



Western Australian Certificate of Education Examination, 2012

Question/Answer Booklet

COMPUTER SCIENCE

Stage 2

Please place your student identification label in this box

Student Number: In figures

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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

Multiple-choice Answer Sheet

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 tape/fluid, 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.

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: Multiple-choice	20	20	25	20	10
Section Two: Short answer	17	17	65	50	35
Section Three: Extended answer	5	5	90	80	55
Total					100

Instructions to candidates

- The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2012*. Sitting this examination implies that you agree to abide by these rules.

- Answer the questions according to the following instructions.

Section One: Answer all questions on the separate Multiple-choice Answer Sheet provided. For each question shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Sections Two and Three: Write answers in this Question/Answer Booklet.

- 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.
- 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(s) that you are continuing to answer at the top of the page.

Section One: Multiple-choice

10% (20 Marks)

This section contains **20** questions. Answer **all** questions.

Answer all questions on the separate Multiple-choice Answer Sheet provided. For each question shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time: 25 minutes.

1. A business has offices that are two kilometres apart. The fastest transmission medium to securely connect the two offices together is
 - (a) twisted pair.
 - (b) fibre optic.
 - (c) wireless.
 - (d) satellite.

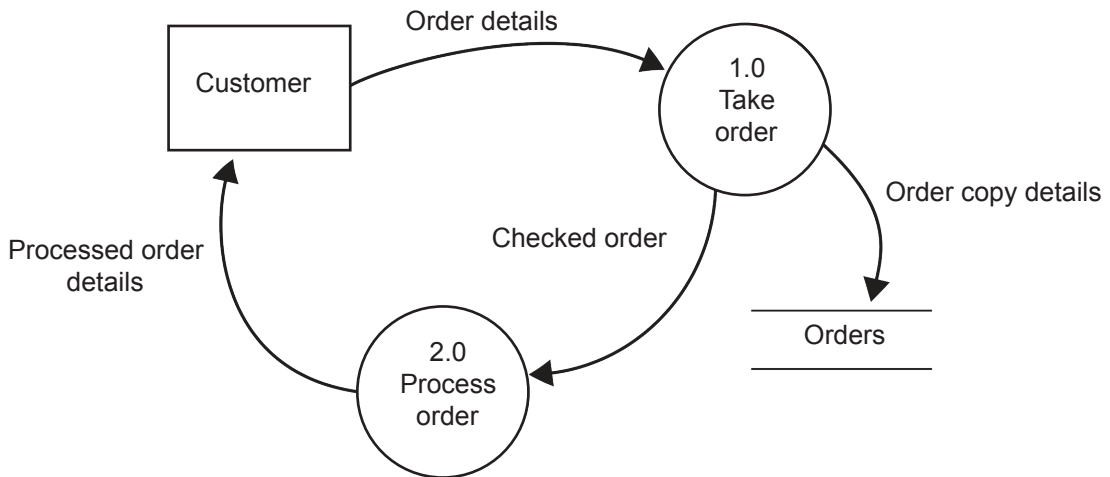
2. Which of the following communication protocols is primarily used to transfer files across a network?
 - (a) File Transfer Protocol (FTP)
 - (b) Hypertext Transfer Protocol (HTTP)
 - (c) Hypertext Transfer Protocol Secure (HTTPS)
 - (d) Simple Mail Transfer Protocol (SMTP)

3. If you are using the internet to search a website that is hosted in another country, what type of communication network is **most** likely being used?
 - (a) Personal Area Network (PAN)
 - (b) Worldwide Interoperability for Microwave Access (WiMax)
 - (c) Wide Area Network (WAN)
 - (d) Local Area Network (LAN)

4. The network device that connects Ethernet cables from a number of devices is called a
 - (a) bridge.
 - (b) firewall.
 - (c) modem.
 - (d) switch.

- 5. In which stage of the Systems Development Life Cycle (SDLC) does the changeover to the new system occur?
 - (a) Design
 - (b) Analysis
 - (c) Implementation
 - (d) Development

Use the following diagram to answer Question 6.



- 6. The symbol for Customer in the Data Flow Diagram (DFD) indicates
 - (a) a data flow.
 - (b) a data store.
 - (c) an entity.
 - (d) a process.

- 7. Computer devices can be classified as input, output or storage. A portable hard drive is
 - (a) an input device.
 - (b) a storage device.
 - (c) an output device.
 - (d) both an input and output device.

- 8. Which component of the Central Processing Unit (CPU) fetches the data to be processed?
 - (a) Control Unit
 - (b) Arithmetic Logic Unit
 - (c) program counter
 - (d) system clock

Use the following information to answer Question 9.

A dental surgery uses a database to manage its stock. Details of two products are shown in the Product Table below:

Product Table			
ProductID	ProductName	NumberInStock	Reorder
000100	Gauze dressing	250	✓
000101	Amalgam mix	1000	x

9. Select the **most** appropriate data types for the Product Table from the samples below.

(a)

ProductID	ProductName	NumberInStock	Reorder
Number	Text	Number	Text

(b)

ProductID	ProductName	NumberInStock	Reorder
Number	Text	Text	Boolean

(c)

ProductID	ProductName	NumberInStock	Reorder
Text	Text	Text	Text

(d)

ProductID	ProductName	NumberInStock	Reorder
Number	Text	Number	Boolean

10. Which of the following lists the evolution of programming languages in the correct order?

- (a) procedural, non-procedural, object oriented, machine, assembler
- (b) machine, assembler, procedural, non-procedural, object oriented
- (c) machine, procedural, assembler, non-procedural, object oriented
- (d) machine, assembler, object oriented, procedural, non-procedural

Use the following spreadsheet to answer Questions 11 and 12.

