



**Western Australian Certificate of Education  
Examination, 2009**

**Question/answer booklet**

**COMPUTER SCIENCE**

**Written paper  
Stage 2**

Please place your student identification label in this box

Student Number: In figures

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In words

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**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
- Case Study insert for Section Three (inside the front cover of this Question/Answer Booklet)

***To be provided by the candidate***

- Standard items: pens, pencils, eraser, correction fluid, ruler, highlighters
- Special items: non-programmable calculators, 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 attempted	Suggested working time (minutes)	Marks available
Section One: Multiple-Choice	20	20	25	20
Section Two: Short Answer	18	18	65	56
Section Three: Extended Answer	6	6	90	84
<b>Total</b>				160

**Instructions to candidates**

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2009*. Sitting this examination implies that you agree to abide by these rules.
2. For Section One you are provided with a Multiple-Choice Answer Sheet. Use a blue or black pen or a B or 2B pencil for all entries on this sheet.
3. For Sections Two and Three, write your answers in the spaces provided in this Question/Answer Booklet. A blue or black pen should be used. Wherever appropriate, fully labelled diagrams, tables and examples should be used to illustrate and support your answers.
4. 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.
5. Spare answer pages are provided at the end of this booklet. If you need to use them, indicate in the original answer space where the answer is continued, i.e. give the page number.

## Section One: Multiple-Choice

20 Marks

Answer **all** questions in this section. Record your answer on the separate Multiple-Choice Answer Sheet using a blue or black pen or a B or 2B pencil. Each question is worth **one** mark.

Suggested working time for this section is 25 minutes.

Use Figure 1 and Figure 2 to answer questions 1 to 3.

Figure 1

Name	Code	Sleeps	Bathrooms	WashingMachine	Parking	Other
Log Cabin	LC	6	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Spa
Pinetree Cottage	PC	10	4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Spa
Pine Hill Cabin	PH	9	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Spa
Pine Needle Lodge	PL	6	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Lake Views
Ski Lodge	SL	10	4	<input type="checkbox"/>	<input type="checkbox"/>	Lake Views
Snowfield Retreat	SR	10	4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Lake Views
Alpine Villa	VA	2	1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Spa
Winter Retreat	WR	8	2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Spa

Figure 2

Name	Code	Bathrooms	WashingMachine
Pine Needle Lodge	PL	2	<input checked="" type="checkbox"/>
Log Cabin	LC	2	<input checked="" type="checkbox"/>

- The area highlighted in Figure 1 is an example of
  - a field.
  - a record.
  - a table.
  - a query.
- Which criteria would have been used to extract the records shown in Figure 2?
  - Bathrooms = 2
  - WashingMachine = "No"
  - Bathrooms = 2 AND WashingMachine = "Yes"
  - WashingMachine = "Yes"
- What would be the most appropriate data type for the Parking field in Figure 1?
  - text
  - number
  - tick box
  - Boolean

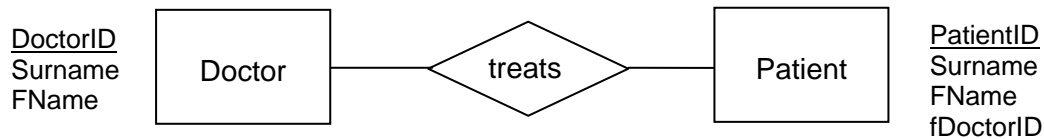
4. Which of the following lists contains the layers of the TCP/IP model in their correct order?
- (a) Application, Transport, Internet, Data Link
  - (b) Application, Internet, Transport, Data Link
  - (c) Internet, Application, Data Link, Transport
  - (d) Internet, Application, Transport, Data Link
5. Utility software includes
- (a) network operating system software.
  - (b) audio editing software.
  - (c) anti-malware software.
  - (d) multimedia authoring software.
6. Encryption is used when transmitting data over the internet in order to improve
- (a) integrity.
  - (b) speed.
  - (c) accuracy.
  - (d) security.
7. Which of the following protocols facilitates the sending of emails?
- (a) HTTP
  - (b) SMTP
  - (c) TCP/IP
  - (d) FTP
8. A computer component is described as having a storage capacity of 250 GB. It is most likely to be
- (a) a hard disk drive.
  - (b) a central processing unit.
  - (c) RAM.
  - (d) ROM.
9. Which of the following are all input devices?
- (a) mouse, touch screen, scanner, microphone
  - (b) keyboard, mouse, monitor, bar code scanner
  - (c) RFID reader, mouse, USB key, scanner
  - (d) microphone, modem, mouse, monitor
10. A single-use software licence means that the software can be loaded onto
- (a) a single network.
  - (b) all the computers in a single office.
  - (c) a single computer.
  - (d) any computer the licence holder uses.

