Pearson Edexcel

Mark Scheme

Specimen Set 2

Pearson Edexcel GCSE In Computer Science (1CP2)
Paper 01: Principles of Computer Science

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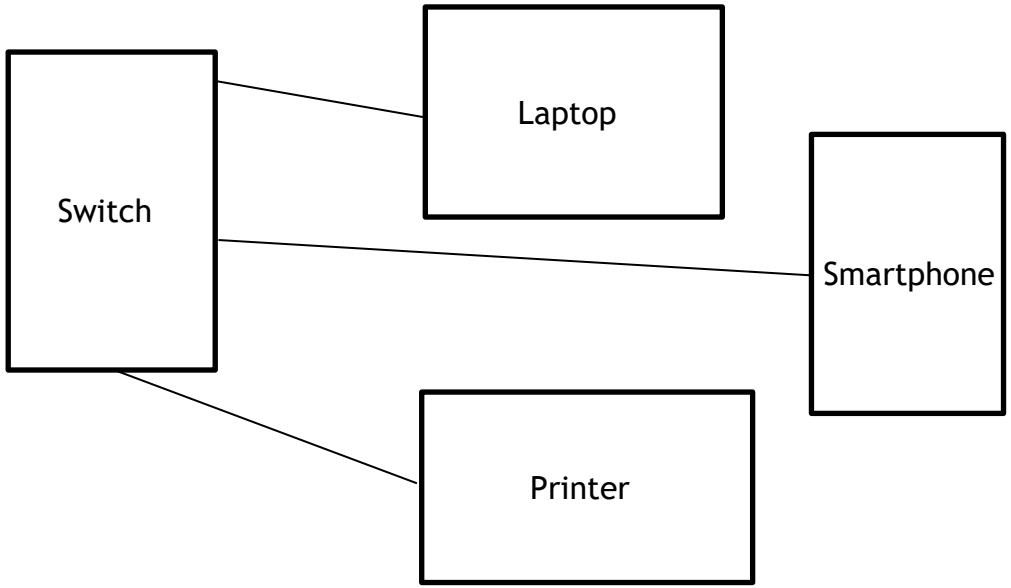
Paper 1 Mark Scheme

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>1(a)</td><td>
<table>
<tr><th>Layer</th><th>Protocol</th></tr>
<tr><td>Application</td><td>HTTP / HTTPS / SMTP / POP3 / IMAP / FTP</td></tr>
<tr><td>Transport</td><td>TCP</td></tr>
<tr><td>Internet</td><td>IP</td></tr>
<tr><td>Link / Data Link / Network interface</td><td>Ethernet</td></tr>
</table>
</td><td></td><td>4</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
1(b)i	One mark for each to a maximum of 2: • Named device is switch/hub (1) • Exactly three lines connecting devices to centre point/named device (1)  	• Marks are independent • Do not award bullet 2 if there are extraneous lines • 'Router' would not gain a mark because it is a term that is often used to describe a hardware device that may contain a modem, router, switch and wireless access point.	**2**

Question Number	Answer	Additional Guidance	Mark
1(b)ii	Any **two** from: • A star is more scalable (1) than a bus because you can add extra devices without disrupting the network. • A star is more fault tolerant/reliable (1) because a damaged cable/faulty device can be replaced/removed without disrupting the rest of the network. • It is easier to troubleshoot/isolate faults (1) because all cables are attached to a central point. • A star is capable of handling higher volumes of network traffic (1) than a bus.		**2**

Question Number	Answer	Additional Guidance	Mark
1(c)	Any one from: • Speeds up data transfer • Reduces the reliability on a single pathway • Reduces the impact of data corruption		**1**

Question Number	Answer	Additional Guidance	Mark
1(d)	D Packet number *A is not correct because the data being sent is in another part of the packet* *B is not correct because if the packet were encrypted the key would not be sent in the header* *C is not correct because packets are not restricted to the type of media they can use*		**1**

Question Number	Answer	Additional Guidance	Mark
1(e)	An explanation that includes the ideas: Permission is given to a person (1) to carry out investigation of security issues (1) in the network White-box / white-hat (1) because system information is provided to the tester (1) The company should give a security expert an ID and password and details of how the network is configured (1), and ask them to try to find vulnerabilities that would enable an employee to access, delete and/or leak sensitive data or install malicious software (1)		**2**

