



*Rewarding Learning*

**ADVANCED SUBSIDIARY (AS)  
General Certificate of Education  
2017**

---

## **Digital Technology**

**Assessment Unit AS 2**

*assessing*

**Fundamentals of Digital Technology**

**[SDT21]**

**FRIDAY 2 JUNE, AFTERNOON**

---

**MARK  
SCHEME**

## General Marking Instructions

### Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

### The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

- 1 (a) (i) **Megabyte**  $2^{20}$  or 1048576 bytes  
**Terabyte**  $2^{40}$  bytes  
(2 × [1]) [2]
- (ii) 1 gigabyte =  $2^{30}$  bytes and 1 megabyte =  $2^{20}$  bytes  
 $\frac{2^{30}}{2^{20}} = 2^{10}$  megabytes = 1024 megabytes  
Therefore, 1 gigabyte can hold  $1024 \div 4$  or 256 of these files  
(each requires 4 megabytes)
- [2] for showing how **1024** is calculated  
[1] for **1024 ÷ 4**  
[1] for **256** [3]
- (b) (i) The binary of the +ve equivalent is inverted  
1 is added to the least significant bit (LSB)  
[1] + [1] [2]
- (ii) The decimal number 64 is 01000000 in binary (01000000<sub>2</sub>) [1]  
Invert 10111111<sub>2</sub> [1]  
Add 1 to LSB 11000000<sub>2</sub> [1] [3]

AVAILABLE  
MARKS

(c) **Indicative content**

**ASCII** uses 7 bits

ASCII can represent  $2^7$  characters/ASCII uses 7 bits to represent 128 characters. The 8th bit can be used for error checking

Alternatively, ASCII can represent  $2^8$  characters/ASCII uses 8 bits to represent 256 characters

**Unicode**

Unicode can represent  $2^{16}$  characters/Unicode uses 16 bits to represent 65536 characters

**Points of comparison**

Unicode can represent  $2^8$  (or 256) times as many characters as ASCII and this eliminates the need to have different character sets for different languages

ASCII uses fewer bits than Unicode which could result in faster processing/reduced memory requirements

Level of response	Marking criteria	Marks
<b>Band 2</b> <b>Excellent</b>	The candidate <ul style="list-style-type: none"><li>Relates the number of bits used by each system to the number of characters that can be represented</li><li>Articulates a valid comparison between the two systems</li><li>Uses the appropriate Digital Technology terminology accurately throughout the response</li></ul> Presentation, spelling, punctuation and grammar are of a high standard.	<b>[4] or [5]</b>
<b>Band 1</b> <b>Good</b>	The candidate <ul style="list-style-type: none"><li>Identifies the number of characters that can be represented by each system</li><li>Describes an advantage or disadvantage of either system</li><li>Uses some relevant Digital Technology terminology</li></ul> Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.	<b>[2] or [3]</b>
<b>Band 0</b> <b>Basic</b>	The candidate <ul style="list-style-type: none"><li>Identifies the number of bits that are used by each system</li><li>Refers to an advantage or disadvantage of either system</li><li>Makes limited use of Digital Technology terminology</li></ul> Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.	<b>[1]</b>

[5]

AVAILABLE  
MARKS

15

- 2 (a) Length check**  
 The number of characters in the field  
 ... must equal/must not be less than/more than a predefined number  
 (2 × [1]) [2]
- Format check**  
 The value must match  
 ... a picture/pattern/input mask  
 (2 × [1]) [2]
- (b) The Email field**  
 This field is compulsory/must be completed/required  
 (2 × [1]) [2]
- (c) The postcode field**  
 The computer searches for the value in a table of all valid postcodes  
 (2 × [1]) [2]
- (d) The Email field/Confirm Email field**  
 The value must be entered a second time/double entry is being used  
 (2 × [1]) [2]
- (e) Data is raw facts/figures**  
 BT1 3BG is just a sequence of characters  
 Information is processed data/data given a meaning/data given a context  
 The label shows that this is a postcode  
 (4 × [1]) [4]

**AVAILABLE  
MARKS**

- (f) (i) Transactions are grouped until a sufficient quantity is available  
 ... or until a particular time is reached/over a period of time  
 All transactions in a batch undergo the same processing  
 Processing takes place at an off peak period/night  
 No human intervention is required  
 (4 × [1]) [4]

(ii) **Indicative content**

**Hash total**

All the **OrderIDs** in a batch are totalled to give a hash total

**Control total**

All the **TotalOrderValues** in a batch are totalled to give a control total

**Point of comparison**

A hash total it is used purely for error checking. The total itself has no intrinsic or inherent meaning.