11. Commercial software such as Microsoft Access ® is normally
- (a) created specifically for an organisation.
  - (b) able to be customised by an organisation.
  - (c) available as shareware.
  - (d) only available under a licence agreement.
12. Creating a trace table to desk check a program is done
- (a) after coding of the algorithm.
  - (b) during coding of the algorithm.
  - (c) after writing the algorithm but before coding it.
  - (d) when the program is released for sale.
13. Consider the diagram below.

The image shows a screenshot of a Microsoft Access data entry form. The form has a light beige background and a vertical scroll bar on the left. It contains several text boxes for data entry, each with a label to its left. The labels and their corresponding values are: PatientId (1), Surname (Burdough), Firstname (Sarah), DOB (25/10/1986), Sex (F), Street (91 Any St), Suburb (RIVERTOWN), and Postcode (6145). At the bottom of the form, there is a 'Record:' label followed by navigation buttons (back, forward, first, last, refresh) and the text '1 of 3'.

- This is an example of
- (a) a report.
  - (b) a form.
  - (c) a table.
  - (d) a query.
14. Which of the following would be the most appropriate data type for a variable called ItemCost that will hold the value of an item (e.g. \$2.50)?
- (a) integer
  - (b) single
  - (c) text
  - (d) currency
15. Which program component is used to store data that does **not** change as the program is executing?
- (a) variable
  - (b) constant
  - (c) procedure
  - (d) integer

Use the Entity-Relationship diagram below to answer questions 16 and 17.



16. PatientID is
- (a) a foreign key.
  - (b) a primary key.
  - (c) an entity.
  - (d) a record.
17. Based on the E-R diagram, the relationship between Doctor and Patient would be
- (a) one to many.
  - (b) many to many.
  - (c) one to one.
  - (d) many to one.
18. What is a foreign key?
- (a) a special key used to decrypt tables written in a language other than Access
  - (b) values in a field in one table that do **not** match primary key values in another table
  - (c) a field that can only store values that are held in the primary key of another table
  - (d) a field that contains values that are duplicates of a foreign key in a linked table
19. Which of the following is used to show the flow of data through the processes of a system?
- (a) context diagram
  - (b) data store
  - (c) data dictionary
  - (d) level 0 data flow diagram

20. Which of the following is the correct algorithm to choose the larger of two numbers entered by the user?

<p>(a)</p> <pre> graph TD     Start([Begin]) --&gt; Input[Input Num1, Num 2]     Input --&gt; Decision{Num1 &gt; Num2?}     Decision -- True --&gt; Print2[Print Num2 "is the larger"]     Decision -- False --&gt; Print1[Print Num1 "is the larger"]     Print2 --&gt; End([End])     Print1 --&gt; End         </pre>	<p>(b)</p> <pre> Input (Num1, Num2) If Num1 &gt; Num2 then     Output (Num1 "is the larger") Else     Output (Num2 "is the larger") End If         </pre>
<p>(c)</p> <pre> Input (Num1, Num2) If Num1 &gt; Num2 then     Output (Num2 :is the larger") Else     Output (Num1 "is the larger") End If         </pre>	<p>(d)</p> <pre> graph TD     Start([Begin]) --&gt; Input[Input Num1, Num 2]     Input --&gt; Decision{Num1 &gt; Num2?}     Decision -- True --&gt; Print1[Print Num1 "is the larger"]     Decision -- False --&gt; Print2[Print Num2 "is the larger"]     Print1 --&gt; End([End])     Print2 --&gt; End         </pre>

End of Section One

See next page

## Section Two: Short Answer

56 Marks

Answer **all** questions in this section. Write your answers in the spaces provided.