Question Number	Answer	Additional Guidance	Mark
2(a)	A definition to include: • The process of removing or hiding unnecessary (1) details so that only the important points remain (1) • Programmers can focus only on the important details of a problem (1) because abstraction allows them to ignore (1) any detail that is not relevant.		**2**

Question Number	Answer	Additional Guidance	Mark
2(b)	One mark for each in the correct location: • Relational (1) • Arithmetic (1) • Boolean/Logical (1)	• Ignore spelling	**3**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>2(c)</td><td>One for each correct cell.

<table><tr><th>Input</th><th>Output</th></tr><tr><td>200</td><td>Too high (1)</td></tr><tr><td>33</td><td>Good choice (1)</td></tr><tr><td>100</td><td>Nice round number (1)</td></tr><tr><td>0</td><td>Too low (1)</td></tr></table></td><td>• Ignore spelling</td><td>4</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
2(d)	A description to include: • A syntax error is caused by using the grammar/form/words of the programming language incorrectly (1), whereas a logic error is caused by an error in the design of the algorithm (1) • A syntax error causes the program not to interpret/compile/translate, whereas a logic error produces an incorrect/wrong result (1)		**2**

Question Number	Answer	Additional Guidance	Mark
2(e)i	Six/6		**1**

Question Number	Answer	Additional Guidance	Mark
2(e)ii	The list has already been split into 7 individual lists. The response here should only show the missing merges. One mark for each correct merge: 4 9 | 3 5 | 1 5 | 7 | (1) 3 4 5 9 | 1 5 7 | | | (1)		**2**

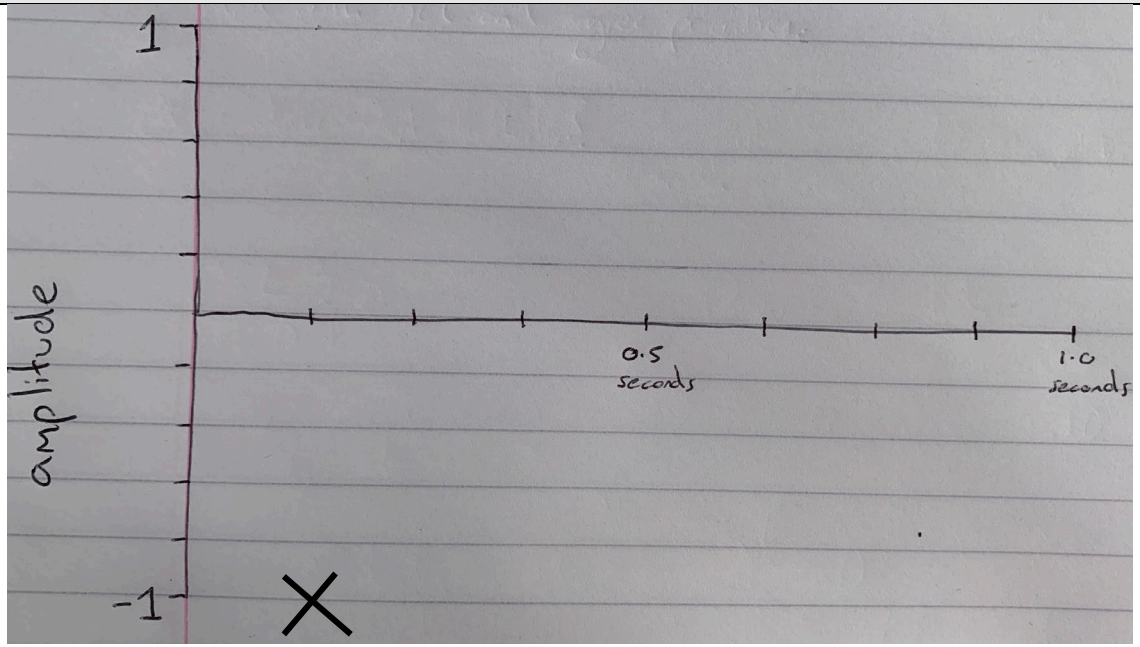
Question Number	Answer	Additional Guidance	Mark
2(e)iii	An explanation to include: • The merge sort will use more memory (1) because it makes copies of the list (1). • The bubble sort will use less memory (1) because it is an in-place (1) sort. • The merge sort will take more time to write and debug (1), because it is a much more complex (1) algorithm. • The bubble sort will probably take less time to write (1) because it is a simple/well-known (1) algorithm.		**2**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>3(a)</td><td>One mark for each correct cell