	A	B	C	D	E
1		January	February	March	April
2	Income				
3	Wages	3000	2500	2700	2500
4	Allowance	500	500	500	500
5	Interest	10	20	10	10
6	Total Income				
7					
8	Expenses				
9	Rent	500	500	500	500
10	Food	200	200	200	200
11	Petrol	150	150	150	150
12	Total Expenses				
13					
14	Balance				

11. What is the **most** efficient formula for calculating the correct Total Income for January in Cell B6?
- (a) =SUM(B3:B5)
 - (b) =(B3:B5)
 - (c) =SUM(B3+B5)
 - (d) =(B3+B4+B5)
12. The Balance amount in March is **most** efficiently calculated in Cell D14 by the formula
- (a) D6-D12
 - (b) =D6-D12
 - (c) =D3:D5-D9:D11
 - (d) =D3+D4+D5-D9-D10-D11
13. The number 1AF2 is an example of which type of number system used in computers?
- (a) Binary
 - (b) Decimal
 - (c) Hexadecimal
 - (d) Ordinary

Use the following algorithm to answer Questions 14 and 15.

```
TotalTemp ← 0
For Day ← 1 to 7
    Input (DayTemp)
    TotalTemp ← TotalTemp + DayTemp
End For
AverageTemp ← TotalTemp/7
Output ("Average temperature is", AverageTemp)
```

14. The algorithm above contains examples of which control structures?
- (a) sequence and selection
 - (b) iteration and division
 - (c) selection and iteration
 - (d) sequence and iteration
15. AverageTemp is a
- (a) constant.
 - (b) character.
 - (c) variable.
 - (d) binary number.
16. Which of the following is an example of an integer?
- (a) 40
 - (b) 51.56%
 - (c) False
 - (d) 31.5
17. The software that keeps track of files and directories in a computer is
- (a) an operating system.
 - (b) utility software.
 - (c) application software.
 - (d) anti-virus software.
18. Select the utility software application that makes one or more files into a smaller file.
- (a) defragmenter
 - (b) anti-malware
 - (c) anti-virus
 - (d) file compression

19. The software licence type that is available for use at no cost or for an optional fee is
- (a) proprietary.
 - (b) commercial.
 - (c) open source.
 - (d) freeware.
20. Digital signatures, passwords and biometrics are all types of
- (a) file compression.
 - (b) authentication.
 - (c) encryption.
 - (d) file structure.

End of Section One

See next page

Section Two: Short answer**35% (50 Marks)**

This section has **17** questions. 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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Suggested working time: 65 minutes.

Question 21**(3 marks)**

The software development cycle has five stages. Complete the table below, placing the remaining **three** stages in the correct order by numbering them from '3' to '5'.

1	state the problem
2	plan and design
	test
	evaluate
	develop

Question 22**(2 marks)**

Outline the difference between application software and operating system software.

Question 23

(2 marks)

Two network diagrams are shown below. Identify the network shown in each diagram.

Diagram one: _____

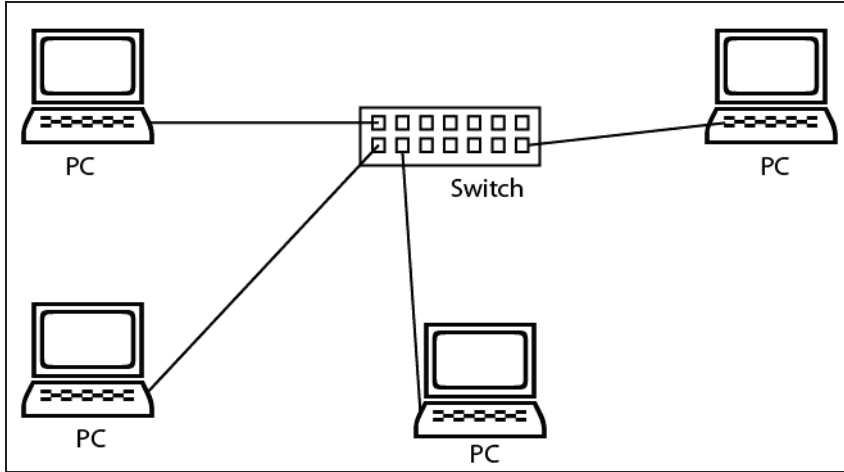
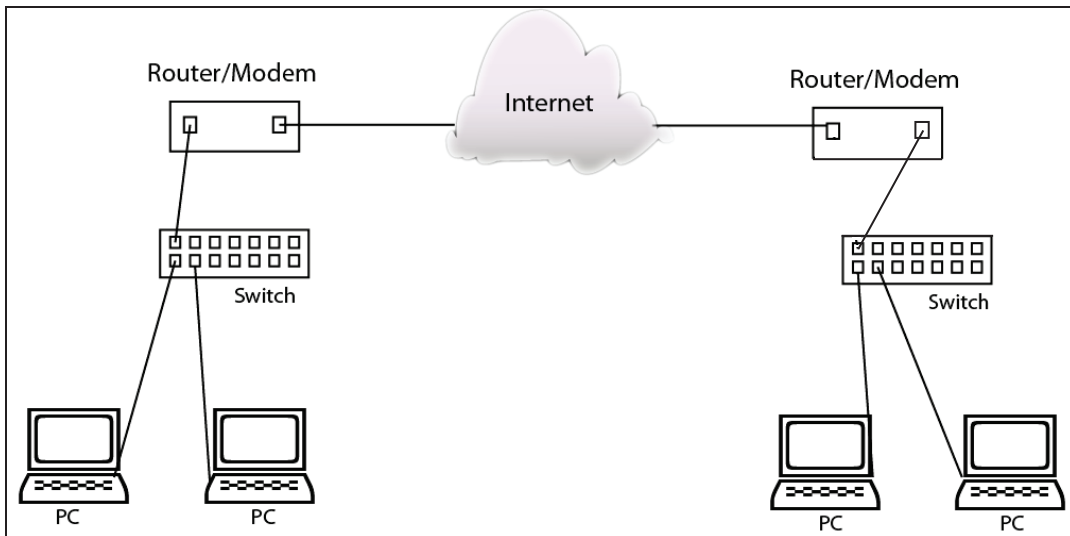


