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GCSE COMPUTER SCIENCE

5.3

Edexcel 1CP2 | Specification point 5.3.2

Methods of protecting digital systems and data (anti-malware, encryption, acceptable use policies,...

Untiered

Answers and examiner comments

2	2021-2025	Untiered
question groups	available papers	tier

Using this booklet

1. Answer numbers match the companion question booklet.
2. Follow the original question number on marking tables.
3. Examiner comments are included where available.

Name _____ **Date** _____

Some entries use full source marking material in an appendix. Any unavailable mark schemes are identified beside the relevant answer.

Original question 8

The full source mark scheme begins on page 6. Use the original paper code, tier and question number shown above.

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	**The only correct answer is A** *B is not correct because gaining consent is an issue with collecting and storing data* *C is not correct because copyright is an issue with ownership of digital assets* *D is not correct as no intellectual property law is broken*	The correct answer is computer misuse	**(1)**

Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	Award **one** mark for any of the following up to a maximum of **three** marks: • Consent must be obtained/given to collect data (1) • Individuals have a right to have data removed/withdraw consent (1) • Individuals have a right to see data held on them (1) • Data can only be collected for a specified purpose (1) • Only necessary data may be collected (1) • Data must be accurate (1) • Data must be kept up to date (1) • Data may not be kept for longer than necessary (1) • Data must be kept securely (1) • Data cannot be shared with third parties without consent (1) • Data controllers must be able to prove data protection measures are sufficient. (1)		**(3)**

Question Number	Answer	Additional Guidance	Mark
3(b)	Award **one** mark for any of the following: • Source code is accessible (1) • Source code can be edited (1) • Source code can be amended/redistributed (1) • Support may not be provided (1)	Do not award free/costs no money	**(1)**

3(c)(i)	Award **two** marks for a linked explanation such as: • Users are deterred from unsafe practices (1) because consequences are clarified (1). • People follow safe/good practices (1) because permitted activities are defined/set out (1). • Users will follow the rules of the policy (1) because they want to keep their files safe (1)	For both marks, the expansion must follow/associate with the statement. Accept responses that use examples. e.g. AUPs contain guidance such as to not open links from unknown sources (1) to prevent malware infection (1)	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(c)(ii)	**The only correct answer is C** *A is not correct because a keylogger only records key strokes* *B is not correct because a trojan masquerades as another file type* *D is not correct because a worm runs by itself*	The correct answer is Virus	**(1)**



Mark Scheme (Results)

November 2021

Pearson Edexcel GCSE In Computer Science (1CP0/01) Paper 1: Principles of Computer Science

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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.

Question Number	Answer	Additional Guidance	Mark
1(a)	D		**1**

Question Number	Answer	Additional Guidance	Mark
1(b)	Any **two** from: • Anti-virus • Anti-spyware • Firewall • File management • File repair/recovery • File conversion • Compression • Defragmentation • Back up	Accept 'anti-malware' if mark not already awarded for Mark point 1/2	**2**

Question Number	Answer	Additional Guidance	Mark
1(c)	Machine code / binary (1) Processor / CPU (1)	Accept 'computer'	**2**

Question Number	Answer	Additional Guidance	Mark
1(d)	An explanation to include **two** linked points such as: • The source code is not available (1) because the compiler converts the code to machine code (1) • Compiled code is not human readable (1) so nobody else can alter it or sell it on (1) • Compiled code is difficult/impossible to reverse engineer (1) so nobody else can alter it or sell it on (1)		**2**