<table><tr><th>Base</th><th>Number of values per digit</th></tr><tr><td>Binary</td><td>2</td></tr><tr><td>Hexadecimal</td><td>16</td></tr></table></td><td>• Ignore spelling</td><td>2</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
3(b)	B Gibibytes represent binary multiples *A is not correct because Gigabits are consistent with the units used for data transmission* *C is not correct because more data cannot be represented in gibibytes* *D is not correct because processors do not have to carry out fewer operations when using gibibytes*		**1**

Question Number	Answer	Additional Guidance	Mark
3(c)	1 mark for each nibble 0101 0010		**2**

Question Number	Answer	Additional Guidance	Mark
3(d)i	 Correct X position (1) Correct Y position (1)		**2**

Question Number	Answer	Additional Guidance	Mark
3(d)ii	There will be more samples in each second (1)		**1**

Question Number	Answer	Additional Guidance	Mark
3(e)	1 mark for each digit in the correct location: 4A		**2**

Question Number	Answer	Additional Guidance	Mark
3(f)i	Award **1** mark for each number in the correct location for a maximum of 3: • 6 in numerator (1) • 1024 in either box in denominator (1) • 8 in either box in denominator (1) Example of expression that gains full marks: $\frac{96 \times 128 \times 6}{1024 \times 8}$		**3**

Question Number	Answer	Additional Guidance	Mark
3(f)ii	3 bits Explanation: because you need to count up to 5. 3 bits counts up to 8, but 2 bits only counts to 3, which is not enough.		**1**

Question Number	Answer	Additional Guidance	Mark
3(g)	One mark for each nibble 1010 0111		**2**

Question Number	Answer	Additional Guidance	Mark
3(h)	An explanation to include: ASCII only represents English characters / Kana/hiragana cannot be represented in ASCII (1) because there are not enough bits (1) With just 7 bits, only 128 unique codes (1) can be generated, which is not enough (1) to represent all the characters used in the written languages of the world The text has foreign characters (1) and there are not enough bits (1) in ASCII to represent them		**2**

Question Number	Answer	Additional Guidance	Mark
4(a)	D Virus E Worm *A is not correct because keyloggers record keystrokes and send them to a third party* *B is not correct because Ransomware prevents access to a system, or files* *C is not correct because a Torjan is malware disguised as legitimate software*		**2**

Question Number	Answer	Additional Guidance	Mark
4(b)	An explanation to include **two** from: It helps prevent unauthorised access to data (1) • because security issues could be missed in development (1) • because there could be interactions with other software (1) • because a malicious user could have published a vulnerability on the web (1) • because sometimes vulnerabilities only become apparent after code has been released to the public (1)		**2**

Question Number	Indicative content
4(c)	Discuss the legal and ethical issues associated with the company's collection and use of data. **Legal responsibilities of the travel company** • Purpose of the data being collected must be revealed to the subject, e.g. personal/passport data used to book international travel • Data should only be used for the purpose specified and not be disclosed to third parties without permission, e.g. use of data to pass to third-party marketing companies (car hire / hotels / airlines) • Data collected must not be excessive, e.g. data must have some relevant connection to travelling • Data held must be accurate and up to date, so the company must check customers' personal details regularly • Ensure data must not be keep data longer than necessary e.g. past one year on from last customer contact • Because the company supports travellers from other countries, they cannot transfer data to countries without adequate protection and should check that their own laws are comparable with those countries from which travellers originate and to which they will travel/share data • Data must be stored securely and prevent unauthorised access e.g. use of effective data security measures including policies and network practices. **Legal rights of data subjects** • Right for data to be processed appropriately (as outlined above) • Right to access data held about them to check and update it **Ethical responsibilities of the travel company** Where data subjects consent to wider uses, the company must • Consider how the data will be used, e.g. automated decision making to find the best/cheapest/environmentally friendly routes/destinations • Ensure that individuals' needs are considered, e.g. those with disabilities / different age groups / families • Anonymise data used for statistical analysis so that individuals cannot be identified

