



*Rewarding Learning*

**ADVANCED  
General Certificate of Education  
2019**

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## **Software Systems Development**

Unit A2 1

Systems Approaches and Database  
Concepts

**[ADV11]**

**FRIDAY 31 MAY, AFTERNOON**

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**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)** Examples could include:

**There is a risk that the problems existing in the business might be overlooked.**

Some staff do not realise that there are problems at all and are happy to continue with existing practices. If problems are not fully uncovered by a systems investigation there are likely to be issues with any new system.

Stock orders clearly present a problem but without proper investigation and analysis the extent of their impact may not be fully understood. It is vital that the secretary clearly explains the process.

Staff in the shop will not have any opportunity to discuss the increasing range of facilities available and many problems might not be identified.

It is also important that Henry indicates any issues he has experienced with the lack of good management information.

Some staff will not have any opportunity to express concerns that they have. It is possible that mechanics might experience great difficulty with the current procedures and will have no opportunity to communicate their views;

The manner in which the whiteboard is completed should be the subject of investigation.

**Without proper analysis, user requirements might not be understood;**

If proper analysis is not conducted it will not be possible to establish acceptable user requirements. The secretary might like to have internet connection to check prices or might like to have certain options within any new system;

It is essential to thoroughly understand all of the business processes before proceeding to develop a solution;

Incorrect perceptions could lead to incorrect solutions;

Without proper analysis, incorrect conclusions could arise. If the secretary is happy with the way stock is ordered it may be concluded that there are no problems.

A proper systems investigation will help to define user objectives.

There is a real risk of imposing a solution that will be unacceptable if a systems investigation is not properly conducted. Henry and other key users must have significant input to ensure success;

Helps point to solutions;

[1] for each of two valid examples

[1] each for each of two valid explanations

Credit any other acceptable alternative

[4]

**(b)** Issues could include:

The approach to the development would be unstructured and could lead to a haphazard approach;

A methodology uses tools and techniques to assist the development process. If these are not used it is likely to affect the efficiency and effectiveness of the solution;

Using a methodology can assist good communication between the developers and users of the system, with no methodology this communication might not be established.

If a methodology is not used, user requirements might not be as well specified and understood.

There will be limited control over the project. This could cause the project to be over budget or over time or incomplete. (Budget, Time and Scope issues.)

[1] for each of two valid issues  
Credit any other acceptable alternative

[2]

6

**2** Discussion of the use of the Waterfall methodology should make reference to a range of advantages and disadvantages including:

- The sequential nature of the methodology;
- Useful for larger projects;
- Linear structure;
- Strict stages defined;
- Strict deadlines;
- Documentation;
  
- Difficult to adapt;
- Preceding stages must be completed before progression;
- User requirements may be incorrectly defined at the beginning with no chance for review;
- Testing tends to take place later on in the cycle. Could have fundamental design flaws that may only be discovered late in the cycle;

Candidates should make specific reference to the application of the methodology at The Woods. They should note the personnel involved at each stage. Henry and senior management should be involved at the early strategic stages. They should agree Terms of Reference. Fact finding should take place at a range of levels and shop staff, the secretary and garage staff should be involved in determining issues that exist. They should also have input into ideas for solutions. Documentation should be produced and agreed. Implementation, Testing and Review could be considered.

Candidates should consider alternative approaches. (DSDM, SCRUM, Prototyping).

Candidates should make reference to the fact that user involvement is most likely to arise at the beginning of the development and then at the end. The methodology is likely to be driven by Business Solutions personnel.

**Level 1 ([1]–[3])****Overall impression: Basic**

Candidate provides a basic answer demonstrating simple knowledge and understanding of the Waterfall methodology.

Candidate makes basic reference to the stages of the methodology and its application to the development at The Woods.

Candidate provides basic discussion of a limited range of advantages and disadvantages.

Candidate makes limited reference to the use of other methodologies.

Candidate makes basic reference to the personnel involved in the application of the methodology to the development process at The Woods.

Candidate makes only a limited selection and use of an appropriate form and style of writing.

The organisation of the material may lack clarity and coherence.

There is little use of specialist vocabulary.

Presentation, spelling, punctuation and grammar may be such that the intended meaning is not clear.

**Level 2 ([4]–[6])****Overall impression: Good**

Candidate provides a good answer demonstrating good knowledge and understanding of the Waterfall methodology.

