**Western Australian Certificate of Education
Examination, 2013**

Question/Answer Booklet

COMPUTER SCIENCE

Stage 3

Please place your student identification label in this box

Student Number: In figures

In words

Time allowed for this paper
Reading time before commencing work: ten minutes
Working time for paper: three hours

Materials required/recommended for this paper
To be provided by the supervisor
This Question/Answer Booklet
Source Booklet

Number of additional
answer booklets used
(if applicable):

To be provided by the candidate
Standard items: pens (blue/black preferred), pencils (including coloured), sharpener,
correction fluid/tape, eraser, ruler, highlighters

Special items: non-programmable calculators approved for use in the WACE examinations,
Mathomat and/or Mathaid and/or any system flowchart template

Important note to candidates
No other items may be taken into the examination room. It is **your** responsibility to ensure
that you do not have any unauthorised notes or other items of a non-personal nature in the
examination room. If you have any unauthorised material with you, hand it to the supervisor
before reading any further.

Ref: 13-029

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of exam
Section One: Short answer	20	20	70	70	40
Section Two: Extended answer	9	9	110	96	60
				Total	100

Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2013*. Sitting this examination implies that you agree to abide by these rules.

2. Write your answers in the spaces provided in this Question/Answer Booklet. A blue or black ballpoint or ink pen should be used. Wherever appropriate, fully labelled diagrams, tables and examples should be used to illustrate and support your answers.

3. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question. Where no specific instructions are given, you should feel free to use a range of formats to express your knowledge and understandings.

4. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
    *   Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
    *   Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question that you are continuing to answer at the top of the page.

5. The Source Booklet is **not** handed in with your Question/Answer Booklet.

Section One: Short answer   **40% (70 Marks)**

This section contains **20** questions. You must answer **all** questions. Write your answers in the spaces provided.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
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- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question that you are continuing to answer at the top of the page.

Suggested working time: 70 minutes.

Question 1   **(3 marks)**

Describe the function of the following components in relation to the fetch execute cycle.

(a)   Control Unit (CU)   (1 mark)

(b)   Arithmetic Logic Unit (ALU)   (1 mark)

(c)   Registers   (1 mark)

Question 2   **(1 mark)**

Cellular is a form of wireless transmission media. Provide **one** characteristic of this type of transmission.

Question 3 **(3 marks)**

Disaster recovery tools are essential to an organisation to ensure that its data and intellectual property are protected. Define the purpose of the following for this situation.

(a) Snapshot imaging (1 mark)

_____

_____

(b) Uninterruptible Power Supply (UPS) (1 mark)

_____

_____

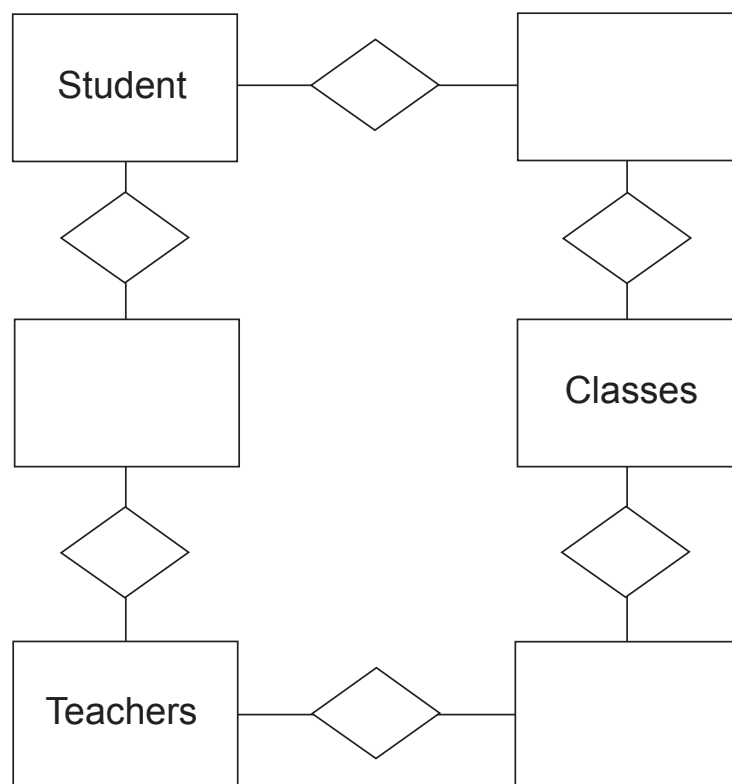(c) Full backup (1 mark)