Question Number	Answer	Additional Guidance	Mark
2(a)			**6**

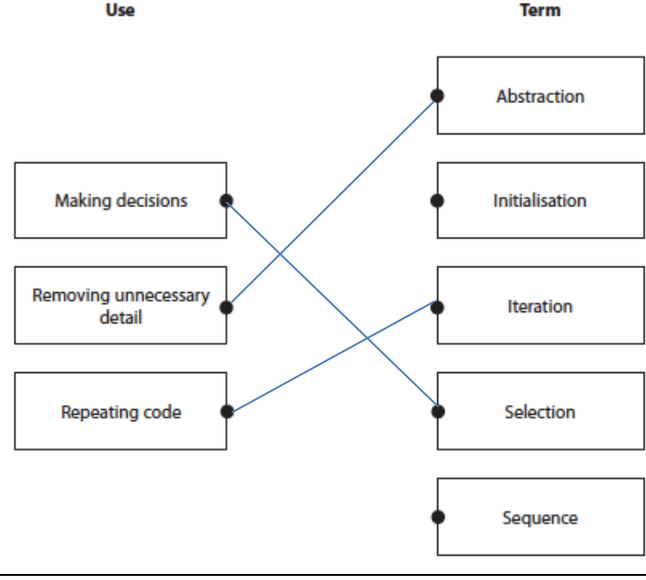
X	Y	Z	Y AND Z	X OR (Y AND Z)
0	1	0	0	0
0	1	1	1	1
1	1	0	0	1
1	1	1	1	1
0	0	0	0	0
0	0	1	0	0
1	0	0	0	1
1	0	1	0	1

Question Number	Answer	Additional Guidance	Mark
2(b)	Arithmetic Logic Unit / ALU		**1**

Question Number	Answer	Additional Guidance	Mark
2(c)	Process		**1**

Question Number	Answer	Additional Guidance	Mark
2(d)	Any **one** from: • To store frequently used instructions (1) • To act as a buffer (1) • To make up the difference in the speed between RAM and the CPU (1)		**1**

Question Number	Answer	Additional Guidance	Mark
3(a)	A description to include: A sequence of instructions (1) that solves a problem (1)		**2**

Question Number	Answer	Additional Guidance	Mark
3(b)			**3**

Question Number	Answer	Additional Guidance	Mark
3(c)	An explanation such as: (Inclusion) reduces the divide/disadvantage in society (1) because more people have access (1)	Mark point 1 can be awarded for reference to: legal requirements / increased sales	**2**

Question Number	Answer	Additional Guidance	Mark
3(d)	An explanation such as: • Less CO2 is produced by people travelling to work (1) because people can use the internet to work remotely (1) • More energy efficient homes (1) because smart technologies can switch the lights off when no one is in the room (1) • Endangered species can be protected (1) because GPS technologies can track their locations (1)		**2**

Question Number	Answer	Additional Guidance	Mark
3(e)	A description to include **two** linked points such as: Freedom to view the source code (1) and modify/distribute it (1)		**2**

Question Number	Answer	Additional Guidance	Mark
3(f)	A description to include **two** points such as: • Essential features such as colours/images/suits/numbers/values (1) can be used to		**2**

	represent a general model of a card (1) • No need to consider physical features of cards / just need to know essential features (1) e.g. suit, value, rank (1)		

Question Number	Answer	Additional Guidance	Mark
4(a)	• 32 • 2^5		**1**

Question Number	Answer	Additional Guidance	Mark
4(b)	AD		**1**

Question Number	Answer	Additional Guidance	Mark
4(c)	**Binary:** One mark for 1110 0011 **Denary:** One mark for 227	Allow follow through.	**2**

Question Number	Answer	Additional Guidance	Mark
4(d)	One mark for each nibble in the correct location: 0100 0101 Or **one** from: • H – E (1) • 72 – 3 (1) • 69 (1)	Binary must be expressed using 8 bits for both marks.	**2**

Question Number	Answer	Additional Guidance	Mark
4(e)	A comparison to include **two** from: Effect on sample resolution (1) e.g. More levels of amplitude can be represented (with 24 bits) Effect on accuracy of representation (1) e.g. The sound is more like the original (with 24 bits) Effect on transmission speed/storage/memory (1) e.g. Takes longer to transmit / creates larger file sizes / uses more memory (with 24 bits)		**2**

Question Number	Answer	Additional Guidance	Mark
4(f) **(i)**	One mark for each nibble: 0 0 1 1 1 0 1 0 1 0 1 1 0 0 1 1 1 1 1 0 1 1 0 1		**2**