Candidate makes good reference to the stages of the methodology and its application to the development at The Woods.

Candidate provides good discussion of a range of advantages and disadvantages.

Candidate makes good reference to the use of other methodologies.

Candidate makes good reference to the personnel involved in the application of the methodology to the development process at The Woods.

Candidate makes good selection and use of an appropriate form and style of writing.

Relevant material is organised with some clarity and coherence.

There is good use of specialist vocabulary.

Presentation, spelling, punctuation and grammar are used appropriately so that the intended meaning is clear.

**Level 3 ([7]–[8])****Overall impression: Excellent**

Candidate provides an excellent answer demonstrating thorough knowledge and understanding of the Waterfall methodology.

Candidate makes excellent reference to the stages of the methodology and its application to the development at The Woods.

Candidate provides an excellent discussion of a wide range of advantages and disadvantages.

Candidate makes excellent reference to the use of other methodologies.

Candidate makes excellent reference to the personnel involved in the application of the methodology to the development process at The Woods.

Candidate makes excellent selection and use of the most appropriate form and style of writing.

Relevant material is organised with a high degree of clarity and coherence. There is excellent use of specialist vocabulary. Presentation, spelling, punctuation and grammar are used to a high standard to ensure that the intended meaning is clear.

[8]

8

- 3
1. **structure**
  2. **working software**
  3. **documentation**
  4. **SCRUM**
  5. **agile**
  6. **SCRUM**
  7. **sprints**
  8. **Scrum Master**
  9. **documentation**
  10. **product backlog (alternatively: Prototypes/working software/Burn down chart)**
  11. **sprint**
  12. **burn down chart**
  13. **Product Owner**
  14. **product backlog**

[1] for each of two correct words

[7]

7

4

Statement	true/false
Diagrams used in UML include Use Case, Class, ER and Sequence diagrams	false
The analyst would use a sequence diagram to represent Henry's interaction with the system.	false
Multiplicity shows the number of object instances in one class that relate to one object instance in an associated class	true
The << Include >> statement means that a use case that can exist on its own, can also be used in other use cases because of some shared functionality.	true
Use case diagrams provide a static view of a system	false
The <<extend >> statement indicates that a use case can be extended by the functionality of another use case.	true

[1] for each correct response

[6]

6

5 (a)