_____

_____

Question 4 **(6 marks)**

Complete the Entity Relationship (ER) diagram to represent the following scenario. Include entities, relationships and cardinalities only.

'One student has many classes. Many classes are taught by many teachers. Many teachers teach many students. Many students are in one class.'

See next page

Question 5 **(6 marks)**

On 15 May 2012, the Australian Government launched a new scheme called the National Television and Computer Recycling Scheme. By the end of 2013, it will have been rolled out across the nation. There will be collection points for consumers to dispose of their old TVs and computers. Companies that make or import these goods in Australia will be required to pay for the end-of-life recycling for these products.

(a) Explain why the Australian Government has introduced this scheme. (2 marks)

(b) State **one** issue that companies need to be aware of before disposing of the data on their old computers. (1 mark)

(c) Describe the steps companies need to take to ensure that they meet their obligations in disposing of the data on their old computers. (3 marks)

Question 6 **(2 marks)**

State the following types of processing that may occur within a computer system.

(a) Sequential (1 mark)

(b) Multicore (1 mark)

See next page

Question 7 **(3 marks)**

Define the following types of integrity.

(a) Data integrity (1 mark)

_____

_____

(b) Domain integrity (1 mark)

_____

_____

(c) Referential integrity (1 mark)

_____

_____

Question 8   **(5 marks)**

Complete the Context Diagram that represents the following scenario.

OPZ Landscaping is a small business. Clients call the business to make appointments for their landscaping to be done. The client data and time details are confirmed by the receptionist. On the agreed day, the landscaper arrives and completes the work. An invoice is given to the client. The client pays for the work by credit card or cash and a receipt is given by the landscaper. At the end of the week, the receptionist reconciles invoices with the credit card slips and cash. The cash is then deposited at the bank. The bank provides a slip to confirm the amount banked.