Suggested working time for this section is 65 minutes.

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**Question 21****(6 marks)**

There are three types of primary storage in a computer system: RAM, ROM and cache.

- (a) Describe **two** differences between RAM and ROM. (2 marks)

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- (b) Why is the storage capacity of ROM much smaller than that of RAM? (2 marks)

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- (c) Explain the purpose of cache memory, and how it is utilised by the CPU. (2 marks)

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**Question 22**

**(2 marks)**

What do the following initials stand for?

PAN: \_\_\_\_\_

LAN: \_\_\_\_\_

**Question 23**

**(2 marks)**

Optical fibre cable is available in either single mode or multi-mode. Describe how each transmits data.

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**Question 24**

**(1 mark)**

What is the purpose of subnets in a TCP/IP network?

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Question 25

(6 marks)

For each of the following network protocols, state what the initials stand for. Explain the purpose of each protocol.

(a) WAP:

(2 marks)

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(b) FTP:

(2 marks)

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(c) SMTP:

(2 marks)

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**Question 26**

**(3 marks)**

(a) Describe **two** differences between Bluetooth and Infrared (IrDA).

**(2 marks)**

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(b) Give an example of a device that would use Bluetooth.

**(1 mark)**

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**Question 27**

**(1 mark)**

What is the purpose of a backup?

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**Question 28**

**(2 marks)**

Describe **two** features of a network operating system.

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**Question 29**

**(2 marks)**

What is a content management system?

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**Question 30**

**(3 marks)**

Define each of the following business systems.

(a) Decision-support system: (1 mark)

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(b) Expert system: (1 mark)

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(c) Transaction processing system: (1 mark)

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**Question 31**

**(2 marks)**

Describe **one** activity that may occur in each of the following stages of the Systems Development Life Cycle.

(a) Preliminary analysis: (1 mark)

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(b) Analysis: (1 mark)

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**Question 32**

**(3 marks)**

Describe **three** functions of a database management system.

- 1. \_\_\_\_\_  
\_\_\_\_\_
- 2. \_\_\_\_\_  
\_\_\_\_\_
- 3. \_\_\_\_\_  
\_\_\_\_\_

**Question 33**

**(5 marks)**

Digital Audio Tape (DAT) stores data as sequential files, whereas a Hard Disk Drive (HDD) stores data in indexed files.

- (a) Describe sequential file processing. **(2 marks)**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- (b) Describe indexed file processing. **(2 marks)**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- (c) What is the main advantage of indexed file processing over sequential file processing? **(1 mark)**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Question 34****(2 marks)**

(a) What is hexadecimal?

(1 mark)

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(b) What advantage does hexadecimal have over binary?

(1 mark)

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**Question 35****(2 marks)**

Use the portion of the ASCII table below to show the binary representation of the letter G.  
Show all your working.

Dec	Hex	Oct	Chr
71	47	107	G

**Question 36****(7 marks)**

An on-site computer repairer charges a call-out fee of \$50, plus \$50 per hour and \$3.50 per km for travel.

Use pseudocode to write an algorithm to calculate the cost of an onsite computer repair. Your algorithm should:

- use constants where appropriate
- accept input of number of hours worked and number of kilometres travelled
- output the final cost.