Level	Mark	Descriptor
	0	No rewardable content.
Level 1	1–2	Basic, independent points are made, showing elements of understanding of key concepts/principles of computer science. (AO1) The discussion will contain basic information with little linkage between points made or application to the context. (AO2)
Level 2	3–4	Demonstrates adequate understanding of key concepts/principles of computer science. (AO1) The discussion shows some linkages and lines of reasoning with some structure and application to the context. (AO2)
Level 3	5–6	Demonstrates comprehensive understanding of key concepts/principles of computer science to support the discussion being presented. (AO1) The discussion is well developed, with sustained lines of reasoning that are coherent and logically structured, and which clearly apply to the context. (AO2)

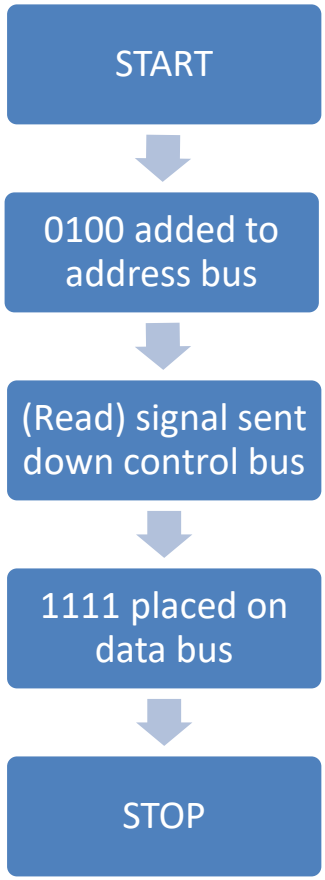
Question Number	Answer	Additional Guidance	Mark
5(a)	A description to include (to a maximum of 3, with at least one in each category): Fragmentation: • Files are written to disk in blocks (1). • Blocks can be dispersed (1) across the disk. Defragmentation: • Defragmentation is when file blocks are rearranged (1) on the disk. • All the blocks for one file are moved closer together (1). • All the free space is moved to be together (1).	• Defragmentation does not 'make' more free space on the disk. It only rearranges what is already there.	**3**

Question Number	Answer	Additional Guidance	Mark
5(b)	One mark for each to a maximum of 2: • There's a record of who changed what when (1) • Identifies the point at which an error/security issue was introduced (1) • Enables the program to be rolled back to a previous state (1) • Improve accountability/produces robust code (1)		**2**

Question Number	Answer	Additional Guidance	Mark
5(c)	A description to include: • To provide access (1) to the device by controlling who can log on (1) to the device • To allow a user to log on (1) by checking the username/password (1) • By authenticating (1) the user before allowing them to log on (1)		**2**

Question Number	Answer	Additional Guidance	Mark
5(d)i	One mark for each to a maximum of 4, with at least one in each category Connectivity: • The mower could connect to a wireless/wired (1) network. • The mower could have a GPS device (1). Input: • A phone/desktop/software application (1) could be used to schedule when it will work. • A map of the garden would be stored (1) on the mower. • The mower would have sensors (1) to know if it ran into things/if it was dark/if it were raining/if it ran outside the garden. Process: • The microcontroller (1) in the mower would run a program (1). • A map of the garden would be read (1) by the program so the mower would know where to go. • The program would monitor (1) the power status to know if it needed recharging. Output: • The program on the mower could upload (1) statistics/information back to the application. • The mower could have a digital readout/flashing lights (1) to indicate status.		**4**

Question Number	Answer	Additional Guidance	Mark
5(d)ii	An explanation to include: The mower should use solid-state secondary storage (1) because it has no moving parts/can use very little power from the battery/is robust to bumps and knocks (1)		**2**

Question Number	Answer	Additional Guidance	Mark
5(e)		2 marks for each box between START and STOP. Award 4 marks max if the order is incorrect.	**6**