Diagram two: _____



Question 24

(2 marks)

Complete the table below by identifying the signals described as analogue or digital.

Description	Signal type
signal from keyboard to computer motherboard	
signal from modem to telephone line	

Question 25**(1 mark)**

Which error detection method adds a bit, either 0 or 1, to a block of data (byte)?

Question 26**(1 mark)**

When a computer is switched on, it goes through a series of internal processes before it is ready to use. What term is used to describe this process?

Question 27**(3 marks)**

Identify each of the following as primary or secondary storage.

Read Only Memory (ROM): _____

Cache memory: _____

Hard disk drive: _____

Question 28**(3 marks)**

Complete the table below by writing each of the following terms next to the correct data bus description.

- data
- address
- control

Description	Term
carries the data and instructions being processed between the components in the Central Processing Unit (CPU)	
carries signals that control how the processor communicates with the rest of the system	
carries information about memory locations, where data is either to be stored or fetched from	

Question 29

(2 marks)

A small business researches accommodation options for prospective clients. The business wishes to develop a new online system. An analyst provided two options for the development of this new system, Systems Development Life Cycle (SDLC) or prototyping.

- (a) Which system development option would you recommend for the business? (1 mark)

- (b) Give **one** reason to justify your recommendation. (1 mark)

Use the following spreadsheet of sales data for a sports club canteen to answer Question 30.

	A	B	C	D	E
	Drink Type	Cost Per Drink	Sales	Total Per Drink (\$)	Canteen Share Per Drink Type
1					
2	Cappuccino	\$2.50	37		
3	Flat White	\$2.00	23		
4	Hot Chocolate	\$2.70	31		
5	Black Tea	\$2.00	12		
6	White Tea	\$2.00	20		
7	Peppermint Tea	\$2.30	9		
8					
9	Total				
10					
11					
12	Highest Sale				
13	Average Sale				
14					

Question 30

(3 marks)

- (a) Using a function, write the formula below that would appear in Cell C9 to calculate the Total Sales for all the drink types. (1 mark)

- (b) Using a function, write the formula below that would appear in Cell B12 to calculate the Highest Sale. (1 mark)

- (c) Using a function, write the formula below that would appear in Cell B13 to calculate the Average Sale. (1 mark)

Question 31**(3 marks)**

The fetch-execute cycle contains four steps. Complete the table below, placing the remaining **three** stages in the correct order by numbering them from '2' to '4'.

1	fetch the instruction from main memory
	execute or carry out the instruction
	store the results
	decode the instruction

Question 32**(2 marks)**

Give **two** examples of preventative maintenance that a user can perform to keep a computer functioning correctly.

One: _____

Two: _____

Question 33**(4 marks)**

HotelID	HotelName	CostPerNight	Airconditioned	Region
100	Paradise Beach	\$65	Y	1
101	Continental	\$80	Y	2
102	Superior	\$70	N	1
103	Junction	\$50	N	3
104	Top View	\$65	Y	3

Explain the following database terms and give an example of each based on the table.

Field: _____

Example: _____

Record: _____

Example: _____

Question 34

(1 mark)

Consider the database object shown below.

The screenshot shows a window titled 'tblaccommodation' with a header 'Accommodation Available' and a subtitle 'List of Resort Accommodation'. The form contains the following fields and values:

- Name: Log Cabin
- Code: LC
- Sleeps: 6
- Bathrooms: 2
- Washing Machine:
- Parking:
- Other: Spa

The status bar at the bottom indicates 'Record: 1 of 8' and 'No Filter'.

What type of database object is this? _____

Question 35

(7 marks)

Use the tables below that show data from a relational database to answer Question 35.