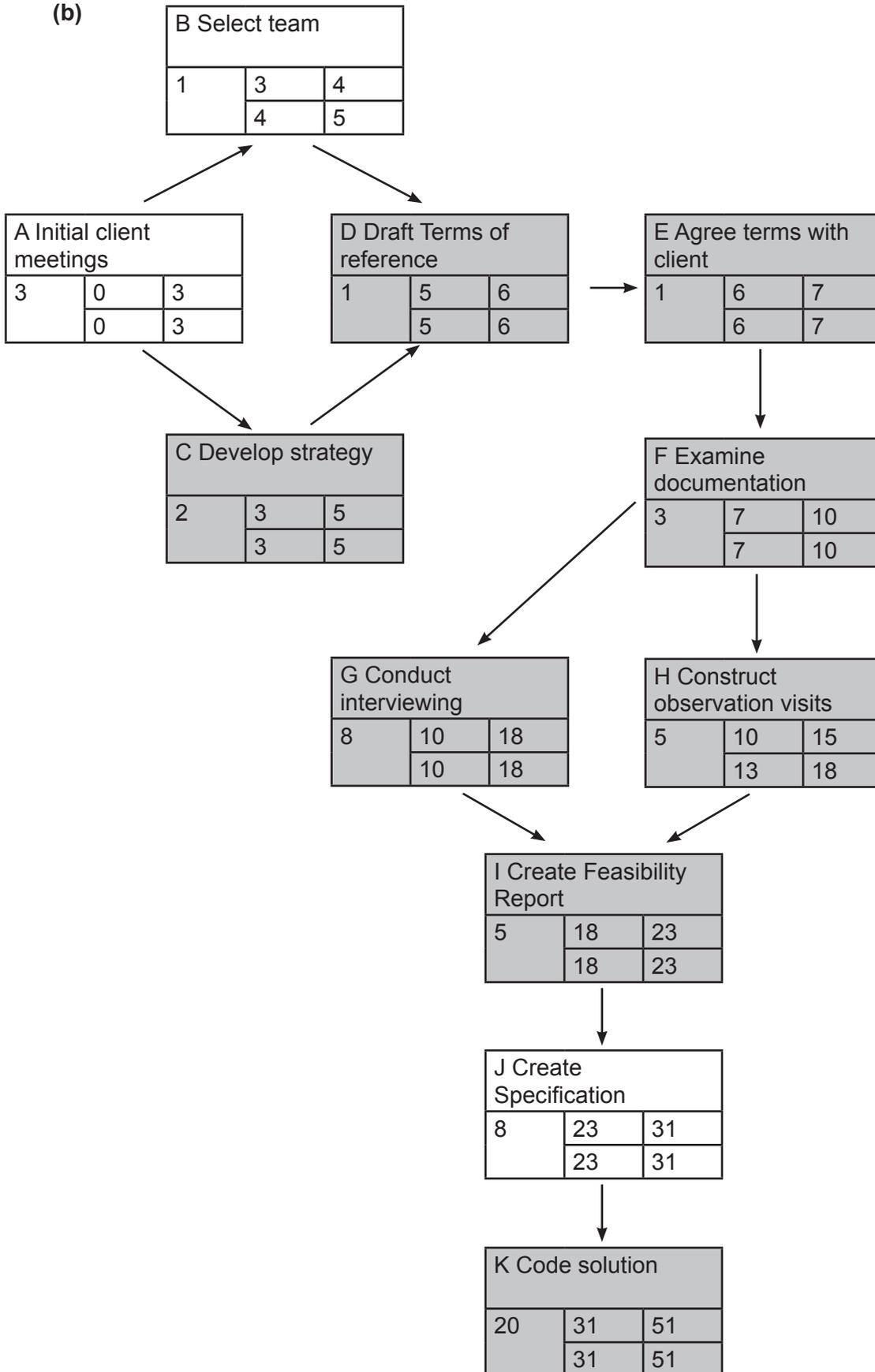
Risk	Example	How this might be managed
Budget	It is possible that the budget may be exceeded as a result of underestimation or because of an unforeseen circumstance. Perhaps the hardware required for the implementation has not been properly costed or the cost of specialist skills that have to be bought in has been overlooked.	The budget should be audited throughout the project and any deficiencies noted immediately. Adjustments to the scope of the project may have to be made if the budget is likely to be exceeded. The project manager may have to limit part of the development in order to stay within budget. It may be necessary to transfer funds or reduce funds from one area of the development to ensure that priorities are guaranteed.
Scope	Scope creep is likely to arise as users become more aware of the possibilities involved in a new development. Henry could decide that he would like a booking system for the new transport facilities or salon that provided historical data regarding customers and their journeys or appointments	The most important factor is to correctly determine user requirements at the outset. If this is not properly done then there is the risk that the client may have a different view of what was agreed. It is important that Business Solutions ensure that Henry is fully appraised of what was agreed. It is also important that Henry is aware that any new requirement should be regarded and costed as a separate project.
Time	It may take longer than anticipated to complete parts of the project. Time estimates may have been unrealistic.	The project manager will have to consider the project plan to see if any time can be recovered from other activities. The use of FLOAT should be considered. If this is not possible the cost of the project could rise or all objectives may not be achieved.

[1] for each completed section  
Credit any other acceptable alternative

[6]

AVAILABLE MARKS

(b)



(i) [1] for each fully completed activity [8]

(ii) A – C – D – E – F – G – I – J – K [1]

(iii) 3 days [1]

- 6 Candidates should identify relevant features of a relational database system. Candidates should note the benefits of using a relational database system in the development at The Woods.

Candidate may include reference to the following:

- Data Redundancy
- Data Integrity
- Data Inconsistency
- Concurrent access
- Security
- Backup and recovery
- Queries and Reports
- Constraints
- Any other valid points

### Level 1 ([1]–[3])

#### Overall impression: Basic

Candidate provides a basic answer demonstrating basic knowledge and understanding of relational database systems.

Candidates make basic reference to the functions of a relational database and the benefits of its use.

Candidate makes basic reference to the application of a relational database system at The Woods.

Candidate provides basic discussion on how a database system could address existing issues and accommodate proposed new developments,

Candidate makes basic reference to how a relational database management system would benefit the management of stock, bookings, routine service and valet as well as bookings for transport at The Woods.

