www.dynamicpapers.com



Mark Scheme (Results)

Summer 2019

Pearson Edexcel International GCSE
In Computer Science (4CP0)
Paper 01 Principles of Computer Science

www.dynamicpapers.com

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2019
Publications Code 4CP0_01_1906_MS
All the material in this publication is copyright
© Pearson Education Ltd 2019

www.dynamicpapers.com

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

www.dynamicpapers.com

Question Number	Answer	Additional Guidance	Mark
1(a)	Award **one** from: Input, process, output in this order – **3 marks** Input, process, output in any order – **2 marks** At least one of input, process, output – **1 mark**		3

Question Number	Answer	Additional Guidance	Mark
1(b)	B: Central processing unit **The only correct answer is B** **A** is not correct as this is memory only **C** is not correct as this is memory only **D** is not correct as this is used only for transporting memory addresses		1

Question Number	Answer	Additional Guidance	Mark
1(c)	• Data (1) • Instructions (1)		2

Question Number	Answer	Additional Guidance	Mark
1(d)	Any **two** from: 1. Virtual memory (VM) is used when RAM becomes full (1) (to hold all programs and data). 2. Virtual memory is used as (an extension to) main memory/RAM / works like RAM. (1) 3. Virtual memory is stored/created on (internal) secondary storage/HDD/SSD. (1) 4. Virtual memory is used as temporary storage. (1) 5. Instructions and data not currently being used are transferred from RAM to VM/HDD. (1) 6. When needed again, instructions and data are transferred back to RAM. (1)		2

www.dynamicpapers.com

Question Number	Answer	Additional Guidance	Mark
1(e)	Any **two** from: 1. The disc surface is made out of polycarbonate. (1) 2. A laser (beam) is used. (1) 3. Data is stored as a series of tiny grooves arranged in tracks on the surface of the disc. (1) 4. Bumps/lands/flats/troughs/pits/dips imprinted/burnt on the disc. (1) 5. Bumps and flats (etc.) represent 1 and 0 (bits) / the reflection (of the laser) represents 1 and 0 (bits). (1)		2

Question Number	Answer	Additional Guidance	Mark
1(f)	D: System software **The only correct answer is D** **A** is not correct because this category is purely for software that is used for security purposes **B** is not correct because this category is designed for end user tasks rather than for managing the computer itself **C** is not correct because this software is used to translate a high level program into machine code		1

www.dynamicpapers.com

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>2(a)</td><td>Award one from each:

Zafer:
1. Choose strong (1) authentication credentials (username/password)
2. Not sharing his credentials (1)
3. Not having automatic login to cloud / leaving his machine unattended (1)
4. Changing password regularly (1)
5. Password protect documents (1)

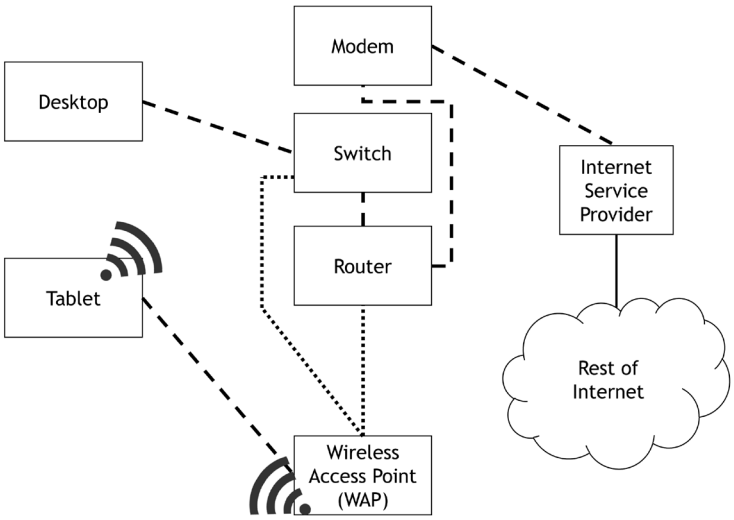
Provider:
1. Infrastructure (e.g. firewall/servers) must be secure from unauthorised access (1)
2. Keeping their security software up to date (1)
3. Policy and procedures effective in preventing an insider attack / a data breach (1)
4. Data protection laws in the resident country must be obeyed (1)
5. Backup and restore procedures (1)
6. Encryption (1)</td><td></td><td>2</td></tr>
</table>

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>2(b)</td><td>Two marks if completely correct.
One mark for any two correct cells.