OPZ
LANDSCAPING
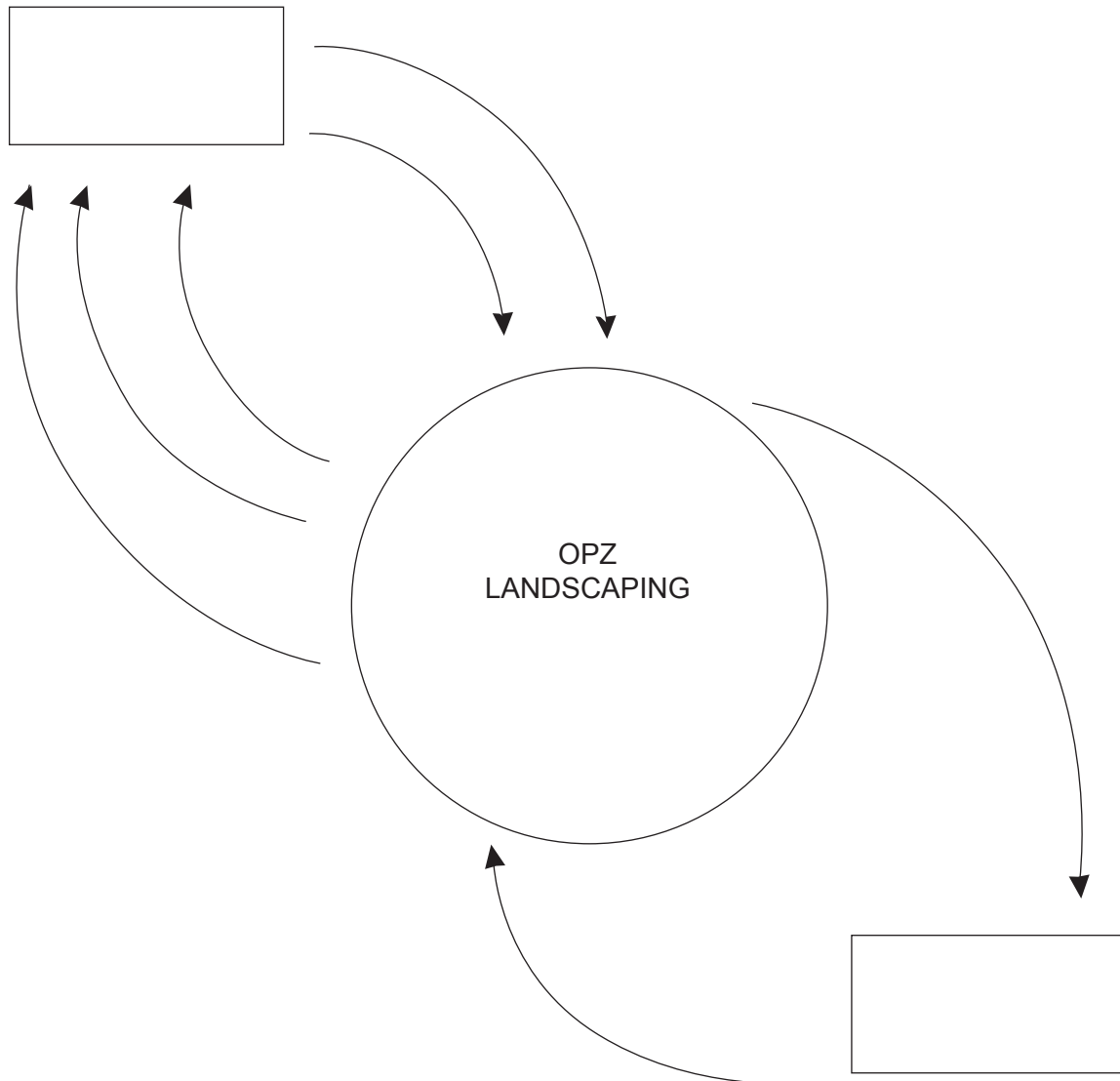
Question 9 **(2 marks)**

An operating system has a number of roles.

(a) State the role of scheduling in an operating system. (1 mark)

_____

_____

(b) State the role of an operating system in managing devices. (1 mark)

_____

_____

Question 10 **(2 marks)**

Analysis is a stage in the System Development Life Cycle (SDLC) that requires the modelling of a current system. Outline **two** data gathering methods that could be used to determine how the current system works.

One: _____

_____

Two: _____

_____

Question 11 **(2 marks)**

Error detection is an essential part of digital communication. Outline how a parity bit works.

_____

_____

_____

_____

See next page

Question 12 **(4 marks)**

Cyberfirm is a company whose product can be used by organisations to streamline their workflow processes. They have a client who would like to trial their product in one department first.

(a) What is the name of this type of implementation strategy? (1 mark)

_____

(b) The client then decides to purchase the product and is planning to introduce it one department at a time. What is this type of implementation strategy called? (1 mark)

_____

(c) Outline **one** advantage the company gained by following each of these processes.

(2 marks)

_____

_____

_____

_____

Question 13 **(3 marks)**

(a) Communication protocols are an essential part of network communication. What is the function of Internet Protocol (IP)? (1 mark)

_____

_____

(b) There are a number of different versions of Internet Protocol (IP). State the main difference between IP4 and IP6. (1 mark)

_____

_____

(c) IP6 was launched in 2012. What was the main reason it was created? (1 mark)

_____

_____

Question 14 **(2 marks)**

Various hardware devices are required for communication networks to operate. State the role of the following devices.