A control total is also used for error checking but the total has an intrinsic meaning – adding the control totals for a number of batches gives the total order value of all the orders in those batches

Level of response	Marking criteria	Marks
<b>Band 2</b> <b>Excellent</b>	The candidate <ul style="list-style-type: none"> <li>Describes accurately and concisely how a hash total is generated using the <b>OrderID</b> field, and how a control total is generated using the <b>TotalOrderValue</b> field</li> <li>Articulates the key difference between the hash total and the control total, and relates this to the order form referred to in the question</li> <li>Uses the appropriate Digital Technology terminology accurately throughout the response</li> </ul> Presentation, spelling, punctuation and grammar are of a high standard.	[4] or [5]
<b>Band 1</b> <b>Good</b>	The candidate <ul style="list-style-type: none"> <li>Distinguishes between the generation of a hash total and a control total but does not refer directly to the <b>OrderID</b> and <b>TotalOrderValue</b> fields</li> <li>Refers to the difference between a hash total and a control total</li> </ul> Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.	[2] or [3]
<b>Band 0</b> <b>Basic</b>	The candidate <ul style="list-style-type: none"> <li>Distinguishes between a hash total and a control total</li> <li>Makes limited use of Digital Technology terminology</li> </ul> Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.	[1]

[5]

**3 (a) Note Multitasking given**

The user can perform more than one process/application  
... (apparently) at the same time  
The user/OS can switch between tasks  
The operating system allocates resources to each task  
Only one task is active at any time  
(4 × [1])

[4]

**(b) Disk defragmenter**

Reorganises/rearranges the files stored on the disk  
... to improve efficiency/reduce search times/reduce access times  
Over time, the data for a file may be stored in different parts of the disk  
The defragmenter identifies all the data for a file  
... and stores it in contiguous space on the disk  
It will also do the same with the free space  
(4 × [1])

[4]

**Archive software**

Removes data which is no longer in regular/current use from the system  
... and stores it off-line  
... so that it is available if required  
The data may be required for legal reasons/auditing purposes  
... or for historical uses  
Compression is often used  
(4 × [1])

[4]

**(c) It is general purpose software**

It is used for many common tasks/computer applications  
Example: word processors/electronic spreadsheets/photo editing  
(3 × [1])

[3]

AVAILABLE  
MARKS

(d) Indicative content

**Off-the-shelf**

The software has already been created and can be purchased immediately

**Custom built**

The software is designed specifically for the company either in-house by their own ICT specialists or by a software developer

**Why off-the-shelf software might be better**

Accounting is a standard business function performed by all businesses/ organisations and there are many standard packages available

Support/training should be available for the off-the-shelf software because it is a common application, whereas this will have to be developed for the custom built software

Level of response	Marking criteria	Marks
<b>Band 2</b> <b>Excellent</b>	The candidate <ul style="list-style-type: none"><li>Describes off-the-shelf software and custom built software accurately and concisely</li><li>Articulates a valid reason why off-the-shelf software might be better for the company</li><li>Uses the appropriate Digital Technology terminology accurately throughout the response</li></ul> Presentation, spelling, punctuation and grammar are of a high standard.	<b>[5] or [6]</b>
<b>Band 1</b> <b>Good</b>	The candidate <ul style="list-style-type: none"><li>Describes the main difference between off-the-shelf software and custom built software</li><li>Refers to an advantage or disadvantage of each type of software</li></ul> Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.	<b>[3] or [4]</b>
<b>Band 0</b> <b>Basic</b>	The candidate <ul style="list-style-type: none"><li>Refers to a difference between off-the-shelf software and custom built software</li><li>Makes limited use of Digital Technology terminology</li></ul> Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.	<b>[1] or [2]</b>

[6]

AVAILABLE  
MARKS

21

- 4 (a) (i) It contains the address of the next instruction to be fetched/executed  
 The contents are incremented when the instruction has been fetched/during the fetch cycle  
 For a jump instruction, the contents may be changed during the execute cycle  
 (3 × [1]) [3]
- (ii) Internal memory is part of the CPU  
 It consists of RAM/ROM/cache memory  
 Secondary storage is external to the CPU  
 Example: magnetic/optical/flash media  
 (4 × [1]) [4]
- (iii) Upgrade the processor type  
 Example: dual/triple/quad/32 bit/64 bit/parallel processing  
 (2 × [1])
- Upgrade the clock  
 ... to one with a faster clock rate/so that more instructions are executed per second  
 (2 × [1])
- Increase the internal memory  
 ... to ensure faster retrieval times/to reducing swapping in and out of memory/Example: RAM/cache  
 (2 × [1])
- [2] for each of two methods** [4]

AVAILABLE  
MARKS

**(b) Indicative content**

**AVAILABLE  
MARKS**

**Command line interface**

There is a pre-set list commands

Each command is entered at a prompt and usually includes parameters and/or switches

