion // pressure // magnetic field
controlling an automatic watering system in a greenhouse	humidity // moisture // temperature

Question	Answer	Marks
2	**One** mark for one correct line, **two** marks for 3 correct lines.	**2**



Question	Answer	Marks
3(a)	– Internet Protocol	**1**
3(b)	Any **two** from: – Unique identifier – Used as destination address of a device (for sending data) // Used to establish path to the host – Used by browser to request webpages	**2**

Question	Answer	Marks
4	**One** mark for each correct row.	**5**

Storage media	Magnetic (✓)	Optical (✓)	Solid State (✓)
Removable Hard Disk Drive	✓		
Digital Versatile Disc (DVD)		✓	
Hard Disk Drive (HDD)	✓		
USB Flash memory			✓
Blu-ray disc		✓	

Question	Answer	Marks
5	Any **three** from: – Allows data to be stored so it is directly accessible by the CPU // primary memory – Stores data temporarily – Stores (parts of the) OS **currently in use** – Stores data/programs that are **currently in use** – Supports/allows multitasking	**3**

Question	Answer	Marks
6(a)	4 marks for 8 correct outputs 3 marks for 6/7 correct outputs 2 marks for 4/5 correct outputs 1 mark for 2/3 correct outputs	**4**

A	B	C	**X**
0	0	0	**1**
0	0	1	**0**
0	1	0	**0**
0	1	1	**1**
1	0	0	**0**
1	0	1	**0**
1	1	0	**1**
1	1	1	**1**

Question	Answer	Marks
6(b)	**One** mark for each correct section of the statement. ((A AND B) OR (NOT A AND C)) AND (B OR C) – (A AND B) – (NOT A AND C) – (B OR C) – Brackets around first two-mark points, and separated correctly with OR and AND	**4**

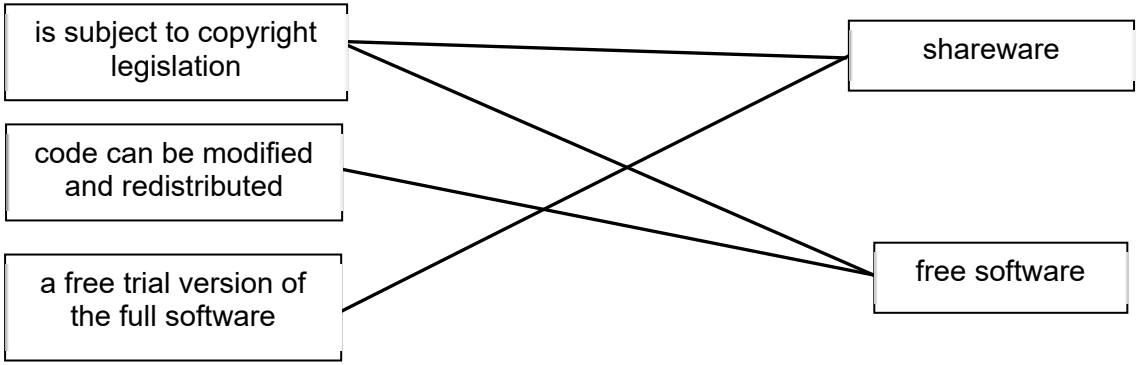
Question	Answer	Marks
7(a)	Any **six** from: – Temporary storage – To store addresses – To store data/instructions – PC stores address of next instruction – MAR stores **address** of instruction **to be fetched** – MDR stores **data** from the **address in MAR** – ACC stores interim results of calculations/data to be used in calculations – CIR stores the **current instruction being processed**	**6**
7(b)	**Three** from: – Data (bus) – Address (bus) – Control (bus)	**3**

Question	Answer	Marks
8(a)	**One** mark for correct answer**:** – 400 kB **One** mark for one correct stage of working e.g.: – 1024 * 100 = 102400 – 102400*32 = 3276800 – 3276800 / 8 = 409600 – 409600 / 1024	**2**
8(b)	Any **three** from: – Uses a (compression) algorithm – No data will be removed – Repeating pixels are identified – … and indexes them – Example of lossless method e.g. RLE – Stores the colour difference between pixels	**3**

Question	Answer	Marks
9(a)	Any **six** from (Max **two** per security issue): Denial-of-Service (DoS): – Large number of requests sent **at the same time** to the **web server/network** – **Web server**/**network** cannot handle all requests so crashes Viruses: – Self-replicating malicious software – Damages data on computer // causes computer to run slowly Hacking: – Unauthorised/illegal access to a **computer**/**system** – To view / steal /damage data	**6**

Question	Answer	Marks
9(b)	**One** from: – Data is **encrypted** and **decrypted** using the **same** key Any **three** from: – Data is scrambled – … to make it meaningless – Data before encryption is known as plain text – Data after encryption is known as cypher text – Key is sent to receiver (to allow data to be decrypted) // Values are sent to receiver that are used to generate key	**4**
9(c)	Any **four** from: – Suitable for long distances – Data is sent one bit at a time – Single wire used – … cheaper to buy/install/maintain – … less chance of interference/crosstalk – … data should arrive in order / won't be skewed – … less chance of error	**4**

Question	Answer	Marks
10(a)	– 119	**1**
10(b)	– 100111010 … – … with leading 0 to make 10 bits (0100111010)	**2**
10(c)	**One** mark for 13 **One** mark for A (only when it is right most digit) **One** mark for 13A with no other values present – 13A	**3**

Question	Answer	Marks
11	**One** mark for correct two lines only to shareware **One** mark for correct two lines only to free software 	**2**

Question	Answer	Marks
12(a)	**One** mark for each correct parity bit. <table><tr><td colspan="2">Parity bit</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr></table>	**2**
12(b)	Any **one** from: – Even number of bits have changed – Transposition error – Still adds up to correct parity – Does not check the order of bits (just the sum of 1s and 0s)	**1**
12(c)	– Byte number – **5** – Bit number – **3**	**2**

Question	Answer	Marks
13	Any **four** from: – No need for multitasking // Single purpose – No need for file management – No requirement to run other software, so no platform needed for this – No need for user interface – No need for security management – No need for user accounts – No need for batch processing – Limited memory management needed – Limited input/output management needed – Limited processor management needed	**4**

Question	Answer	Marks
14	Any **three** from: – To acts as a firewall – To redirect traffic away from a server // Protect server from DoS – To keep IP address anonymous – Cache data to speed up common requests – Encrypts data	**3**

Question	Answer	Marks
15(a)	– Create 3D object // by example	**1**
15(b)	Any **two** from: – Receives instructions from CAD software – Printer creates object in layers // additive manufacturing – … using plastic / resin / plaster / metal – … using moving arm/nozzles – … using xyz co-ordinates – Object/layer is then dried/cured	**2**