Question 37

(5 marks)

Examine the following algorithm.

```
1   Rate = 0.1
2   Input (Sales)
3   If Sales < 1000 then
4       Commission ← 0
5   Else
6       Commission ← Sales * Rate
7   End If
8   Output ("Commission earned is" Commission)
```

- (a) Explain the following terms, using examples from the pseudocode to support your answer. (4 marks)

Variable: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Constant: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- (b) The algorithm above calculates the commission for a single sale. Which control structure would be the most appropriate to efficiently calculate the commission for 10 sales? (1 mark)

\_\_\_\_\_  
\_\_\_\_\_



Question 38

(2 marks)

Describe the purpose of the following symbols used in an E-R diagram.

(a)



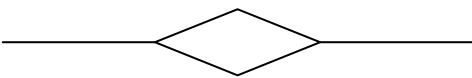
(1 mark)

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(b)



(1 mark)

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End of Section Two

See next page

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**See next page**

**Section Three: Extended Answer****84 Marks**

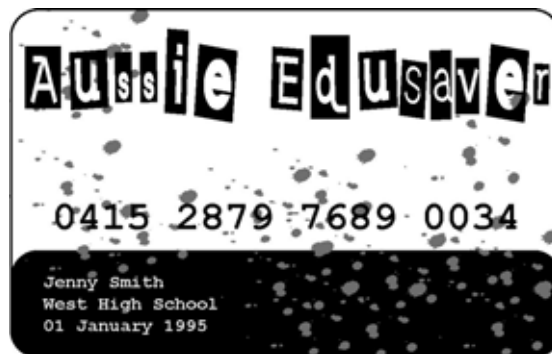
Read the Case Study below to answer the questions in this section. A copy of this Case Study is provided on the insert sheet.

Write your answers in the spaces provided.

Suggested working time for this section is 90 minutes.

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Aussie EduSaver is a new and exciting discount card available to all high school and tertiary students. The card is free and is personalised with your name, the educational institution you attend and your date of birth.



Once you have your card you can present it at selected shops and entertainment venues to receive discounts. You can also apply online for discount vouchers and special offers, which are then sent to your mobile phone via SMS.

A student may apply for an Aussie EduSaver card by entering their information into an online form on the Aussie EduSaver website or by completing a paper-based form and sending it in to the Aussie EduSaver office. When applying for this card, the student must supply their name, mailing address, date of birth, email address, password, gender and the name of the school, university or TAFE college they attend. A student can only be assigned to one Institution at any one time.

When an application is received, the Membership Officer at Aussie EduSaver verifies that the applicant is actually a student by contacting the institution listed on the application. If a student's status cannot be verified, an email is sent to the applicant telling them why the application has been refused.

If verification of their student status is received, the Membership Officer enters the student's details into the Membership File, allocates a membership number and submits an order to Cards 4 Us for a membership card.

Membership cards are sent to Aussie EduSaver for distribution to students. When the membership card is received, the Promotions Officer sends the card and some promotional material to the student's mailing address.

Once a month a promotional e-zine (electronic magazine) is sent, by email, to all members. This e-zine outlines the latest discount offers and competitions.

**See next page**

**Question 39**

**(16 marks)**

- (a) Draw a context diagram modelling the Aussie EduSaver Membership Information System.

**(6 marks)**

- (b) Draw the Level 0 Data Flow Diagram of this system to match the context diagram in (a).  
(10 marks)

## Question 40

(21 marks)

Membership data is currently kept in a Membership file. An extract from the file is shown below. A copy of this extract is provided on the insert sheet.