(a) Network Interface Card (NIC) (1 mark)

_____

_____

(b) Gateway (1 mark)

_____

_____

Question 15 **(3 marks)**

Consider the following pseudocode.

```
TotalAmount ← 0
Repeat
    Input (Amount)
    TotalAmount ←TotalAmount + Amount
    Input (Continue)
Until Continue = 'N'
Output ('Total amount is ', TotalAmount)
```

(a) What is the purpose of TotalAmount ← 0? (1 mark)

_____

_____

(b) What type of iteration is a Repeat Until? (1 mark)

_____

_____

See next page

(c)   The pseudocode was changed to the following.   (1 mark)

        TotalScore← 0
        Continue ←'Y'
        While Continue = 'Y'
            Input (Amount)
            TotalAmount ← TotalAmount + Amount
            Input (Continue)
        End While
        Output ('Total amount is ', TotalAmount)

    State an advantage of using this type of iteration instead of a Repeat Until.

_____

_____

Question 16   **(5 marks)**

(a)   Planning and development of software solutions occurs during the Software Development
       Cycle (SDC). During which phase of the SDC does the coding of the software occur?
                                                                                       (1 mark)

_____

(b)   The development of documentation is an essential part of a programmer's work.

       (i)   State **two** types of external documentation the programmer would develop for the
              user.   (2 marks)

              One: _____

              _____

              Two: _____

              _____

       (ii)   State **two** types of internal documentation the programmer would develop for the
              administrator in order to maintain the program.   (2 marks)

              One: _____

              _____

              Two: _____

              _____

See next page

Question 17 **(5 marks)**

Consider the following pseudocode.

```
sum ←0
counter ← 0
average ← 0
Input(number)
While number <> 999
    sum ← sum + number
    counter ← counter + 1
    Input(number)
Endwhile
average ← sum/counter
Output('The average of the numbers is ',average:6:2)
```

(a)   Read the following line of code
        Output('The average of the numbers is ',average:6:2)
        What is the purpose of *'average:6:2'*? (1 mark)

(b)   Complete the trace table below with the following data items: 6, 4, 11, 27, 999.   (4 marks)

Sum	Counter	Number	Average

Question 18 **(4 marks)**

State the purpose of the following programming terms that relate to an algorithm.

(a)   Constant   (1 mark)

_____

_____

(b)   Global variable   (1 mark)

_____

_____

(c)   Stub   (1 mark)

_____

_____

(d)   Parameter   (1 mark)

_____

_____

Question 19 **(7 marks)**

Use the information provided below to answer the following questions.

Marks book	
Total mark	**Final grade**
<35	F
35–49	D
50–64	C
65–74	B
75–100	A

(a)   What type of selection control structure would be best to use in an algorithm to determine the final grades for this marks book?   (1 mark)

(b)   Write the pseudocode for the selection control structure of the marks book.   (6 marks)

Question 20 **(2 marks)**

Validation rules are used extensively in databases. What is a validation rule? Provide an example of a validation rule.

End of Section One

See next page

Section Two: Extended answer 60% (96 Marks)

This section has **nine (9)** questions. Answer **all** questions. Write your answers in the spaces provided.

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Suggested working time: 110 minutes.

Question 21 (13 marks)