Candidate makes only a limited selection and use of an appropriate form and style of writing.

The organisation of the material may lack clarity and coherence.

There is little use of specialist vocabulary.

Presentation, spelling, punctuation and grammar may be such that the intended meaning is not clear.

### Level 2 ([4]–[6])

#### Overall impression: Good

Candidate provides a good answer demonstrating good knowledge and understanding of relational database systems.

Candidates make good reference to the functions of a relational database and the benefits of its use.

Candidate makes good reference to the application of a relational database system at The Woods.

Candidate provides good discussion on how a database system could address existing issues and accommodate proposed new developments,

Candidate makes good reference to how a relational database management system would benefit the management of stock, bookings, routine service and valet as well as bookings for transport at The Woods.

Candidate makes good selection and use of an appropriate form and style of writing.

Relevant material is organised with some clarity and coherence.

There is good use of specialist vocabulary.

Presentation, spelling, punctuation and grammar are used appropriately so that the intended meaning is clear.

### Level 3 ([7]–[8])

#### Overall impression: Excellent

Candidate provides an excellent answer demonstrating good knowledge and understanding of relational database systems.

Candidates make excellent reference to the functions of a relational database and the benefits of its use.  
 Candidate makes excellent reference to the application of a relational database system at The Woods.  
 Candidate provides excellent discussion on how a database system could address existing issues and accommodate proposed new developments,  
 Candidate makes excellent reference to how a relational database management system would benefit the management of stock, bookings, routine service and valet as well as bookings for transport at The Woods.  
 Candidate makes excellent selection and use of the most appropriate form and style of writing.  
 Relevant material is organised with a high degree of clarity and coherence. There is excellent use of specialist vocabulary.  
 Presentation, spelling, punctuation and grammar are used to a high standard to ensure that the intended meaning is clear. [8]

8

- 7 Candidates should identify relevant types of testing.  
 Candidates should note how testing should be applied in the development at The Woods.  
 The candidate may include reference to the following:  
 Program/unit  
 Integration  
 System  
 Acceptance  
 Black Box  
 White Box

**Level 1 ([1]–[2])**

**Overall impression: Basic**

Candidate provides a basic answer demonstrating basic knowledge and understanding of testing.  
 Candidate makes basic reference to the types of testing and how they would be applied to the development at The Woods.  
 Candidate provides basic discussion of the stages of testing in the development process at The Woods  
 Candidate makes basic reference to the personnel involved in the testing process at The Woods.  
 Candidate makes only a limited selection and use of an appropriate form and style of writing.  
 The organisation of the material may lack clarity and coherence.  
 There is little use of specialist vocabulary.  
 Presentation, spelling, punctuation and grammar may be such that the intended meaning is not clear.

**Level 2 ([3]–[4])**

**Overall impression: Good**

Candidate provides a good answer demonstrating good knowledge and understanding of testing.  
 Candidate makes good reference to the types of testing and how they would be applied to the development at The Woods.  
 Candidate provides good discussion of the stages of testing in the development process at The Woods  
 Candidate makes good reference to the personnel involved in the testing process at The Woods.  
 Candidate makes good selection and use of an appropriate form and style of writing.

Relevant material is organised with some clarity and coherence.  
 There is good use of specialist vocabulary.  
 Presentation, spelling, punctuation and grammar are used appropriately so that the intended meaning is clear.

**Level 3 ([5]–[6])**

**Overall impression: Excellent**

Candidate provides an excellent answer demonstrating excellent knowledge and understanding of testing.

Candidate makes excellent reference to the types of testing and how they would be applied to the development at The Woods.

Candidate provides excellent discussion of the stages of testing in the development process at The Woods

Candidate makes excellent reference to the personnel involved in the testing process at The Woods.

Candidate makes excellent selection and use of the most appropriate form and style of writing.

Relevant material is organised with a high degree of clarity and coherence. There is excellent use of specialist vocabulary. Presentation, spelling, punctuation and grammar are used to a high standard to ensure that the intended meaning is clear.