Continent Table		
ContinentID	ContinentName	ContinentAreaSqKm
1	Africa	31,000,000
2	Asia	45,000,000
3	Antarctica	13,000,000
4	Australia	8,000,000
5	Europe	10,000,000
6	South America	18,000,000

Country Table						
CountryID	CountryName	CountryAreaSqKm	Population	CapitalCity	Government	ContinentID
1	Zambia	753,000	10,000,000	Lusaka	Republic	1
2	Brazil	8,511,965	184,101,019	Brasilia	Federative republic	6
3	Australia	7,686,850	19,913,114	Canberra	Democratic, federal-state system	4
4	China	9,596,960	1,298,847,624	Beijing	Communist state	2
5	Norway	324,220	4,574,560	Oslo	Constitutional monarchy	5

See next page

- (a) What data type would be **most** suitable for the Population field? (1 mark)
-
- (b) How could the user extract a list of **only** those countries that were located in the continent of Asia? (1 mark)
-
- (c) In the space below draw an Entity Relationship (ER) diagram to show how the Continent and Country tables are linked. (You do **not** need to include attributes.) (5 marks)

Question 36

(7 marks)

Study the following algorithm:

```

1 Total ← 0
2 For Count ← 1 to 3
3   Read (Number)
4   Total ← Total + Number
5 End For
6 Average ← Total/Count
7 Print (Average)

```

- (a) Complete the trace table below to test the logic of the algorithm using the following values: 5, 2, 5. (6 marks)

Line	Count	Number	Total	Average	Output
1			0		
2	1				
3		5			
4			$0 + 5 = 5$		
2	2				
3					
4					
2	3				
3					
4					
6					
7					

- (b) Name the iteration control structure used in the algorithm. (1 mark)

Question 37

(4 marks)

Explain the following programming error types. Provide an example of each.

Syntax error: _____

Example: _____

Run-time error: _____

Example: _____

End of Section Two

Section Three: Extended answer

55% (80 Marks)

This section has five (5) questions. Answer all questions. Write your answers in the spaces provided.

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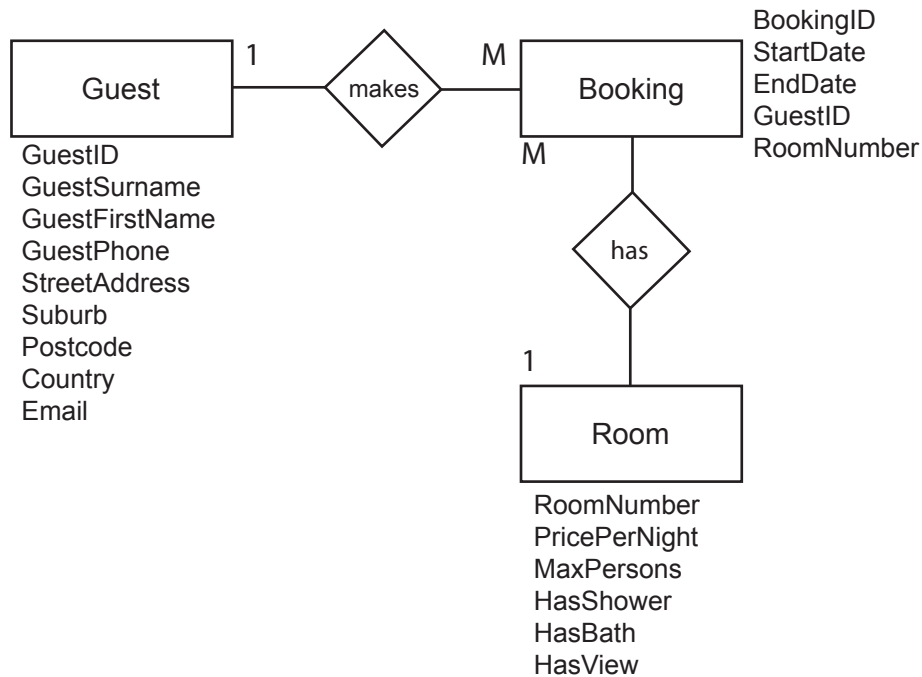
Suggested working time: 90 minutes.

Question 38

(15 marks)

Carla's Forest Getaway is a guesthouse offering bed and breakfast accommodation in Nannup. A guest can make many bookings and a room can be booked many times.

Below is an Entity Relationship (ER) diagram showing the tables that could be used in a relational database for this business.



(a) Identify the primary key for each table. (3 marks)

Guest: _____

Booking: _____

Room: _____

- (b) Identify **two** foreign keys in the ER diagram. (2 marks)

One: _____

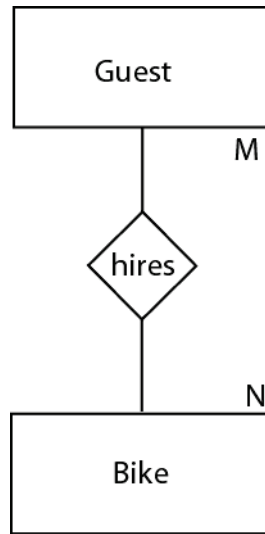
Two: _____

- (c) Describe the relationship between the Guest and Booking entities. (2 marks)

- (d) Describe the relationship between the Booking and Room entities. (2 marks)

- (e) What data type would be **most** appropriate for the StartDate in the Booking entity? (1 mark)

The owner of Carla's Forest Getaway has purchased a fleet of bikes for the guests to hire while they are at the cottage. She has modified the ER diagram to include a Bike entity as shown below.