Question Number	Answer	Additional Guidance	Mark
4(f) **(ii)**	It will produce an overflow error (1) because there are not enough available bits (1)		**2**

Question Number	Answer	Additional Guidance	Mark
5(a)	**One** from: • Instructions for the game do not change. • RAM is volatile. • Users aren't expected to alter the game's code or assets		**1**

Question Number	Answer	Additional Guidance	Mark
5(b)	An explanation such as: To store actions /progress during the game (1) because this data is changeable (1) OR RAM stores data that can change (such as variable values) (1) which is needed to store scores/progress during the game (1)		**2**

Question Number	Answer	Additional Guidance	Mark
5(c)	A linked response to include **two** from: Logic allows for decisions to be made (1) enabling a range of options/pathways/scenarios to be provided (1) that can adapt to ability of the player / how the player plays (1) Example response: Logic is used to compute the output response (1) generated by the player's action given their location and the location and actions of other players in the game environment (1)		**2**

Question Number	Answer	Additional Guidance	Mark
5(d)i	000 0011 010 0101 (1) 000 0100 (1) 010 0001 111 0011 010 0001 000 0011 (1)		**3**

Question Number	Answer	Additional Guidance	Mark
5(d)ii	One mark for sight of each: • 10x9 (1) • x7 (1) • 10x9/15x7 (1) Award all four marks for a complete expression including minus sign and expressed with the correct order of operations. e.g. (10x9x7)-(10x9/15x7)	Award equivalent expressions e.g. • (10x9x7)-(6x7) • (90x7)-(6x7)	**4**

Question Number	Answer	Additional Guidance	Mark
6(a)	A		**1**

Question Number	Answer	Additional Guidance	Mark
6(b)	A description to include **three** linked points from: ROM contains (1) the firmware for the motherboard / BIOS / Boot sequence / Start-up instructions (1) that loads the operating system (1) from secondary storage (1) into RAM (1)		**3**

Question Number	Indicative content
6(c)	**Lower order responses: -** HDD vs SSD Low cost/High capacity vs High cost/Low capacity Low vs High energy efficiency Slow vs fast access speeds **Higher order responses:** Access speeds negated by network latency SSD access speeds faster, so could be used for database software to provide quicker lookups. Larger storage capacity means used for file storage provided by HDD Files written to SSD as faster and then permanently stored / Backed up to HDD Frequently stored data 'cached' on SSD.

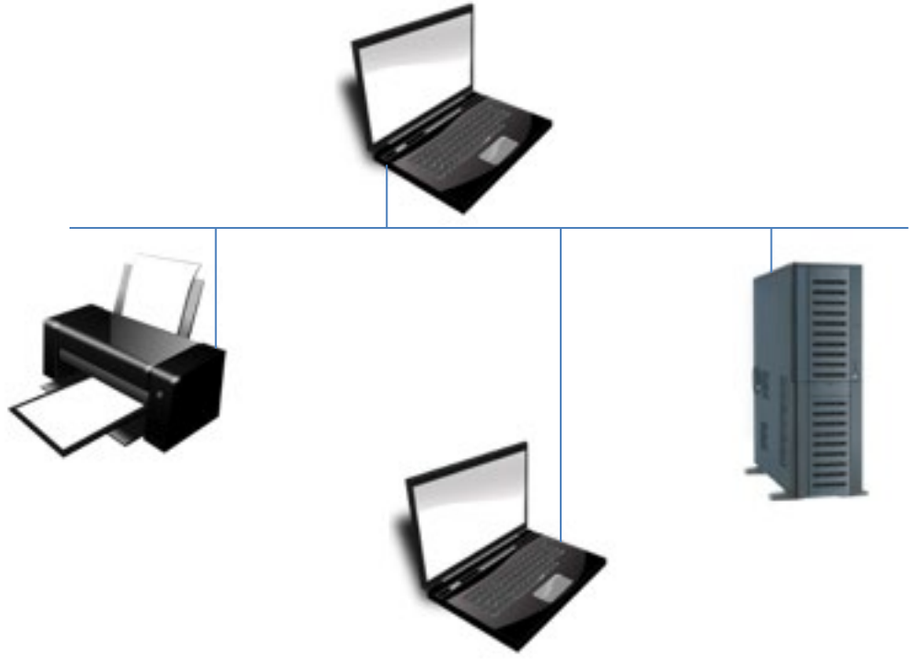
Level	Mark	Descriptor
	0	No rewardable content
Level 1	1-2	A comparison may be attempted but with limited application of knowledge and understanding of key concepts/principles of computer science to the theoretical context. The comparison will contain basic information with some attempt made to link knowledge and understanding to the given context.
Level 2	3-4	A comparison will be given with adequate application of knowledge and understanding of key concepts/principles of computer science to the theoretical context. Lines of reasoning are occasionally supported through a linkage The comparison shows some linkages and lines of reasoning with some structure.
Level 3	5-6	A comparison will be given with comprehensive application of knowledge and understanding of key concepts/principles of computer science to the theoretical context. Line(s) of reasoning are supported throughout by sustained application of relevant evidence. The comparison shows a well-developed and sustained lines of reasoning which is clear, coherent and logically structured.