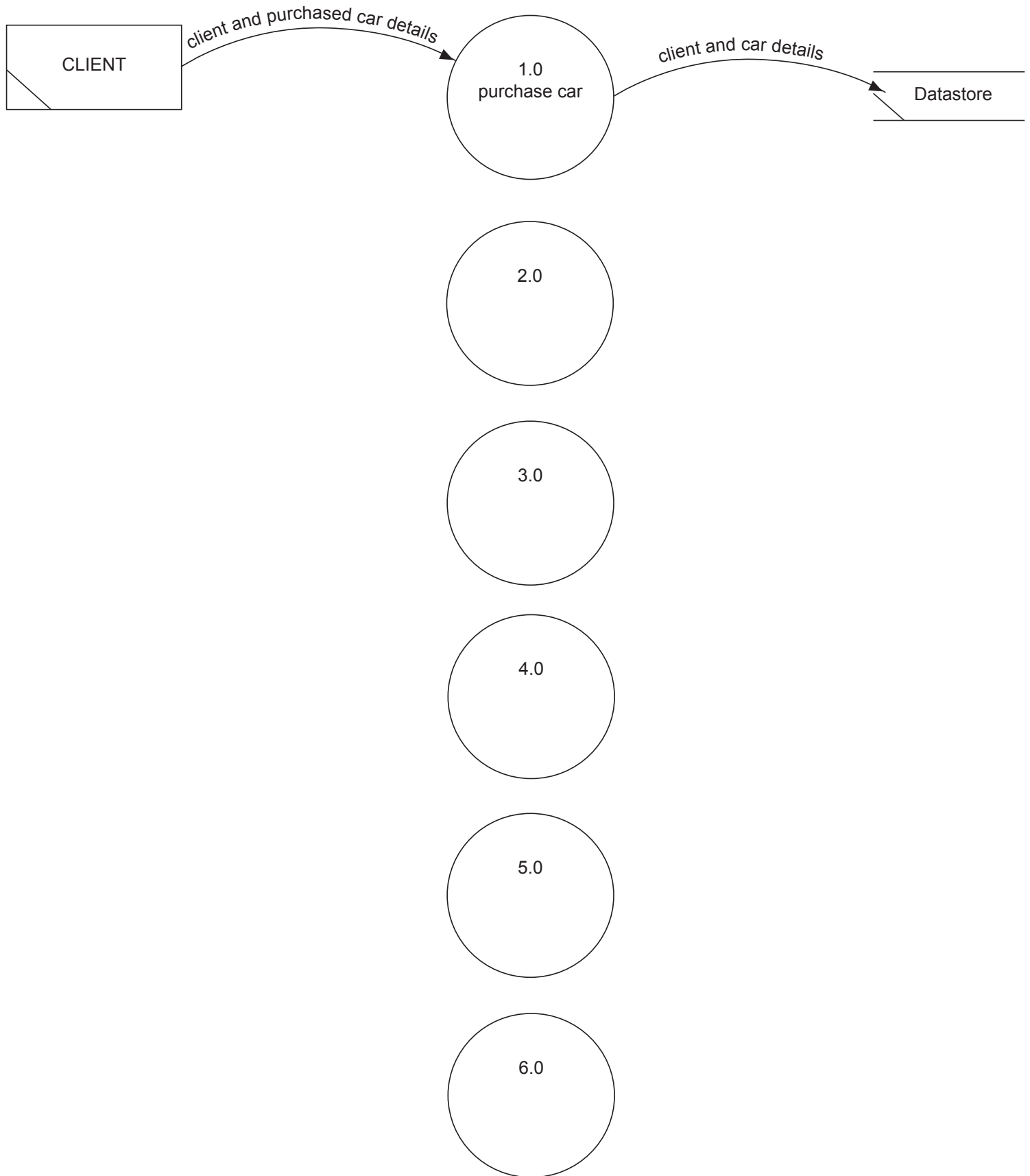You will need to refer to pages 2 and 3 of the **Source Booklet** to answer this question.

Using the case study and the given Context Diagram, draw a Level 0 Data Flow Diagram (DFD) for the system on page 16.

This area will **not** be marked and may be used for drafts.

Complete the Level 0 DFD on this page.

CLIENT

client and purchased car details

1.0
purchase car

client and car details

Datastore

2.0

3.0

4.0

5.0

6.0

See next page

Question 22 (7 marks)

CarsNow stores the data on individual sales made by its salespersons each day. The following is an example of the data.

Staff ID	Surname	First name	Date	RegNo	Sales
55892	Lee	Jack	12/09/2013	1AD356	9500
				1UP457	4800
				1JKOP8	12300
48751	Jones	Mary	12/09/2013	1OKL78	5400
12587	Smith	Robert	12/09/2013	1WUTE8	8500
				1NHE89	10200

It has been suggested that a database would be a better way of storing this data.