- (f) In the space below redraw the ER diagram shown above to resolve the M:N relationship. Include the cardinalities. (You do **not** need to include attributes.) (5 marks)

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See next page

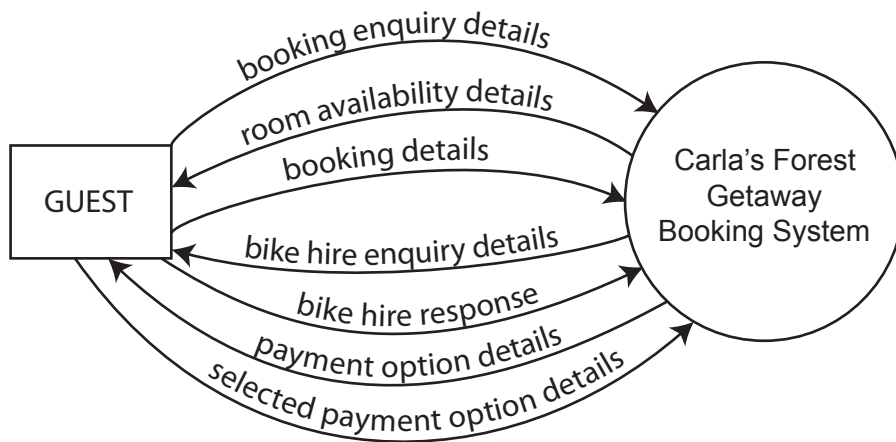
When a guest contacts Carla’s Forest Getaway to make a booking they provide their intended arrival and departure date. The owner checks the Bookings database to see if there are any rooms available. The owner then informs the guest of room availability and room price per night.

If the guest wants to make a booking, the owner records the booking details in the Bookings database.

The owner asks the guest if they would like to hire bikes during their stay. If the guest requires bikes, the owner records the bike hire details in the Bookings database.

The owner informs the guest of the payment options and the guest advises the owner which option they would like to use. The payment details are recorded in the Bookings database.

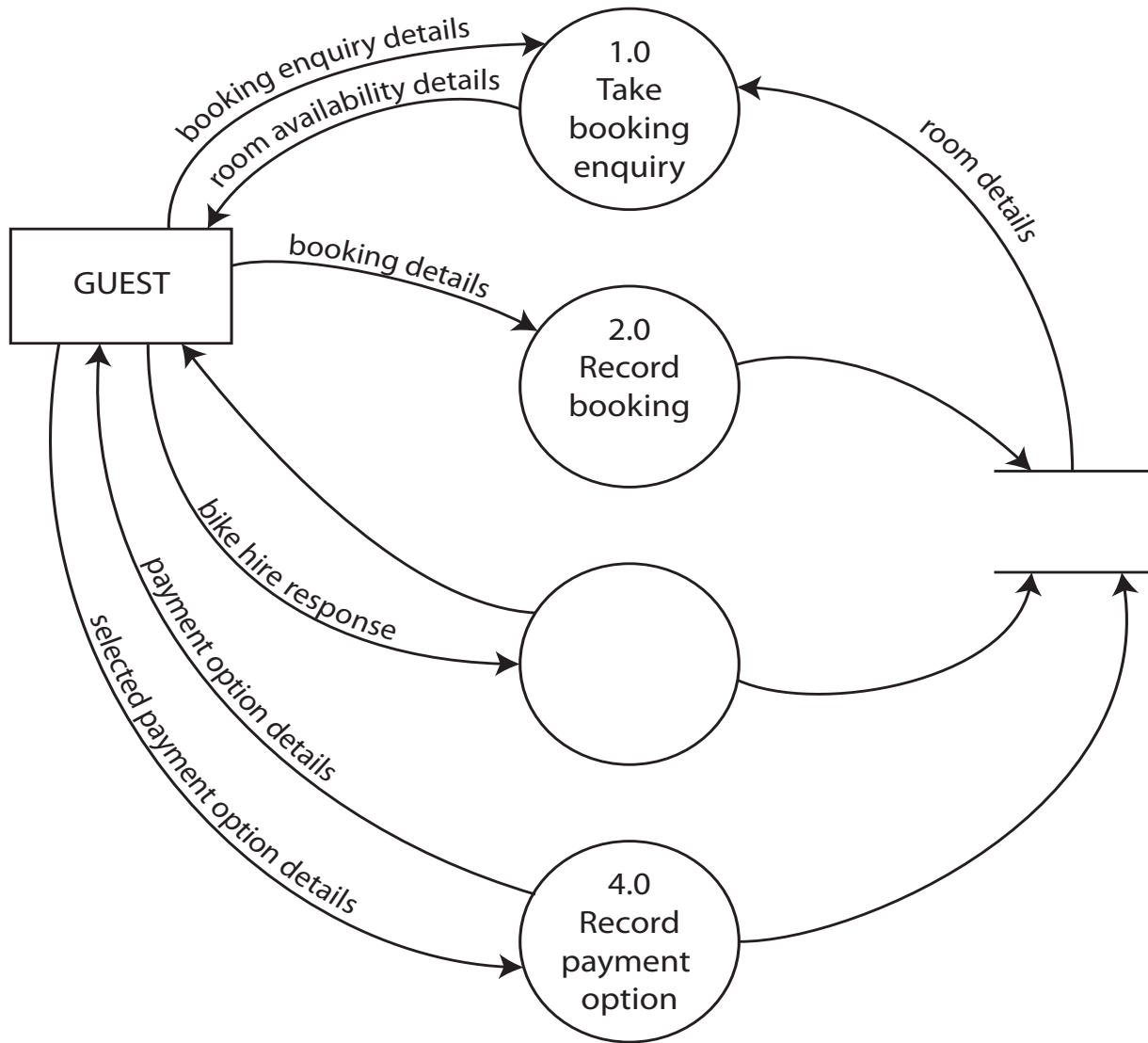
A context diagram for Carla’s Forest Getaway Booking System is shown below. It shows the interaction between the external entity and the system.