Question Number	Answer	Additional Guidance	Mark
7(a)	C		**1**

Question Number	Answer	Additional Guidance	Mark
7(b)	An explanation to include **two** from: • IMAP retains the data on a server (1) which can be read by any computer (1) • POP3 downloads the data to the client (1) so it would not be available from a different computer (1)		**2**

Question Number	Answer	Additional Guidance	Mark
7(c)	A linked description to include **four** from: Splits the data into packets (1) and numbers them (1) using a checksum (1) to see if packets have been delivered correctly (1) to avoid error/data corruption detection (1) before reordering them at their destination (1) Award other linked points such as: resends packets if found to be corrupt/missing on arrival (1) handles handshaking and transmission details (1) establishes a dedicated channel between source and destination devices (1) communicates with the application layer above and the network layer below (1)		**4**

Question Number	Answer	Additional Guidance	Mark
7(d)	Responds to incoming client requests (1) by supplying a service/resource (1) Examples: File/web/mail/database server (1) stores resources (data/files) and delivers (data/files) / manages requests (for data/files) (1) Print server (1) manages requests for print jobs (1)		**2**

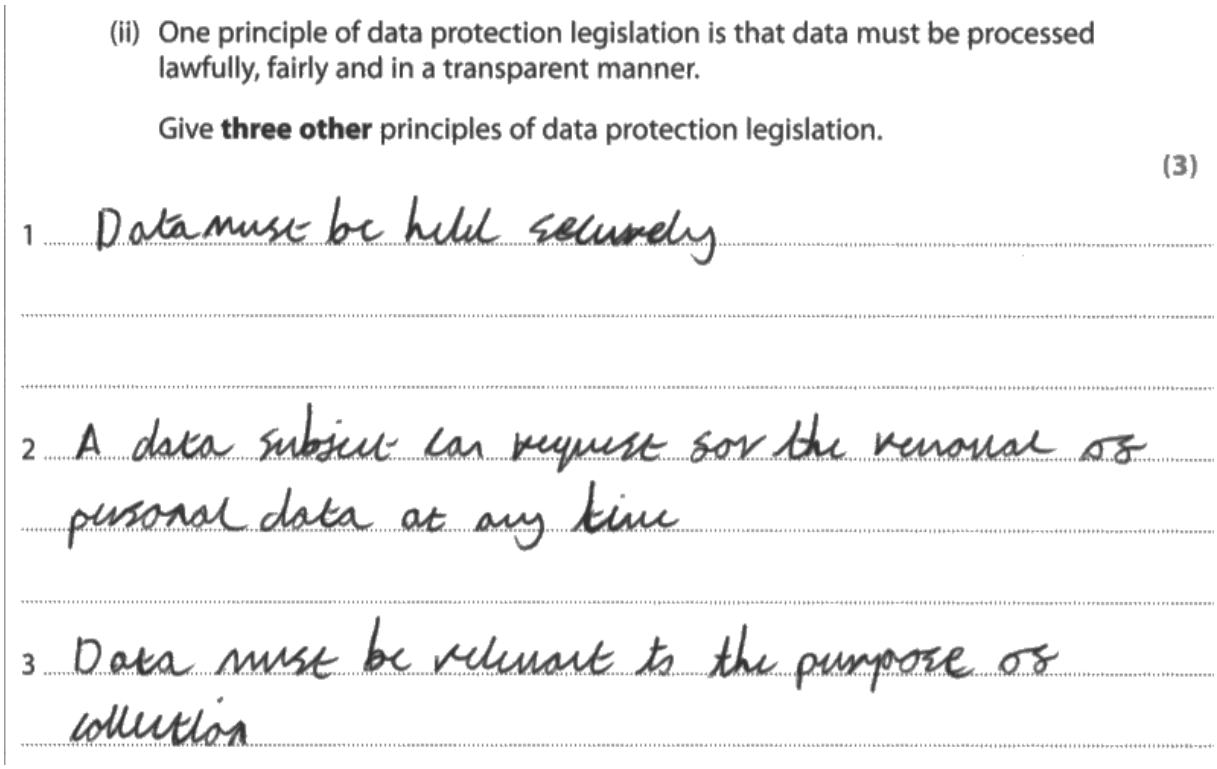
Question Number	Answer	Additional Guidance	Mark
7(e)	Single line not directly connected to any device (bus) (1) single lines connecting each device to bus (1) 		**2**