(a)   Why would update anomalies be an issue with this data if it was copied into a database?

(1 mark)

_____

_____

(b)   Why would it be unwise to replicate this spreadsheet into a database without making any changes? (1 mark)

_____

_____

(c)   Explain the steps you would take to create this database. (4 marks)

_____

_____

_____

_____

_____

(d)   State the name of this process. (1 mark)

_____
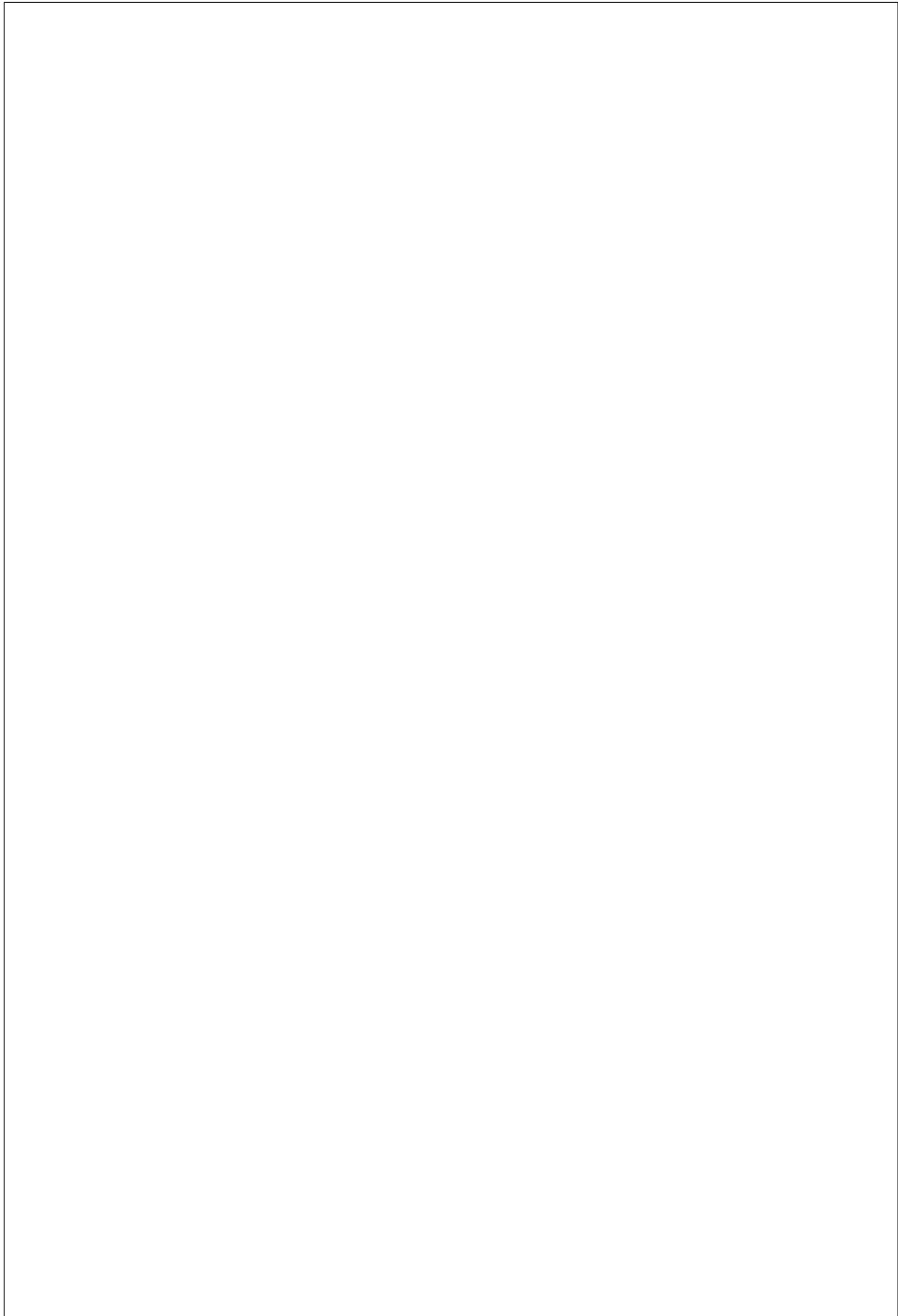
See next page

Question 23 **(14 marks)**

CarsNow uses the Used Car Sales Invoice (page 4 in the **Source Booklet**) when they buy and sell cars.