<table>
<tr><th></th><th>Robert</th><th>Zafer</th></tr>
<tr><td>Washing machine design drawings</td><td>Read</td><td>Read</td></tr>
<tr><td>A folder of manuals for new machines</td><td>None</td><td>Read, Write
Or
Write, Read</td></tr>
</table>
</td><td>Ignore spelling mistakes</td><td>2</td></tr>
</table>

www.dynamicpapers.com

Question Number	Answer	Additional Guidance	Mark
2(c)	Award **one** mark from each category (maximum of 2) Input: • www.pearson.com / website domain (1) • Uniform Resource Locator / URL (of Pearson website) (1) Output: • 2.20.38.113 (1) • Pearson's machine IP(v4) address (1)	Don't penalise spelling or typos, especially in addresses	2

Question Number	Answer	Additional Guidance	Mark
2(d)	One mark for each dotted connection, correctly located. Maximum of 6 marks. Note: WAP can be connected to either the Switch or the Router, but not both  		6

www.dynamicpapers.com

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	• LAN / Local area network (1) Allow PAN/Personal Area Network		1

Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	• WAN / Wide area network (1)		1

Question Number	Answer	Additional Guidance	Mark
3(b)	A: Megabits per second **The only correct answer is A** **B** is not correct because megapixels are associated with images rather than network data speeds **C** is not correct because mebicycles are not associated with network data speeds **D** is not correct because mebihertz are not associated with network data speeds		1

www.dynamicpapers.com

Question Number	Answer	Additional Guidance	Mark
3(c)	• IMAP (1) AND **one** from: • because changes are synced (1) with the mail server in real-time (1) • because the messages always reside on the email server (1) as she has limited storage (1) on her tablet and phone • it gets sent to both smartphone and tablet (1) **Alternative answer:** • POP3 (not awarded a mark) AND **one** from: • because storage limitations on server (1) and privacy issues (1) • because more CPU time (1) may be used when syncing (1) (a large number of messages).		3

Question Number	Answer	Additional Guidance	Mark
3(d)			4

Characteristic	Bus	Ring	Star	Mesh
Network performance degrades as more devices are added.	✓			
All devices are directly or indirectly connected to all others.				✓
Each node has a physical attachment to a routing device.			✓	
There are no data collisions, because packets travel in the same direction.		✓		

www.dynamicpapers.com

Question Number	Answer	Additional Guidance	Mark
3(e)(i)	-81 One mark for negative sign One mark for 81.		2

Question Number	Answer	Additional Guidance	Mark
3(e)(ii)	One mark for each nibble in correct order 0100 1011		2

www.dynamicpapers.com

Question Number	Answer	Additional Guidance	Mark
3(e)(iii)	Any **two** from: 1. This is an overflow (1) error 2. It is caused by adding two 1s in the most significant bit (1) 3. The resulting number is too large to fit in the number of bits available / requires 9 bits / the number is larger than 2^8 / there is 1 that needs to be carried over (in MSB) / MSB gets discarded (1) 4. It can cause the program to crash or produce unreliable/incorrect results (1)		2

Question Number	Answer	Additional Guidance	Mark
4(a)	Any **two** from: Kilobyte is a SI (physics/science) / International System of Units measurement, whereas Kibibyte is an IEC (computing) / International Electrotechnical Commission / International System of Quantities / ISO measurement (1) Kilobyte is equivalent to 1000 bytes, whereas a kibibyte is equivalent to 1024 bytes (1) Kilobyte is equivalent to 10^3 bytes, whereas a kibibyte is equivalent to 2^{10} bytes (1) Kilobyte is a base 10 measurement, whereas a kibibyte is a base 2 measurement (1)	Ignore units	2

www.dynamicpapers.com

Question Number	Answer	Additional Guidance	Mark
4(b)	Award **4 marks** for 19.17 or **One** mark for each of: • Calculates correct bits/bytes(1) • Adds metadata (1) • Calculates correct megabytes (1) • Completely correct response (1) Examples: $\frac{\frac{2322 \times 4128 \times 16}{8} + 975}{1000 \times 1000}$ $\frac{(2322 \times 4128 \times 2) + 975}{1000 \times 1000}$ ((2322 x 4128 x 16 bits per colour) ÷ 8 bits per byte) + 975 bytes --- 1000 bytes per KB x 1000 kilobytes per MB ((2322 x 4128 x 2 bytes per colour) + 975 bytes --- 1000 bytes per KB x 1000 kilobytes per MB	• Arithmetic precedence rules must be clearly followed • Units are not required • Equivalent expressions are accepted • Calculations not explicit (8x1000x1000) but expressed (8000000) gain the mark	4

www.dynamicpapers.com

Question Number	Answer	Additional Guidance	Mark
4(c)(i)	Any **two** from: • To save disc/storage space (1) • Reduce transmission time (1) • Meet email attachment size restrictions (1)		2