Question Number	Indicative content
8	• Validation and authentication techniques (access control, physical security and firewalls) • Security issues associated with the 'cloud' and other contemporary storage • Different forms of cyberattack (based on technical weaknesses and behaviour) including social engineering (phishing, shoulder surfing), unpatched software, USB devices, digital devices and eavesdropping • Methods of identifying vulnerabilities including penetration testing, ethical hacking, commercial analysis tools and review of network and user policies • How to protect software systems from cyber-attacks, including considerations at the design stage, audit trails, securing operating systems, code reviews to remove code vulnerabilities in programming languages and bad programming practices, modular testing and effective network security provision

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.

Question 3(a)ii

Most candidates demonstrated at least some knowledge of the principles of data protection, either giving the responsibilities of companies holding and processing data or the rights of individuals. The most commonly cited data protection principle was the need to gain consent to collect data.



(ii) One principle of data protection legislation is that data must be processed lawfully, fairly and in a transparent manner.

Give **three other** principles of data protection legislation.

(3)

1 Data must be held securely

2 A data subject can request for the removal of personal data at any time

3 Data must be relevant to the purpose of collection

ResultsPlus
Examiner Comments

This response gained all 3 marks, covering both the rights of individuals and the responsibilities of companies.

Question 3(b)

A number of responses were too general to be awarded credit. Statements such as 'anyone can use it' or 'anyone can access it' could equally apply to free software where the source code is not made available. Good responses made it clear that it was the source code that could be accessed/edited.

(b) Software licensed as open-source can be used free of charge.

Give **one other** characteristic of open-source software licensing.



ResultsPlus
Examiner Comments

This response gained 0 marks because it was too vague. Anyone can use any software if they pay for it. Anyone can use 'free' software. It was not clear that the source code was freely available to anyone.

Question 3(c)i

Many candidates gave clear explanations using examples of recommended or banned actions that could appear in an AUP alongside resultant consequences and reasons. Some candidates confused acceptable usage policies with cyber security and the need for malware protection or confused it with access controls or monitoring programs. This showed a misunderstanding between policy to influence behaviour and automated technological systems to stop unwanted actions.

(c) Cyber security protects computer systems from harm.

(i) Explain **one** reason why an acceptable use policy keeps computer systems secure.

(2)

It prevents people with unauthorised access to misuse the systems to access data for personal use.

ResultsPlus
Examiner Comments

This response scored 0 marks because it confused access controls with acceptable usage policies.