Create an Entity Relationship (ER) diagram for the structure of the CarsNow database. In your diagram show all entities, cardinality, primary keys (PK) and foreign keys (FK) for each table in your structure. You do **not** need to show all attributes.

This area will **not** be marked and may be used for drafts.

Draw your Entity Relationship (ER) diagram on this page.

Question 24   **(11 marks)**

Using the data in the table extracts below answer the following questions.

Client (ClientID, Fname, Sname, Suburb, State, Mobile, RegNo)

ClientID	Fname	Sname	Suburb	State	Mobile	RegNo
1	Dax	Wright	Bassendean	WA	0802389470	1ANJ057
2	Aubrey	Kennard	Midland	WA	0819284718	1BES567
3	Piers	Jess	Mundaring	WA	0823487268	1CAX453
4	Nathanael	Blaze	Midland	WA	0821048761	1CDE426
5	Isaac	Cole	Midland	WA	0810489012	1CFX456
6	Angel	Pancras	Canberra	ACT	0109487208	1CFX546
7	Braxton	Gib	Swan Valley	WA	0803897401	1CSI462
8	Cristobel	Salena	Helena Valley	WA	0810239847	1CSN548
9	Elisabeth	Imogene	Parkerville	WA	0801874091	1CSW417
10	Quanna	Evelin	Adelaide	SA	0501923487	1CTQ432

Car (RegNo, Make, Model, BodyType, Colour, Price)

RegNo	Make	Model	BodyType	Colour
1ANJ057	Holden	GLX	Sedan	Blue
1BES567	Holden	Commodore	Sedan	Blue
1CAX453	Ford	Kingswood	Sedan	Blue
1CDE426	Audi	A3	Hatchback	Burgundy
1CFX456	Ford	Falcon	Sports	Blue
1CFX546	Ford	Falcon	Station Wagon	White
1CSI462	BMW	18I	Hatchback	White
1CSN548	Audi	A3	Hatchback	Blue
1CSW417	Audi	A4	Sedan	Silver
1CTQ432	Audi	A4	Sedan	Grey

(a)   State the purpose of RegNo in the Client table.   (1 mark)

_____

_____

See next page

(b)   Using Structured Query Language (SQL), write a query that will list the first name and
         surname of all customers that have a Ford Falcon.   (5 marks)

_____

_____

_____

_____

_____

_____

You will need to refer to page 5 of the **Source Booklet** to answer the following questions.

(c)   The menu on page 5 was created to enable the user to access the available reports.
         Other menus are available by returning to the main menu. With reference to the image,
         why has the developer created these menus?   (1 mark)

_____

_____

(d)   The report on page 5 is an example of the output from the 'Report Transactions'.
         The *Profit Made* column is not a field in any entity.

         (i)   State why this was not included.   (1 mark)

         _____

         _____

         (ii)   State what the issue would be if it were to be included.   (1 mark)

         _____

         _____

         (iii)   State, using an example, what the database developer did to get the information
                  on this report.   (2 marks)

         _____

         _____

         _____

         _____

See next page

Question 25 **(22 marks)**

CarsNow currently calculates wages and tax for each salesperson manually. It has decided to use an algorithm to do this instead.

(a) CarsNow needs a module, within the algorithm, called *StaffTax* to calculate the tax to be paid and the net pay for each salesperson. Use the following specifications to create this module using pseudocode. (8 marks)

Input Parameters:
- StaffID (the ID for the salesperson)
- PayGross (for each salesperson)

Output Parameters:
- PayTax (the tax to pay)
- PayNet (the net pay for the salesperson)

Calculations:
- PayTax is PayGross less $1,500 multiplied by $0.30 cents
- PayNet is PayGross less PayTax

See next page

(b)   CarsNow also requires a module called *TotalWages* that calculates all three salespersons' wages.

