

AQA Level 3 Technical Level IT

Fundamental Principles of Computing

Unit Number: Y/507/6424

Mark Scheme

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the learners' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation, each associate analyses a number of learners' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of learners' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from: aqa.org.uk/tech-levels

SECTION A

The following list indicates the correct answers used in marking Candidates' responses to the multiple choice questions

KEY LIST

1	B	5	D
2	D	6	A
3	A	7	C
4	B	8	C

9a The micro USB port can be used to charge the tablet computer. Identify **one** other way in which the micro USB port could be used.

[1 mark]

1 mark for an appropriate way of using the micro USB port, eg

- Transferring files to/from
- Tethering
- Charging a mobile phone/other device
- Connecting peripherals including input, storage and output
- Gain superuser/root access to hack/customise tablet

NOT allowed:

- Charging the tablet

9b The CPU is a quad core processor. Give one purpose of multi-core processors.

[1 mark]

1 mark for a suitable purpose, eg

- Increase the performance of a CPU
- Reduce power consumption
- More efficient simultaneous processing of multiple-tasks
- To package the core logic of two processors into a single circuit
- Any other reasonable purpose

9c Describe the Fetch-Execute Cycle of the CPU.

[2 marks]

1 mark for each description, eg

- Fetch/retrieve/open instruction/command from memory/RAM
- CPU stores instructions in its (temporary) registers
- Decode instruction/command / decide what to do (or other reference to data processing)
- Execute/run instruction/command
- One clock pulse for fetch / one clock pulse for execute

9d Give two possible disadvantages of a 64 bit computer.

[2 marks]

1 mark for each disadvantage, eg

- 16/32 bit software is not/may not be compatible
- Drivers may not be available for peripherals
- More data space required for the same data (1 mark for this or related point), eg
 - more bloated software
 - less memory available for other programs to use

9e Calculate the size of the internal storage of the tablet computer in **mebibytes**. Show your working.

[3 marks]

1 mark for recognising the definition of 1GB recommended by the International System of Units is 1,000,000,000 (or 1000^3 , 10^9 , etc) either explicitly or implicitly, eg writing down 32,000,000,000 (or 32×1000^3 , 32×10^9) within working

Do not penalise further for not recognising SI definition of gigabyte, ie candidate may use 1000^3 or 1024^3 to work out answer

1 mark for stating explicitly that a 'mebibyte' is 1024^2 , or implicitly in working, eg multiplication by 1024^{-2} division by 1024^2 or equivalent calculation

1 mark for the correct answer of 30517.6 (allow 30517 to 30518) or (if using 1024^3) 32768 or 2^{15}

10a Sending and receiving emails are two features of email applications. Give **two** other **features** of email applications.

[2 marks]

1 mark for each feature, eg

- Attachments to include a file with an email
- Signature to show details of who the email is from
- Email can be forwarded to another person
- Scheduling meetings

10b Describe **two** features of **anti-malware** software.

[4 marks]

1 mark for identifying feature and **1 mark** for expansion point, eg

- Automatic updates (1) which install new virus/spyware definitions (1)
- Scheduled scans (1) to scan the system at a pre-arranged time (1)
- Malware definitions (1) to give information to the user about malware that is found (1)
- On-access/real-time scanning/protection (1) to check files, links or webpages as they are accessed (1)
- Detect malware (1) and notify potential problems (1)
- Eliminate / vault malware (1) so that it no longer poses a threat (1)

10c State **two** disadvantages of installing **freeware**.

[2 marks]

1 mark for each disadvantage, eg

- May include malware which can damage files/software
- May include advertisements which can be distracting for the user
- Owner does not usually make financial gain from selling freeware
- May require payment for features
- May have limited functionality, or only be available for a limited time
- Less likely to be tested fully so may include bugs/errors
- May restrict the rights of the user to use, copy, distribute, modify, make derivative works or reverse-engineer the software

11a Identify a situation when a programmer may use JavaScript in preference to C++.
[1 mark]

1 mark for identifying situation, eg

- Client-side scripts to interact with the user
- Creating dynamic content (either online or offline, eg populate/validate forms within PDFs)
- Teaching a beginner to program
- Any other sensible suggestion

11b Describe the difference between Prolog and languages such as C and Java.
[2 marks]