Question Number	Answer	Additional Guidance	Mark
4(c)(ii)	Any **two** from: • Compressing / decompressing the file takes execution time (1) • Both compressing and decompressing have to be done with compatible software / both ends of transmission have to use compatible software (1) • (If the compression utility uses a lossy algorithm then) some of the data will be permanently removed / it won't be possible to reconstruct the original file. (1) • Can affect the quality of the file (1) • File size can increase (1)		2

www.dynamicpapers.com

Question Number	Answer	Additional Guidance	Mark
4(d)	Award 4 marks for 11 Award 3 marks for a value between 10 and 11 **One** mark for each: • 80 x 66 x 2 or 80 x 66 x 16 ÷ 8 (1) • + 40 or + 80 (1) • ÷ 1024 (1) • Ceiling or RoundUp (1)	• Arithmetic precedence rules must be clearly followed • Units are not required • Alternative notations for ceiling are accepted • If 16 bits per Unicode character is not awarded, then allow follow through error • Allow follow through error, if interim calculations attempted • Equivalent expressions are accepted	4

www.dynamicpapers.com

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>5(a)(i)</td><td>One mark for each correct row

<table>
<tr><th>Width</th><th>Length</th><th>Height</th><th>Output</th></tr>
<tr><td>4</td><td>4</td><td>2</td><td>Requires large container (1)</td></tr>
<tr><td>2</td><td>2</td><td>2</td><td>Too small for cargo container (1)</td></tr>
<tr><td>3</td><td>8</td><td>5</td><td>Too large for cargo container (1)</td></tr>
</table>

Do not penalise spelling</td><td>3</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
5(a)(ii)	Any response that indicates the concept of: Determining which size shipping container is needed for the indicated cargo.		1

www.dynamicpapers.com

Question Number	Answer	Additional Guidance	Mark
5(b)	SEND states [numStates] TO DISPLAY (1) or SEND state TO DISPLAY (1) SET numStates TO numStates + 1 (1) or LENGTH(states) (1) Concatenation of message and variable uses “ and & & numStates & TO DISPLAY (1) or & LENGTH(states) & TO DISPLAY (1) or STRING(numStates) TO DISPLAY (1) Pseudocode is correct (1)	• Accept , or + in place of & • Ignore capitalisation of commands •	4

```
SET numStates TO 0
SET states TO ["France", "Singapore",
               "Malta", "Panama",
               "Greece", "Italy"]
FOR EACH state FROM states DO
    SEND state TO DISPLAY
    SET numStates TO numStates + 1
END FOREACH
SEND "There are " & numStates & "states" TO DISPLAY
```

```
SET numStates TO 0
SET states TO ["France", "Singapore",
               "Malta", "Panama",
               "Greece", "Italy"]
FOR EACH state FROM states DO
    SEND state TO DISPLAY
END FOREACH
SEND "There are " & LENGTH (states) & "states" TO DISPLAY
```

```
SET numStates TO 0
SET states TO ["France", "Singapore",
               "Malta", "Panama",
               "Greece", "Italy"]
FOR EACH state FROM states DO
    SEND state TO DISPLAY
    SET numStates TO numStates + 1
END FOREACH
SEND "There are " & STRING (numStates) TO DISPLAY
```

www.dynamicpapers.com

Question Number	Answer	Additional Guidance	Mark
5(c)(i)	Showing that index goes up to 4 and does not exceed 4 (1) Showing correspondence between values of index and loadWeight[index] (1)	• There does not have to be an explicit indication of the out-of-bounds / crashing error. • Ignore target and found columns • Allow two rows per loop with matching index and loadWeight values	2

target	found	index	loadWeight[index]
50500	FALSE	0	20000
		1	28000
		2	40000
		3	50000
		4	

target	found	index	loadWeight[index]
50500	FALSE	0	
		1	20000
		2	28000
		3	40000
		4	50000