Question 39

(7 marks)

Complete the Level 0 Data Flow Diagram (DFD) for the system, using the information from the context diagram provided.



Question 40

(12 marks)

The owner of Carla’s Forest Getaway uses the following spreadsheet to calculate the amount owing by a customer.

E15 fx =SUM(E9:E14)						
	A	B	C	D	E	F
1	Carla’s Forest Getaway - Customer Invoice					
2						
3	Name:	Mr & Mrs J Smith				
4	Address:	9 Jay Street				
5	Suburb:	West Leederville				
6	Postcode:	6007				
7						
8	Item Code	Item Description	Item Cost	Quantity	Total Cost	
9	100	Lake View Room	\$130.00	3	\$390.00	
10	105	Picnic Hamper	\$35.00	1	\$35.00	
11	103	Bike Hire	\$10.00	2	\$20.00	
12						
13						
14						
15			TOTAL AMOUNT OWING:		\$445.00	
16						
17						
18						
19						
20	Item Code	Item Description	Item Cost			
21	100	Lake View Room	\$130.00			
22	101	West Wing Room	\$120.00			
23	102	Forest View Room	\$110.00			
24	103	Bike Hire	\$10.00			
25	104	Candlelight Supper	\$75.00			
26	105	Picnic Hamper	\$35.00			
27						
28						
29						
30						
31						
32						
33						
34						

(a) Write the formula below for a VLookUp that can be used in Cell B9 to automatically display the item description when the owner enters the item code in Cell A9. (4 marks)

(b) Describe how you could sort the data in rows 9, 10 and 11 so that the Item Code column shows the codes listed from lowest to highest. (2 marks)

- (c) Explain the following spreadsheet terms. Give examples from the spreadsheet data provided on page 24 to support your explanation. (6 marks)

Formula: _____

Example: _____

Label: _____

Example: _____

Worksheet: _____

Example: _____

Question 41

(28 marks)

Carla's Forest Getaway would like to replace their spreadsheet with a software program to calculate a customer's bill.

A programmer has written the following algorithm.

```
BikeHireRate ← 10
HamperRate ← 35

Print ("Enter Room Rate")
Input (RoomRate)
Print ("Enter number of nights stay")
Input (NumNights)

RoomCost ← RoomRate * NumNights

Print ("Any bike hire, Yes/No")
Input (Response)
If Response = "Yes" then
    Print ("Enter number of bikes hired")
    Input (NumBikes)
    BikeCost ← (BikeHireRate * NumBikes)
Else
    BikeCost ← 0
End If

Print ("Any picnic hampers, Yes/No")
Input (Response)
If Response = "Yes" then
    Print ("Enter number of picnic hampers")
    Input (NumHampers)
    HamperCost ← (HamperRate * NumHampers)
Else
    HamperCost ← 0
End If

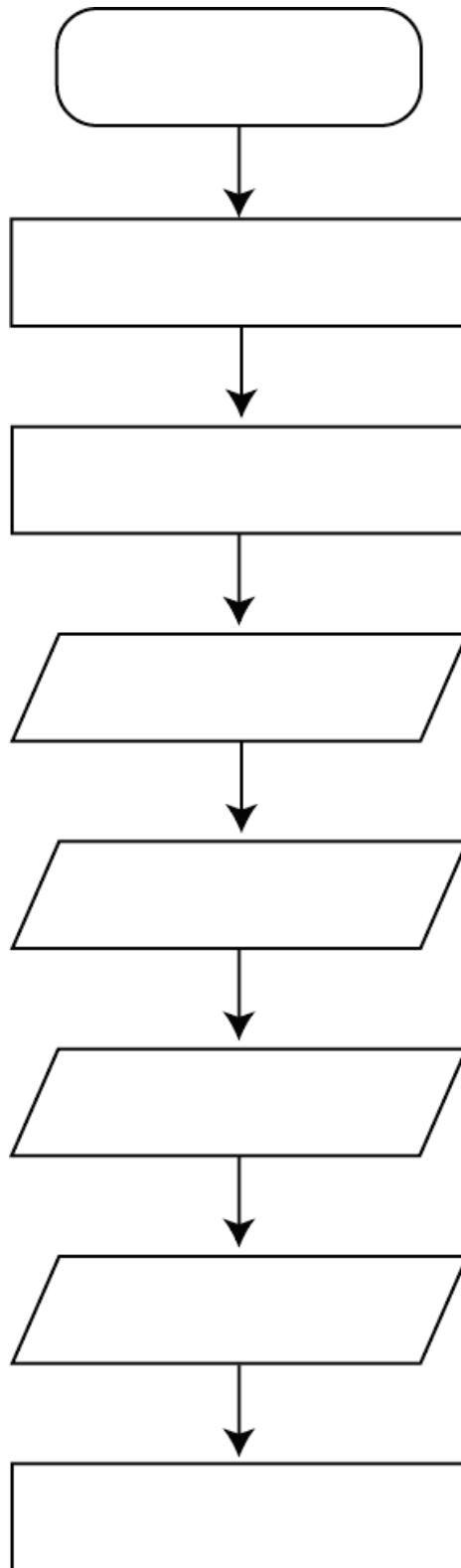
TotalCost ← RoomCost + BikeCost + HamperCost

Print ("Total payable is", TotalCost)
```