1 mark for each difference or expansion point, eg

- Prolog is a declarative language, C and Java are procedural languages
- Declarative languages describe a problem rather than defining a solution
- Programming a knowledge based system / expert system / artificial intelligence
- Example of difference in syntax
- Any other reasonable difference or expansion point

11c Give a situation when the programmer might use assembly language.
[1 marks]

1 mark for description of situation, eg

- To program / code device drivers
- To improve the performance of programs written in high-level languages
- To perform an operation that is hardware dependent
- To perform an operation that is not possible in a high-level language
- For programs that need precise timing

11d Contrast ASCII and extended ASCII codes.
[2 marks]

1 mark for ASCII statement

1 mark for **related** extended ASCII statement

eg

- ASCII uses 7 bits, extended ASCII uses 8 bits

- ASCII has 128 characters from 0 to 127, extended ASCII has 256 characters from 0 to 255
- ASCII includes English characters, extended ASCII includes foreign characters
- ASCII includes control codes, extended ASCII includes special symbols

12a Explain why a technician would need to use a disc defragmentation utility.

[2 marks]

1 mark for each reason or expansion point, eg

- To enable the hard disk to work more efficiently
- Each file stored on a disc volume is not always stored in the same set of sectors / location so the volume becomes fragmented
- Access time to files is increased because the disc has to look in different sectors / places for a single file
- The utility will move files around so that each file is stored on a sequential set of sectors / rings

12b Give two reasons why a technician might want to use remote desktop protocol (RDP) when working from home.

[2 marks]

Answers must be related to working from home.

Answers must have a reason, not just “to access a desktop remotely”

1 mark for each reason, eg

- To use the software installed at work which is not available at home
- To gain access to files from work which are not available at home
- To provide technical support by accessing a desktop remotely

12c Give two reasons why a technician might configure an operating system via a command line interface rather than the graphical interface..

[2 marks]

1 mark for each reason, eg

- More control over file and operating systems
- Bypass the limitations of the graphical interface, eg for partitioning disks
- CLI uses less system resources
- Use for installing or repairing operating systems
- Commands stay relatively consistent while appearance of OS changes

13a Describe how the BIOS manages booting an operating system.

[2 marks]

1 mark for each method, eg

- Initialise and test the system hardware components
- Identify the first boot device and look for a boot partition / boot loader / master boot record operating system
- Report “no bootable device” if none is found
- If no boot partition / boot loader / master boot record / operating system, look for next boot device
- Locate the boot partition / boot loader / master boot record for the operating system
- Load the operating system from the boot partition / boot loader / master bot record

13b Evaluate the suitability of an **internal** or **external** PSU for a portable computer or console.

[3 marks]

Band	Descriptor	Marks
3	Sensible reasons explained for both internal and external PSU related to a portable computer or console	3
2	Sensible reasons given for both internal and external PSU related to a portable computer or console	2
1	Sensible reason given for use of internal or external PSU related to a portable computer or console	1

eg

Reasons for external PSU

- PSU can be heavy which makes computer less portable
- PSU can get hot which can have adverse effect on tightly packed components

Reasons for internal PSU

- PSU cannot be forgotten if it is part of the portable computer
- Universal plugs / leads (eg USB, IEC) can be used to power / charge the portable computer

Explanations

- Universal plugs / leads (eg USB, IEC) can be used to power / charge the portable computer which saves having to carry around an external adapter as most offices will have these universal leads.
- PSU can be heavy which makes computer less portable because the PSU is integrated into the computer.

13c Contrast memory **buffer** register and memory **address** register.

[2 marks]

1 mark for a contrast, 1 mark for an expansion point, eg

- MBR stores data whereas the MAR stores the address of the data
- Buffer register holds data ready for next clock cycle / about to be accessed by CPU whereas the memory address register holds the address of data that needs to be accessed

14 Illustrate the advantages and disadvantages of supercomputers and their potential applications.

[5 marks]

Band	Descriptor	Marks
3	Gives a range of advantages and disadvantages which are applied to potential applications	4-5
2	Gives a number of advantages and disadvantages and suggests possible applications	2-3
1	Gives at least two advantages or disadvantages	1

The specification (AO1) is open-ended on the types of applications that should be studied, though it should be clear in the potential applications cited that the candidate understands the relative power of super computer in terms of speed of calculations and volume of data handled.