Question Number	Answer	Additional Guidance	Mark
5(c)(ii)	1. Use of AND operator (in the test of relevant conditions) (1) 2. Use of suitable function to find the length of the array using a correct comparison to index (1) Example: WHILE ((NOT found) AND (index < LENGTH (loadWeight))) DO	• Do not penalise pseudocode syntax • Ignore changes to first condition as long as meaning is not lost	2

www.dynamicpapers.com

Question Number	Answer	Additional Guidance	Mark
6(a)(i)	Features such as power consumption / processor / memory / number and type of components / physical size (1) can be optimised / chosen to fit just one specific task. (1)		2

Question Number	Answer	Additional Guidance	Mark
6(a)(ii)	Any **two** from: • Printer (1) • Bank card (magnetic strip) reader/scanner (1) • Bank card contactless/NFC reader/scanner (1) • Cash input and giving change device (1)	Allow any hardware that relates to paying by cash for MP4	2

Question Number	Answer	Additional Guidance	Mark
6(a)(iii)	To prevent unauthorised people from reading / understanding the bank card information (1)	Do not award 'to keep it from being hacked / accessed'.	1

www.dynamicpapers.com

Question Number	Answer	Additional Guidance	Mark
6(b)	Award **one** mark for each of (maximum of 4): 1. Readability: high-level language is easily readable by a human because it is designed to look like English whereas a low-level language is binary patterns / mnemonics / abbreviations. (1) 2. Portability: code written in a high-level language is easily transportable across machines whereas a low-level language is designed for a specific microprocessor / piece of hardware. (1) 3. Uses: low-level languages are commonly used to write programs for hardware or devices, like printers, whereas high-level languages are commonly used for to write higher-level applications, such as word processors. (1) 4. Optimisation: low-level languages are used to improve performance, especially of hardware, whereas high-level languages have to go through multiple layers of software to get to the hardware, e.g. the need for HLL to be compiled/interpreted makes programmes run slower than LLL, HLL has a higher level of abstraction removing unnecessary detail (one to many), LLL keeps more of a detail (one to one) (1) 5. Ease of use: high-level languages usually have tools, functions, libraries and development environments which are accessible, even by those with little knowledge, whereas, low-level languages are often challenging to work with and require expertise and depth of knowledge. (1)	For each mark point: • the general feature is followed by exemplification • needs to be a comparison, which may be implicit	4

www.dynamicpapers.com

Question Number	Answer	Mark
6(c)	Indicative content: Characteristics – Any of the following: • Implemented in software. • Could involve the use of neural networks / clustering / modelling • Algorithms are trained by exposure to data that has been validated / checked • Algorithms learn by identifying commonalities between the validated / checked data • Algorithms make predictions for new data based on prior learning • Algorithms may incorporate recursive self-improvement Uses – Any of the following: • Game playing (opponents) • Analytics (analyse buying patterns, predicting behaviours, predictive text, targeted advertising, personalised news feeds, friend suggestions) • Image / Audio processing (recognising objects/patterns, face recognition) • Logistics (scheduling, order fulfilment) • Control systems (cars, manufacturing, weapons, navigation • Diagnostic systems (medical, mechanical, electrical) • Natural languages processing (chatterbots, chatbots, speech recognition, personal assistants) • Robotics (dangerous situations, help aged or disabled) Ethical issues – Any of the following: • Training sets could include data that should not be used to make decisions (race, religion, gender, etc.) that could cause biased outcomes • Is a computer to be trusted to make decisions (life-death)? • If a computer discovers something that humans can't prove, should it be accepted as truth? • How do we know that the answer produced is correct? • Will people be comfortable interacting with machines that are considered intelligent? • Some jobs may be at risk, especially those requiring human skills such as empathy or creativity.	6

www.dynamicpapers.com

Level	Mark	Descriptor
	0	No rewardable content.
Level 1	1–2	Basic, independent points are made showing elements of knowledge and understanding of key concepts/principles of computer science. The discussion will contain basic information with little linkage between points made.
Level 2	3-4	Demonstrates adequate knowledge and understanding of key concepts/principles of computer science. The discussion shows some linkages and lines of reasoning with some structure.
Level 3	5-6	Demonstrates comprehensive knowledge and understanding by selecting relevant knowledge and understanding of key concepts/principles of computer science to support the discussion being presented. The discussion shows a well-developed, sustained line of reasoning which is clear, coherent and logically structured.

www.dynamicpapers.com

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom