



Rewarding Learning

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

Digital Technology

Assessment Unit AS 1

assessing

Approaches to System Development

[SDT11]

Assessment

**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.

Additional Guidance for Marking

Technical language is an integral part of Digital Technology as is abundantly clear from the material in the BCS Dictionary, as well as in the sets of Fact Files associated with this GCE specification. Obviously, candidates are required to be proficient with this technical language in order to understand fully the questions they are being asked. But more importantly, candidates are required to use this technical language in their responses, and to use it competently, liberally and appropriately. Paraphrasing, or the inaccurate use of the appropriate technical language will not be given credit. If they have not already done so, teachers should familiarise themselves with the Exemplification of Standards material on the Digital Technology microsite for both AS and A2. Every Chief Examiner's Report for this GCE Digital Technology specification has stressed that the most common reason why a candidate does not perform as well in the examinations as their Centres expected is because their responses have failed to reflect the required technical language.

Except when asked to list or identify an element of Digital Technology, in which case appropriate single words or phrases will be given credit, candidates are expected to answer using complete sentences. Furthermore, in assessing their candidates using the mark schemes, it is very important that teachers avoid 'cherry picking' part or parts of a mark point.

AO3 Assessments

Some questions on each paper are identified as also assessing the candidate's quality of written communication. Teachers should be aware that the standard of assessment in these questions is considerably higher than elsewhere as these questions are also part of the examination's AO3 assessment. In particular, to achieve the two higher ranges of marks in these questions, candidates must use the appropriate Digital Technology terminology accurately throughout their response, and the presentation, spelling, punctuation and grammar must be of a high standard. An important further requirement is that candidates must produce a concise and focused response as indicated by the answer space allocated – the two higher band marks will not be awarded to responses lacking in focus, or which include irrelevant material, irrespective of how the response meets the other Marking criteria.

- 1 (a) Software was not being developed on time
Software was being delivered over budget
Effective advances in hardware and software were not being used in the production of software
Software systems were becoming more complex
Systems were difficult/expensive to maintain
The user interface did not match the users' IT skills
(3 × [1]) [3]
- (b) Carries out a feasibility study/produces a feasibility report
Liaises with the client/users
Identifies the user requirements
Defines the system specification
(2 × [1]) [2]
- (c) **Questionnaires**
A representative group of users
... complete a set of questions
The questions may be open
... or closed
The questions aim to identify current processes/data
(3 × [1]) [3]
- Document sampling**
The analyst inspects
existing documentation
... such as orders/invoices/reports
... to identify the current system's inputs and outputs
... and the volume of data stored
... and how data is collected and stored
(3 × [1]) [3]

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- 2 (a) **Functional requirement**
An activity that a system must perform [1]
- Non-functional requirement**
An additional function by which the billing system will be judged [1] [2]

(b)

Reference	Functional Requirement	Non-functional Requirement
R347		✓
R399	✓	
R477	✓	
R859		✓

(4 × [1]) [4]

- (c) The HW/SW requirements
User guide/operating instructions
Installation guide
Help/troubleshooting/FAQ support
Training materials/tutorials
(4 × [1]) [4]

(d) System testing

This tests that the system meets the system specification
Each system function is tested
... with valid data
... and extreme/invalid data
(3 × [1])

[3]

Acceptance testing

Performed by the user
... using real/suitable volumes of data
... in the real environment
... so that the system can be signed off
(3 × [1])

[3]

(e) Parallel changeover

Both old and new system are used concurrently until the new system has proven itself/meets the system requirements
Then the old system is scrapped and the new system takes over
Advantages: Results from the new system can be compared with those of the old
If the new system fails then the old one is still there as a back up
Disadvantages: Requires duplicate resources. Two systems need to be maintained
Context: Billing is a standard business process and follows steps that can be tested in advance so there is low risk if it should fail. Parallel may not be the best method of changeover.

Level of response	Marking criteria	Marks
Band 2 Excellent	The candidate <ul style="list-style-type: none"> Provides an accurate description of parallel changeover Provides an accurate description of both an advantage and a disadvantage of parallel changeover Provides an accurate description of both an advantage and a disadvantage of parallel changeover Concludes that parallel may not be the best method of changeover Uses the appropriate Digital Technology terminology accurately throughout the response Presentation, spelling, punctuation and grammar are of a high standard.	[5]–[6]
Band 1 Good	The candidate <ul style="list-style-type: none"> Provides an accurate description of parallel changeover Provides an accurate description of both an advantage and a disadvantage of parallel changeover Uses some relevant Digital Technology terminology Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.	[3]–[4]
Band 0 Basic	The candidate <ul style="list-style-type: none"> Provides a description of parallel changeover which is correct but which lacks detail Makes limited use of Digital Technology terminology Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.	[1]–[2]

[6]

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(f) Corrective

Errors/Bugs have been identified when the system is in use and these need to be corrected/fixed
The system must be retested
(3 × [1])

[3]

Perfective

Although the system is meeting user requirements
... it could be made more efficient
... by optimising code
... upgrading hardware
(3 × [1])

[3]

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3 (a) Monitoring the project's progress

All stages of the project must be planned
The project manager must be constantly aware of how the project is progressing
... and respond immediately to risk/deviations from the schedule/
bottlenecks/slippage
Report to management/client
(3 × [1])

Scheduling

Key deadlines must be established
... and met
... or remedial action taken
(3 × [1])

Managing the budget

The budget must be allocated
... and continually checked
... to prevent cost overruns
(3 × [1])

Allocating resources

Personnel/hardware/software must be allocated
... to each stage of the project
... and used effectively/efficiently
(3 × [1])

(2 × [3])

[6]

(b) To display in graphical form

... the start date
... and finish date
... of the different elements/activities of a project
... plotted against time
... and the dependencies between these
(4 × [1])

[4]

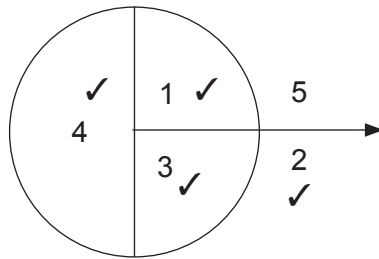
(c) (i)

Reference	Component
5	Task identifier

[1]

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(ii)



(4 × [1])

[4]

- (d) The monitoring/tracking of changes to a system during the development process and operational life
Prevents two people amending the same document at the same time
The development team must all be working from the same version of software/documentation
All changes must be recorded and there must be a method of tracking changes and reversing changes if required
All documents/code modules should have the same version number and old versions should be archived
(4 × [1])

[4]

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- 4 (a) Run time environment
Code linking/execution
Debug options/facilities/tools (tracing/breakpoints/variable inspection)
File management features/support (directory trees/solution explorer)
GUI Builder
Automatic production of documentation
(3 × [1])
- [3]
- (b) **Source code editor**
Syntax checker/assistance
Code/syntax suggestions/IntelliSense
Automatic tabs/layout
Comments
White space
Automatic line numbering
(4 × [1])
- [4]
- Compiler**
Converts all of the source code into machine code before executing it/
creates the machine code/intermediate code
Performs Lexical/Syntax/Semantic analysis
If statements are not structured properly it generates a list of errors
Optimises code
(4 × [1])
- [4]
- (c) Sequence [1]
Instructions are executed in the order in which they are listed
Can contain any number of actions and none can be omitted
(2 × [1])
- [3]
- Selection [1]
Statements may not be executed in the order in which they are listed
Statements to be executed next depend on the outcome of a condition
Can be implemented using IF..THEN..ELSE/Nested IFs/CASE statements
(2 × [1])
- [3]

(d)

```
begin
  value = 3
  for i = 1 to 10
    output i , " times ", value , " = ", i * value
  next i
end
```

[1] begin/end

[1] for initialising a constant

[1] for correct for with counter 1 to 10

[1] for correct output

[1] for correct next/end

Max [4]

[4]

(e) **Count-controlled loop**

The instructions inside the loop are executed a set number of times, controlled by a loop counter.