Membership Num	LName	FName	DOB	Address	Mobile	Email	Password	Institution	Institution Address	Institution Phone
0415 9 7689 0034	Smith	Jenny	01/01/1995	24 East Street Smallville, 6011	0422984565	jsmith@wshs.com	JenS01	West School	21 Eel Street, Smallville, 6011	93224567
0415 9 7689 0035	Jones	John	21/06/1987	5 First Avenue, Littletown, 6050	0416984170	johnj@jse.com	xCSTnu	Newt Uni	Long Hwy Newtown, 6213	94521200
0415 9 7888 1024	Xu	Jason	10/11/1989	3 Little Street Bigville, 6107	0422454678	xuj@klo.com	Fido1	MMC	Hay Road Littletown, 6050	93684567
32149 8887 2567	De Rosa	Sallie	17/03/1993	21 Big Street Oldtown, 6123	0428765490	sallie@mail.com	pinkibest	West School	32 Eel Street, Smallville, 6011	93224567

**Note** that historical data is not kept. For example, when a student changes address or phone number, their data is updated in the table and any old information is lost.

As membership numbers have increased, Aussie EduSaver has outgrown the current system. One problem it has encountered is update anomalies.

(a) Explain the term **update anomaly**, giving an example from the data extract.

(2 marks)

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(b) Explain the term **data integrity**, giving an example from the data extract. (2 marks)

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(c) Explain the term **data redundancy**, giving an example from the data extract. (2 marks)

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(d) Is the data extract table in the form of a relation? Justify your answer. (2 marks)

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- (e) In order to overcome the current problems, Aussie EduSaver has decided to convert the file into a relational database containing two tables: Student and Institution.

Draw an Entity-Relationship Diagram (E-R Diagram) for the new database. You should:

- identify primary keys by underlining them
- write FK next to any foreign keys
- include a list of suitable fields for each entity (refer to sample data).

(7 marks)

- (f) The way in which addresses are now stored in the file has caused problems. For example, searching for the names of all students who live in a particular suburb and sorting the data into postcode order is difficult. What could be done to improve this?

(1 mark)

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- (g) It has been suggested that storing the password in text format is not very secure. Use an example from the data to explain what can be done to increase security. (1 mark)

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Aussie EduSaver has received a number of complaints from members about personal details that are collected when applying for membership, in particular the date of birth. Aussie EduSaver wants to make sure that it adheres to the legal requirements that apply to the collection and storage of private information in Australia.

- (h) Describe **two** legal requirements it must consider when collecting private information. (2 marks)

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- (i) Explain **two** procedures that could be put in place to protect members' private information. (2 marks)

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Question 41

(9 marks)

Aussie EduSaver is considering upgrading the services it provides to include a reward points system. When a student uses their card at participating companies they will receive reward points that can be used towards further discounts – the more the card is used, the greater the number of points.

In order to do this, Aussie EduSaver needs to track member purchases. It plans to allocate points for every dollar spent at participating businesses (e.g. 1 point for every \$5.00 spent).

The sample form below shows the data Aussie EduSaver wants to store in the Purchases table.

**Student Reward Points Purchases**

MembershipNum	<input type="text"/>	PurchaseNum	<input type="text"/>
ItemDescription	<input type="text"/>	CompanyName	<input type="text"/>
Date	<input type="text"/>	Points	<input type="text"/>
Amount	<input type="text"/>	<input type="button" value="Close"/>	

- (a) Complete the table with the correct data types. Include any primary and/or foreign keys necessary to incorporate the table into the relational database. (6 marks)

Field Name	Data Type	Primary or Foreign Key
MembershipNum	Number	
ItemDescription	Text	
Date		
Amount		
PurchaseNum	Number	
CompanyName		
Points		

(b) Explain the purpose of each of the following database objects. (3 marks)

Table: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Form: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Report: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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## Question 42

(25 marks)

Eventually Aussie EduSaver would like to implement a system whereby members are given a status depending on how often they use their card. The proposed guidelines are as follows.

Status	Frequency of transactions
Classic	Less than 12 transactions per year
Bronze	12-23 transactions per year
Silver	24-35 transactions per year
Gold	36-47 transactions per year
Platinum	48 or more transactions per year

(a) Use pseudocode to design an algorithm to determine the current status of a single member. Your algorithm should:

- input the membership number
- input the number of transactions made by this member in the last 12 months
- output the membership number and status.