[6]

6

8

<b>Table</b>	<b>Primary Key</b>	<b>Foreign Key(s)</b>
<i>Stock</i>	<i>StockNo</i>	<b>SupplierNo CategoryNo</b>
<i>SupplierOrder</i>	<b>SupplierOrderNo</b>	<i>SupplierNo</i>
<i>SupplierStockOrder</i>	<b>SupplierOrderNo StockNo</b>	<b>SupplierOrderNo StockNo</b>

[1] for **each** correct box

[6]

6

9 (a) Update the StockPrice of stock item H1539 by 5 percent.

```
UPDATE Stock
SET StockPrice = StockPrice * 1.05
WHERE StockNo = 'H1539'
```

[1] UPDATE Stock  
 [1] SET  
 [1] correct increase  
 [1] correct WHERE

[4]

(b) Display details of stock to be returned from SupplierNo 12.

```
SELECT    sk.StockNo, sk.StockDescription, sk.ReorderQty,
          c.CategoryDescription
          s.SupplierNo, s.SupplierName                (sample fields)

FROM      Stock sk

          INNER JOIN  Supplier s on s.SupplierNo = sk.SupplierNo
          INNER JOIN  Category c on sk.CategoryNo = c.CategoryNo

WHERE     sk.SupplierNo = 12 and QtyInStock <= ReorderLevel
ORDER BY  CategoryDescription asc
```

[1] SELECT  
[3] at least 3 relevant fields  
[1] if fields come from at least 2 tables  
[1] FROM table  
[1] for **each** of the 2 joins (*ignore order of table joins*)  
[1] correct WHERE and [1] correct comparison  
[1] ORDER BY CategoryDescription [11]

(c) Display a list of any outstanding supplier orders that have not yet been delivered.

```
SELECT    SupplierName, count(*) As StockItems, SupplierOrderDate
FROM      SupplierOrder so
          INNER JOIN  Supplier s on so.SupplierNo = s.SupplierNo
          INNER JOIN  SupplierStockOrder sso on so.SupplierOrderNo =
          sso.SupplierOrderNo

WHERE     so.SupplierOrderDateDelivered is null
GROUP BY  SupplierName, SupplierOrderDate
ORDER BY  SupplierOrderDate
```

[1] SELECT *SupplierName*  
[1] count  
[1] FROM table (*allow any order for three named tables*)  
[1] for either JOIN  
[1] WHERE date  
[1] GROUP BY is correct  
Or [1] ORDER BY is correct [6]

AVAILABLE  
MARKS

21

10 (a) [1] customer or staff name [1]

(b) 1NF

BOOKING (**BookingNo.**, CarReg, RepairNo, RepairDescription, HourlyRate, ExpectedDuration, CustomerTitle, CustomerSurname, CustomerForename)  
 BOOKING\_DETAILS (**BookingNo\***, **DateBooked.**, StartTime, staffNo, StaffForename, StaffSurname, ActualDuration)  
 BOOKING\_STOCK (**BookingNo\***, **StockNo.**, StockDescription, Qty, StockSalePrice)

[1] correct fields in Booking\_Details  
 [1] correct fields in Booking\_Stock  
 [1] each for 3 key fields  
 [1] for each FK  
 [1] for atomic breakdown - staff or customers [8]

2NF

BOOKING unchanged  
 BOOKING\_DETAILS unchanged  
 BOOKING\_STOCK (**BookingNo\***, **StockNo\***, Qty)  
 STOCK (**StockNo.**, StockDescription, StockSalePrice)

[1] Changes made to Booking\_Stock only  
 [1] correct fields in Stock  
 [1] stockNo key field stockNo  
 [1] for FK stockNo [4]

3NF

BOOKING (**BookingNo.**, CarReg, RepairNo\*, CustomerTitle, CustomerSurname, CustomerForename )  
 REPAIR (**RepairNo.**, RepairDescription, HourlyRate, ExpectedDuration)  
 BOOKING\_DETAILS (**BookingNo\***, **DateBooked.**, StartTime, staffNo\*, ActualDuration)  
 STAFF (**StaffNo.**, StaffForename, StaffSurname) [3]

[1] Correct Fields in Repair or staff or Car Reg  
 [1] key field (any new)  
 [1] FK (any new)

Allow alternative 3NF

BOOKING (**BookingNo.**, CarReg\*, RepairNo\*)  
 REPAIR (**RepairNo.**, RepairDescription, HourlyRate, ExpectedDuration)  
 CARREG (**CarReg.**, CustomerTitle, CustomerSurname, CustomerForename)

Total

100

AVAILABLE MARKS

16