A

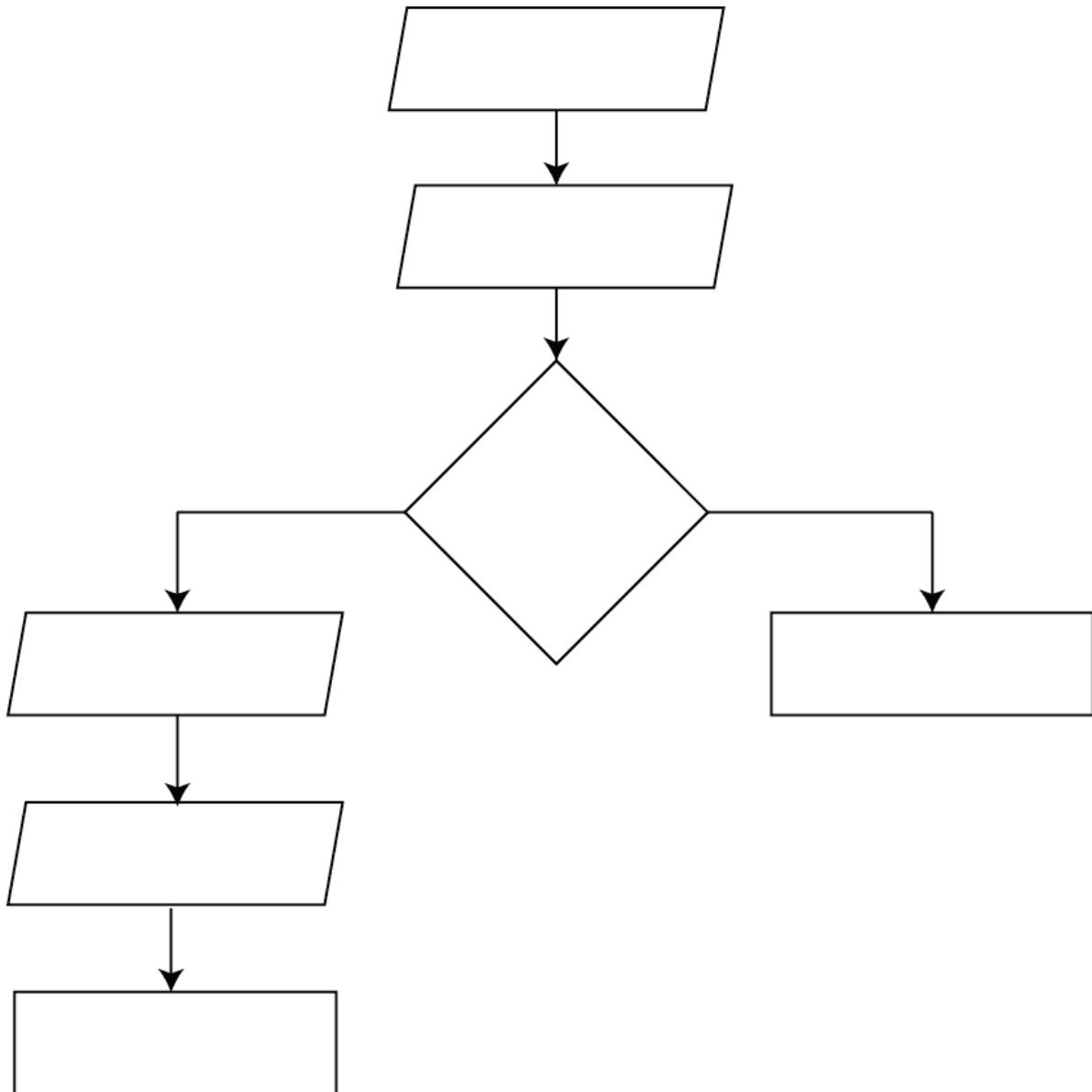
B

(a) Complete the flow chart for the section of code identified as **A** on page 26. (8 marks)



See next page

(b) Complete the flow chart for the section of code identified as **B** on page 26. (9 marks)



(c) State the purpose of the following lines of code. (3 marks)

BikeHireRate ← 10

If Response = "Yes" then

Input (NumHampers)

- (d) Carla's Forest Getaway wants to recognise customer loyalty by offering a discount to customers who return for subsequent stays. The discount offered will be as follows:

First visit: no discount.

Second visit: 5% discount.

Three or more visits: 10% discount.

Write an algorithm for a program that will:

- initialise variables
- accept the visit number (VisitNumber)
- accept the total cost (TotalCost)
- calculate the discount amount
- deduct the discount amount from the bill total
- print the final amount owing.