**WIMP**

This is a GUI

Each task/process has its own window containing icons and/or menus

A pointer and mouse/touchpad are used to navigate and to select icons and/or menu options

**The experienced user**

An experienced user may prefer a CLI as a single command may perform a task which would require a long sequence of mouse clicks and menu selections in a WIMP

<b>Level of response</b>	<b>Marking criteria</b>	<b>Marks</b>
<b>Band 2</b> <b>Excellent</b>	The candidate <ul style="list-style-type: none"><li>• Describes the key features of a command line and a WIMP interface accurately and concisely</li><li>• Articulates why an experienced user will probably prefer a command line interface</li><li>• Uses the appropriate Digital Technology terminology accurately throughout the response</li></ul> Presentation, spelling, punctuation and grammar are of a high standard.	<b>[3] or [4]</b>
<b>Band 1</b> <b>Good</b>	The candidate <ul style="list-style-type: none"><li>• Distinguishes between a command line and a WIMP interface</li><li>• Refers to an advantage of a command line interface or a disadvantage of a WIMP interface for an experienced user</li><li>• Uses the appropriate Digital Technology terminology accurately throughout the response</li></ul> Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.	<b>[2]</b>
<b>Band 0</b> <b>Basic</b>	The candidate <ul style="list-style-type: none"><li>• Distinguishes between a command line interface and a WIMP interface</li><li>• Refers to an advantage or disadvantage of either interface</li><li>• Makes limited use of Digital Technology terminology</li></ul> Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.	<b>[1]</b>

[4]

		AVAILABLE MARKS
<p>(c) It reduces the size of a file ... and so decreases its storage requirements (2 × [1])</p> <p>It reduces the size of a file ... and so decreases transmission times/download times/upload times (2 × [1])</p>	<p>[4]</p>	<p>19</p>
<p><b>5 (a)</b> An intranet is a private/closed/restricted network ... accessible only by an organisation's staff/provides resources for an organisation's staff The Internet is a global network/communications system ... which can be used by anyone/any device with broadband access (4 × [1])</p>	<p>[4]</p>	
<p><b>(b)</b> The W3C develops/regulates standards ... of the World Wide Web Example: languages for web page design ... such as HTML/CSS (4 × [1])</p>	<p>[4]</p>	
<p><b>(c) (i)</b> Specifies/identifies a link ... to another page/to part of the current page (2 × [1])</p>	<p>[2]</p>	
<p><b>(ii)</b> <code>&lt;ul&gt;</code>     <code>&lt;li&gt;Orange&lt;/li&gt;</code>     <code>&lt;li&gt;Green&lt;/li&gt;</code>     <code>&lt;li&gt;Blue&lt;/li&gt;</code> <code>&lt;/ul&gt;</code> [1] for <code>&lt;ul&gt;</code> and <code>&lt;/ul&gt;</code> tags [1] for three <code>&lt;li&gt;</code> and <code>&lt;/li&gt;</code> tags [1] for correct content within correct tags (3 × [1])</p>	<p>[3]</p>	

- (d) (i) To keep the data secure  
 ... if it is intercepted it is meaningless  
 ... without the key  
 (3 × [1])

[3]

(ii) **Indicative content**

**Public and private keys**

There is a unique mathematical relationship between a public key and its corresponding private key  
 Data encrypted with a public key can only be decrypted by its corresponding private key

**Comparison**

The public key is made available via a publicly accessible directory  
 The sender encrypts the data using the recipient's public key

The private key remains confidential to its owner – the recipient  
 Only the recipient has the corresponding private key to decrypt the data

Level of response	Marking criteria	Marks
<b>Band 2</b> <b>Excellent</b>	The candidate <ul style="list-style-type: none"> <li>Describes public keys and private keys, and the relationship between them, accurately and concisely</li> <li>Compares the use of a public key and its corresponding private key in data encryption</li> <li>Uses the appropriate Digital Technology terminology accurately throughout the response</li> </ul> Presentation, spelling, punctuation and grammar are of a high standard.	<b>[5] or [6]</b>
<b>Band 1</b> <b>Good</b>	The candidate <ul style="list-style-type: none"> <li>Makes a distinction between a public and a private key</li> <li>Refers to the use of a public key by the sender and a private key by the recipient in data encryption</li> </ul> Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.	<b>[3] or [4]</b>
<b>Band 0</b> <b>Basic</b>	The candidate <ul style="list-style-type: none"> <li>Refers to the use of a key in encrypting and decrypting data</li> <li>Makes limited use of Digital Technology terminology</li> </ul> Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.	<b>[1] or [2]</b>

[6]

**Total**

**AVAILABLE MARKS**

22

**100**