(9 marks)

- (b) Using the table below, create test data to test all paths within the algorithm. (5 marks)

MembershipNum	Frequency of transactions	Likely status
3214 5679 8887 2567		
5487 5872 1145 8543		
1000 2365 2225 5874		
2565 4412 8961 2575		
3415 5393 2822 8288		

- (c) Internal documentation is an important part of writing programs. Explain why comments and meaningful names for variables should be used. (2 marks)

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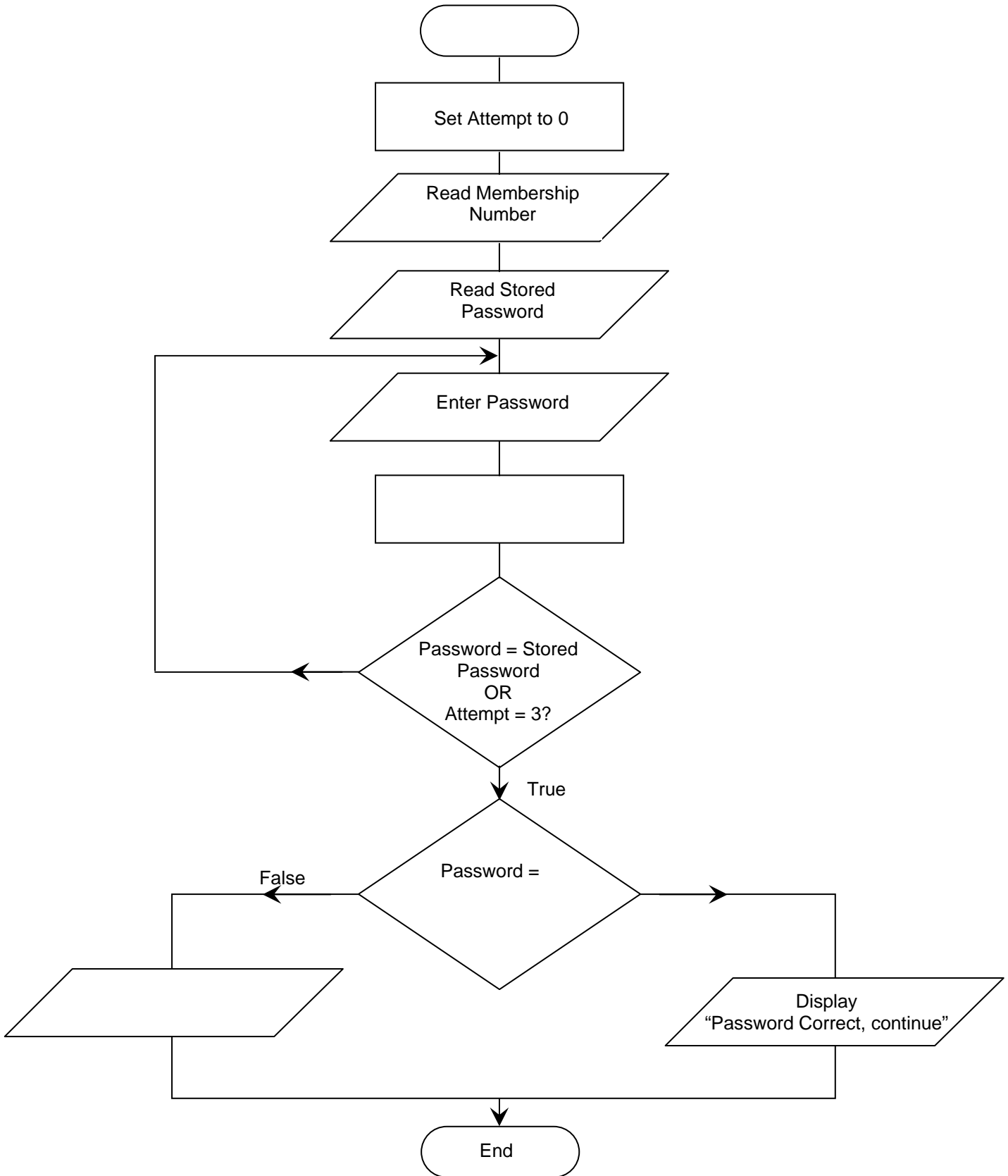
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(d) Aussie EduSaver has been asked by a number of its members to offer online details. An individual member will be able to go to [www.ausedusaver.com.au](http://www.ausedusaver.com.au) and log on to access their details using their membership number and password. They will be allowed to have three attempts to enter the correct password.