An initial value, final value and increment are specified. Each time the loop is executed, the loop counter is incremented. The default increment is usually 1.

Condition-controlled loop

The number of times the loop is to be carried out is not known in advance but is controlled by a Boolean variable/expression.

Until loop

Repetition continues until the condition becomes **true**. In this case, the condition is tested at the end of the loop.

While loop

Repetition continues while the condition is **true**. In this case, the condition is tested at the beginning of the loop.

Level of response	Marking criteria	Marks
Band 2 Excellent	The candidate <ul style="list-style-type: none"> Provides an accurate description of the structure of both types of loop Distinguishes clearly between the termination of the two types of loop Uses the appropriate Digital Technology terminology accurately throughout the response Presentation, spelling, punctuation and grammar are of a high standard.	[5]–[6]
Band 1 Good	The candidate <ul style="list-style-type: none"> Provides an accurate description of the structure of both types of loop Uses some relevant Digital Technology terminology Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.	[3]–[4]
Band 0 Basic	The candidate <ul style="list-style-type: none"> Provides a description of the structure of each type of loop which is correct but which lacks detail or Provides an accurate description of the structure of one type of loop Makes limited use of Digital Technology terminology Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.	[1]–[2]

[6]

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5 (a) Object

A self-contained component/abstract design relating to a real world object...

Which is constructed from a class/an instance of a class

It describes details of the object including..

data/properties and

functions/methods

Is an instance of a class

(3 × [1])

[3]

Method

A section of code/procedure..

contained within a class

It defines an action that an object of that class can perform

Methods only have access to data within their own class

(3 × [1])

[3]

Class

A template that specifies..

the properties...

and methods...

That relate to a real world object

(3 × [1])

[3]

- (b) Object oriented programming uses the concept of self-contained objects, which contain both program routines and the data being processed. An object oriented program is designed as a collection of objects which interact by sending messages to each other.

Advantages:

Classes and methods created for one object oriented application can be reused

(Encapsulation) Once an object is created it can be used without knowledge of how it is implemented/coded

Due to its modular nature there is an extensive design/planning stage resulting in less maintenance

Software quality is improved as classes can be tested in isolation from the application they are intended to be used in and inheritance means that testing of derived classes can assume that the base class is correct and can focus on additional attributes/behaviours

Disadvantages:

Steep learning curve as encapsulation and inheritance can be difficult to understand

Object oriented programs use polymorphism whereby at runtime the program selects which particular version of a method to call. This can incur a runtime cost.

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Level of response	Marking criteria	Marks
Band 2 Excellent	<p>The candidate</p> <ul style="list-style-type: none"> Provides an accurate description of object oriented programming Provides an accurate description of both an advantage and a disadvantage of object oriented programming Provides an accurate description of both an advantage and a disadvantage of parallel changeover Uses the appropriate Digital Technology terminology accurately throughout the response <p>Presentation, spelling, punctuation and grammar are of a high standard.</p>	[5]–[6]
Band 1 Good	<p>The candidate</p> <ul style="list-style-type: none"> Provides an accurate description of object oriented programming Provides an accurate description of both an advantage or a disadvantage of object oriented programming Uses some relevant Digital Technology terminology <p>Presentation, spelling, punctuation and grammar are sufficiently competent to make the response clear.</p>	[3]–[4]
Band 0 Basic	<p>The candidate</p> <ul style="list-style-type: none"> Provides a description of object oriented programming which is correct but which lacks detail Makes limited use of Digital Technology terminology <p>Presentation, spelling, punctuation and grammar are such that the intended meaning is not completely clear.</p>	[1]–[2]

[6]

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Total

100