Input Parameters:

- StaffID (the ID for each salesperson)
- PayGross (for each salesperson)
- PayTax (for each salesperson)

Output Parameters:

- TotalGrossPay (total gross amount for all salespersons)
- TotalNetPay (total net amount for all salespersons)

(i)   Why would an array be used for this module?   (1 mark)

(ii)   Create the module using an array.   (13 marks)

Question 26 **(10 marks)**

CarsNow has introduced further developments for its online systems and is keen to package the application and sell it to other car dealers.

(a) One of the car dealers planning to purchase the application is not happy with the user interface, as it is too difficult to use. Outline **two** features that CarsNow could include to ensure that it is easier to use. (2 marks)

_____

_____

_____

_____

(b) CarsNow implemented these changes quickly. However, when the application was run, the application returned a syntax error. What is meant by a syntax error? (1 mark)

_____

_____

_____

(c) Outline **two** steps that CarsNow could have taken to ensure that this type of error did **not** occur. (2 marks)

_____

_____

_____

_____

(d) It has been suggested that CarsNow create an end user licence agreement (EULA). State the purpose of this document. (1 mark)

_____

_____

_____

(e) The application currently runs on a 32 bit operating system. A new 64 bit operating system has just been released. What does CarsNow need to do to ensure the application runs smoothly on the new operating system? (4 marks)

_____

_____

_____

_____

_____

_____

Question 27 **(6 marks)**

(a) It has been suggested that the salespeople use personal devices, such as smart phones, to send and receive data to and from the database.

(i) Name the standard used for wireless connections. (1 mark)

_____

(ii) State **two** advantages for salespeople using personal devices. (2 marks)

One: _____

_____

Two: _____

_____

(iii) State **one** disadvantage for salespeople using personal devices. (1 mark)

_____

_____

(b) CarsNow is keen to have a website where potential clients can search the car database. The Information Technology (IT) administrator has suggested that CarsNow undertake a feasibility study. Outline why this was suggested. (2 marks)

_____

_____

_____

_____

See next page

Question 28 **(4 marks)**

The administrator has put together the following plan for the project.

Task ID	Task	Possible start	Length	Type	Dependent on
1	Meet with owners	Wk 1	2 days	Sequential	
2	Build online prototype	Wk 2	3 days	Sequential	1
3	Train staff	Wk 3	1 day	Sequential	2
4	Beta test new online system	Wk 3	2 days	Parallel	2
5	Implement new online system	Wk 4	2 days	Sequential	4

Draw a PERT chart that represents this proposal.

Question 29 **(9 marks)**

(a) CarsNow is a little concerned about its database being accessible over the internet. It had heard about *back doors* and *IP spoofing*, but is not sure what these are. Outline these **two** types of security concerns. (2 marks)

back doors

_____

_____

IP spoofing

_____

_____

(b) Ethernet 802.3 communicates between nodes in messages called frames, each frame containing information about the destination node address, the sending node address, the data and parity information. Nodes continually 'listen' to the network.

(i) State what happens when the network is quiet and two nodes decide to send a message at the same time. (1 mark)

_____

_____

(ii) What do the nodes do next? (1 mark)

_____

_____

(iii) What is the impact on the performance of the network if this continually happens? (1 mark)

_____

_____

(iv) State why standards like Ethernet 802.3 are used in network communications. (1 mark)

_____

_____

See next page

Question 29 (continued)

(c)   The network diagram below was drawn to show how the different branches and clients
       are connected to the internet via a Virtual Private Network (VPN). Label the components
       at 1, 2 and 3 shown below.   (3 marks)

End of questions

Question number: _____

Question number: _____

Question number: _____

Question number: _____

Question number: _____

Additional working space

Additional working space