(8 marks)

Question 42

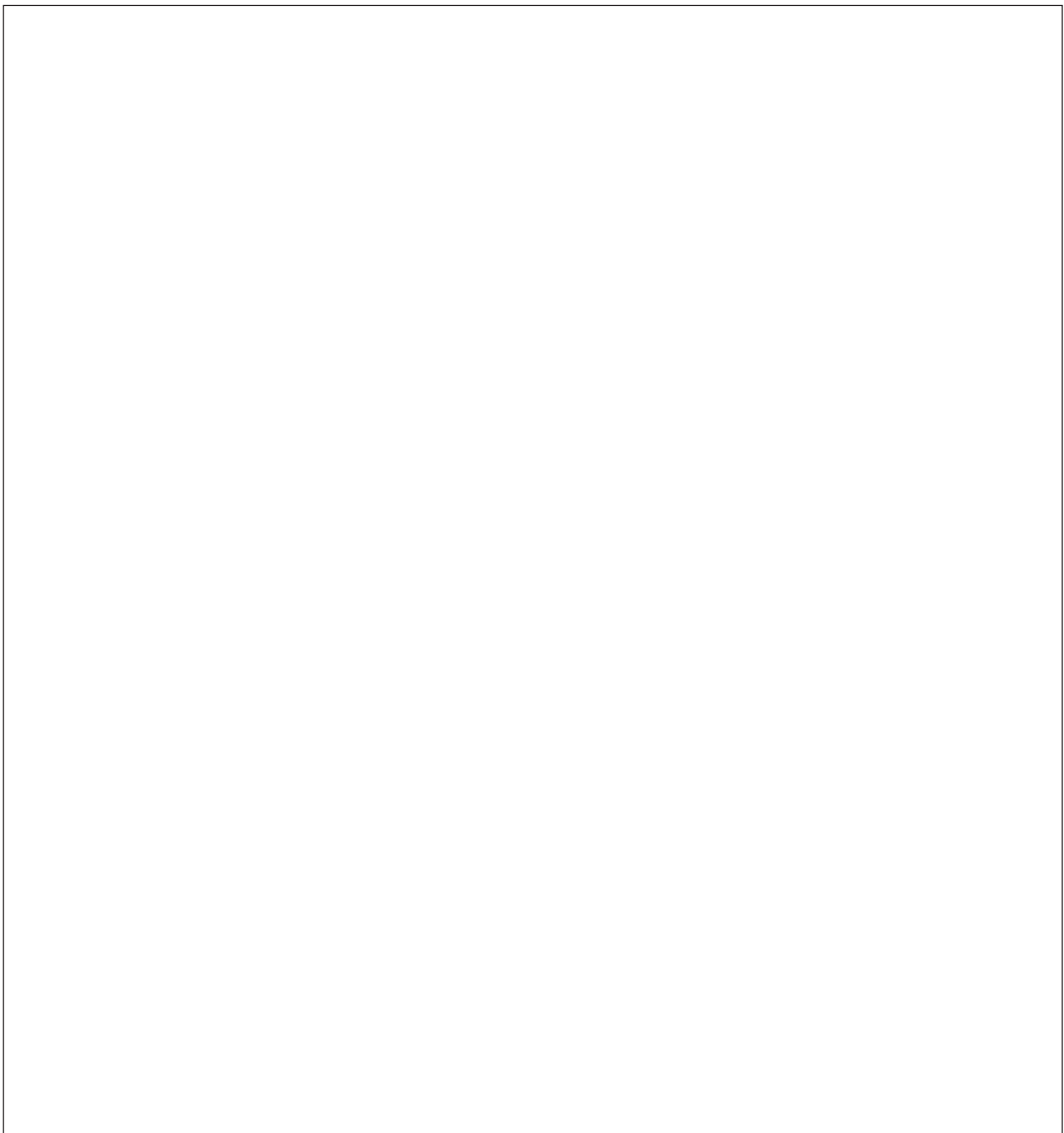
(18 marks)

Carla's Forest Getaway is planning to set up a combined wired and wireless network so that guests can have access to the internet via their own notebook computer while they stay at the cottage. The network will have a computer workstation, printer, server and wireless modem/router located in the office. Each of the four guest rooms will have a wireless access point to allow the guests to connect to the internet.

- (a) Draw a diagram showing the network topology for this Local Area Network (LAN).
Your diagram should include:

- equipment located in the office
- **four** wireless access points
- networking devices
- wired and wireless connections.

(9 marks)



- (b) Give **one** reason why the network planned for Carla's Forest Getaway is a LAN. (1 mark)

- (c) Give **one** advantage of using a wireless network in the cottage. (1 mark)

- (d) Give **one** disadvantage of using a wireless network in the cottage. (1 mark)

- (e) Which protocol would be used by the guests to view a web page on the internet? (1 mark)

- (f) List **two** security measures guests could implement on their notebook computer to ensure other guests are not able to access their data. (2 marks)

One: _____

Two: _____

- (g) How could the owner of Carla's Forest Getaway protect the data stored on the workstation and server from being accessed by cottage guests? (1 mark)

- (h) The owner of Carla's Forest Getaway has found a software product that could help her manage the bookings for the cottage, but she cannot afford it. A friend has offered to burn her a copy of the software onto disks. Give **two** reasons why the owner should **not** accept the copied software. (2 marks)

One: _____

Two: _____

End of questions

Question number: _____

Horizontal lines for writing an answer.

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