Advantages, eg

- Solve tasks that require intensive calculations over many months, handle vast amount of data in a shorter time, accelerate research and development, share workload among multiple processors, data can move between processors rapidly

Disadvantages, eg

- Expense of build, usage and maintenance, huge power consumption/cooling requirements, takes up a lot of physical space, have a limited number of applications, increasing number of cores increases likelihood of system failure, specialist training, require storage devices fast enough to accommodate data being produced, may require OS specifically designed for each type of supercomputer

SECTION B

15a Identify three file systems that he could use to format the external device and describe how each is suitable in this situation.

[8 marks]

Candidates who assess each file system generically (ie without reference to the situation) are limited to 5 marks on this question.

- 1 mark** for each file system, **1 mark** for expansion point that assesses properties/limitations, eg
- ExFAT; can handle large files and works natively on both OS
 - NTFS; can handle large files on both OS but OSX requires some tweaking
 - FAT/FAT32; this has a 4GB size limit and wouldn't be suitable
 - HFS+; this will store large files but requires third-party tools to be recognised in Windows

1 mark for understanding that some file systems have file size limits

1 mark for identifying a format that can read and write 8GB files

15b Identify two other methods of backing up a music and film collection and assess the advantages and disadvantages of each.

[7 marks]

Band	Descriptor	Marks
3	Identifies two ways of backing up data and assesses the advantages and disadvantages of each	4-7
2	Identifies two ways of backing up data and one advantage or disadvantage; or one way of backing up data and one advantage and one disadvantage	2-3
1	Identifies one way of backing up data	1

16a Accuracy is a key metric for ensuring quality of data.

State three other metrics that can be used to ensure quality of data.

[3 marks]

1 mark for each metric, eg

- Validity, reliability, timeliness, relevance, completeness, bias, limitations, alignment, ownership

Not allowed:

- Accuracy

16b A company wants to research the use of smartphones among young people.

For each of your three metrics, explain how you could ensure quality of data in this research.

[8 marks]

Band	Descriptor	Marks
4	Provides an explanation for three metrics which shows clear understanding	7-8
3	Provides an explanation for three metrics which shows some understanding	5-6
2	Provides an explanation for two metrics which shows some understanding	3-4
1	Provides an explanation for one or two metrics, maybe lacking some context	1-2

Candidates may use other metrics than those given for their answer in 16a)

16c The company wants to separate its research into qualitative and quantitative data about smartphone use.

Define qualitative and quantitative data and give an example how each type could be used to research into smartphones.

[4 marks]

1 mark for each definition, **1 mark** for each example

Assessment Outcomes coverage

Assessment Outcomes	Marks and % of marks available in section A	Marks and % of marks available in section B	Total Marks
AO1: Understand the different types of computer	7 marks 8.75%	0 marks 0%	7
AO2: Understand the hardware requirements of a computer system	17 Marks 21.25%	7 marks 8.75%	24
AO3: Understand the software requirements of a computer system	14 Marks 17.5%	8 marks 10%	22
AO4: Understand how data is converted to information	1 Marks 1.25%	15 marks 18.75%	16
AO5: Demonstrate how computers process user requirements	11 Marks 13.75%	0 marks 0%	11
Total Marks	50	30	80

Question	Assessment Outcome					Question Total
	1	2	3	4	5	
SECTION A						
1		(2a)1				1
2		(2i)1				1
3		(2l)1				1
4		(2j)1				1
5				(4g)1		1
6			(3j)1			1
7					(5b)1	1
8					(5j)1	1
9		(2l)1, (2a)1, (2b)2, (2e)2	(3g)1		(5b)3	10
10	(1b)2		(3m)4, (3b)2			8
11					(5g)1, (5g+h)2, (5f)1, (5d)2	6
12			(3d)2+2, (3i)2			6
13		(2j)2, (2f)3, (2e)2				7
14	(1c)5					5
Total A	7	17	14	1	11	50

SPECIMEN MARK SCHEME – FUNDAMENTAL PRINCIPLES OF COMPUTING

SECTION B						
15		(2p)7	(3j+k)8			15
16				(4c+d)3+8+4		15
Total B	0	7	8	15	0	30
Totals	7	24	22	16	11	80