Complete the partial flowchart below.

(6 marks)



See next page

(e) Why is the variable Attempt set to 0 at the beginning of the program? (1 mark)

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(f) Besides sequence, which other control structures are used in the algorithm? (2 marks)

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Question 43

(6 marks)

Aussie EduSaver has decided to move premises. It will need to set up a Local Area Network in the new offices. The existing equipment it has consists of:

- 4 desktop PCs
- 2 wireless notebooks
- 1 network multifunction centre (machine that can print, copy, scan and fax)
- 1 file server.

(a) List **two** other network devices that would need to be purchased in order to set up the network. (2 marks)

(i) \_\_\_\_\_

(ii) \_\_\_\_\_

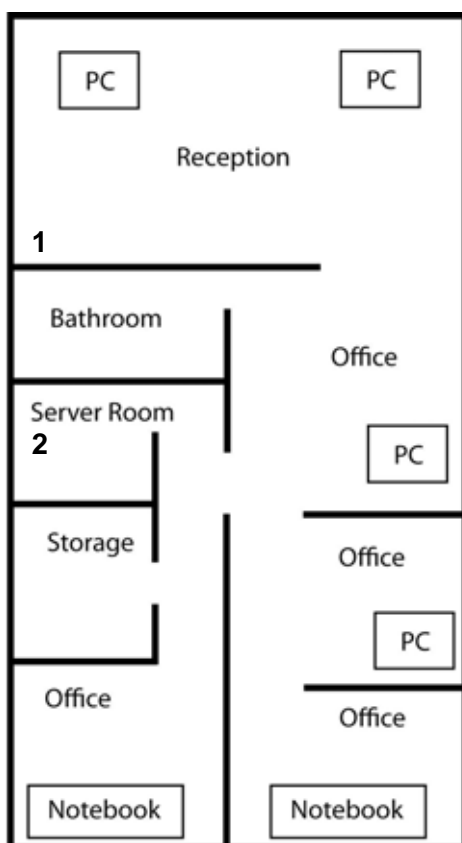
(b) What type of cabling would be most suitable? Justify your choice. (2 marks)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(c) Complete the office layout diagram below by indicating the location of your two devices from (a) above, as shown in the legend. (2 marks)



Legend:

Location	Network device
1	Multifunction Centre
2	Server
3	(i)
4	(ii)



## Question 44

(7 marks)

Aussie EduSaver has employed a web developer to further enhance its website. Many of its suppliers would like to be able to enter the site and upload products and services at a discounted price to the members.

- (a) Aussie EduSaver employees are not sure about the terms **intranet** and **extranet**. Explain the difference between an intranet and an extranet. (2 marks)

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- (b) Who would be the likely users of the Aussie EduSaver intranet? (1 mark)

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- (c) Who would be the likely users of the Aussie EduSaver extranet? (1 mark)

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The web developer has suggested that a prototype of the website be created and piloted (tested) by a small number of suppliers.

- (d) Describe **one** benefit of prototyping for Aussie EduSaver compared to the traditional Systems Development Life Cycle. (1 mark)

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- (e) During the pilot study, a number of suppliers have raised concerns regarding the Graphical User Interface (GUI) for the site. They have stated that it is not inclusive of all users. Describe **two** features the web developer should include when designing the interface. (2 marks)

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**End of questions**

*Check that you have written your Student Number on the front of this booklet.*





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