



Western Australian Certificate of Education Examination, 2011

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

To be provided by the candidate

Standard items: pens, pencils, eraser, correction fluid/tape, 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 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	55	35
Section Three: Extended answer	5	5	90	85	55
Total					100

Instructions to candidates

- The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2011*. 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, do not erase or use correction fluid, and shade your new answer. 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.

See next page

Section One: Multiple-choice**10% (20 Marks)**

This section has **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, do not erase or use correction fluid, and shade your new answer. 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. ROM is an example of
 - (a) primary storage.
 - (b) computer software.
 - (c) secondary storage.
 - (d) a processing device.

2. The clock speed of a CPU is measured in
 - (a) bits per second.
 - (b) bytes per second.
 - (c) hertz.
 - (d) gigabytes.

3. Which of the following describes a primary key?
 - (a) A primary key organises all the records.
 - (b) A primary key is a list of properties that belong to a field.
 - (c) A primary key uniquely identifies each record in a table.
 - (d) A primary key extracts a subset of records from a table.

4. Which of the following is a network that is usually confined to a single room or building?
 - (a) LAN
 - (b) WAN
 - (c) FTP
 - (d) TCP/IP

5. Software that is available for no cost and is used for evaluation purposes is known as
 - (a) commercial software.
 - (b) shareware.
 - (c) copyrighted software.
 - (d) restricted-use software.

See next page

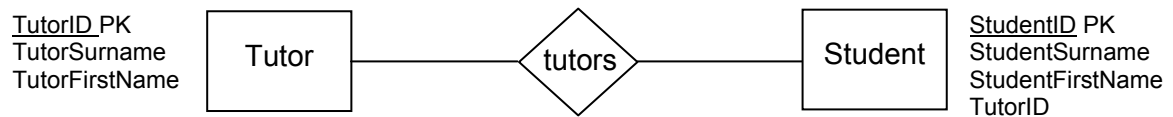
Use the algorithm below to answer Questions 6 and 7.

```
Input (Age)
Input (NumOfTickets)
If (Age < 20) OR (Age > 60) then
    TicketPrice ← 20
Else
    TicketPrice ← 40
End If
TotalCost ← NumOfTickets * TicketPrice
Output (TotalCost)
```

6. Which list contains examples of variables in the algorithm above?
- (a) Input, NumOfTickets, TotalCost
 - (b) If, TicketPrice, End If
 - (c) Age, Input, TicketPrice
 - (d) Age, NumOfTickets, TotalCost
7. The algorithm above includes which program constructs?
- (a) sequence and selection
 - (b) sequence and repetition
 - (c) selection and repetition
 - (d) sequence, selection and repetition
8. Which of the following provides a user-friendly interface for the data held in a database where records can be viewed one at a time?
- (a) table
 - (b) query
 - (c) form
 - (d) report
9. A CD-ROM is an example of which type of storage device?
- (a) magnetic
 - (b) optical
 - (c) flash memory
 - (d) cache memory
10. Which Australian law prevents a business from sending unsolicited emails to its customers?
- (a) Copyright Act 1968
 - (b) Telecommunications Act 1997
 - (c) Privacy Act 1988
 - (d) Spam Act 2003

11. In relation to a Data Flow Diagram (DFD), which of the following statements is correct?
- (a) Data can flow directly from an entity to a data store.
 - (b) Data stores are represented by a circle.
 - (c) Data processes must contain a verb.
 - (d) Data flows must be labelled with the names of computer hardware.
12. The number 32D9 is an example of
- (a) a binary number.
 - (b) a decimal number.
 - (c) an octal number.
 - (d) a hexadecimal number.
13. Which of the following statements about data encryption is true?
- (a) Data is scrambled into an unrecognisable form.
 - (b) It is a form of data integrity.
 - (c) It uses universal keys.
 - (d) Encrypted data can be read by everyone.
14. A database table consists of
- (a) records and files.
 - (b) fields and records.
 - (c) fields and queries.
 - (d) records and reports.
15. A tool used to test the logic of a program algorithm is
- (a) a trace table.
 - (b) a database table.
 - (c) an E-R diagram.
 - (d) a DFD.
16. How many bits does ASCII use to represent a single character?
- (a) 10
 - (b) 13
 - (c) 7
 - (d) 9
17. A university has separate campuses that are two kilometres apart. The best transmission medium to connect the campuses securely to the university intranet is
- (a) wireless.
 - (b) coaxial.
 - (c) twisted pair.
 - (d) fibre optic.

Use the diagram below to answer Questions 18 and 19.



18. In the Student entity, TutorID is a
- (a) primary key.
 - (b) foreign key.
 - (c) table.
 - (d) record.
19. Which relationship type is represented in the above diagram?
- (a) one to one (1:1)
 - (b) many to many (M:N)
 - (c) many to one (M:1)
 - (d) one to many (1:M)
20. The most appropriate data type for a field in a database storing a phone number such as (08) 9321 1234 is
- (a) text.
 - (b) number.
 - (c) integer.
 - (d) memo.

End of Section One

See next page

Section Two: Short answer

35% (55 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.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
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Suggested working time: 65 minutes.

Question 21**(2 marks)**

Write the following abbreviations in full, e.g. CPU stands for Central Processing Unit.

ALU _____

RAM _____

Question 22**(1 mark)**

State the purpose of a router in a network.

Question 23**(2 marks)**

List **two** reasons why a firewall is necessary when connecting a computer to the internet.

One: _____

Two: _____

Question 24

(3 marks)

Complete the table below, listing the layers of the TCP/IP model.

Application

Question 25

(2 marks)

Explain the following terms in a relational database.

Relation: _____

Relationship: _____

Question 26

(1 mark)

What is a data dictionary?

Question 27

(2 marks)

Businesses usually store the personal data of customers in a computer system. This data needs to be kept both secure and private. List **two** methods that can be used to keep data on a computer secure.

One: _____

Two: _____

Question 28

(3 marks)

Complete the table below, which lists some stages of the Systems Development Life Cycle (SDLC).

Preliminary Analysis
Design
Development

Question 29

(1 mark)

Prototyping is another method used for developing a system. What is the role of the user in prototyping?

Question 30

(3 marks)

When developing a computer program, the developer needs to ensure that the data entry screens are inclusive for a wide number of users. Outline **three** things the developer must do to ensure inclusivity.

One: _____

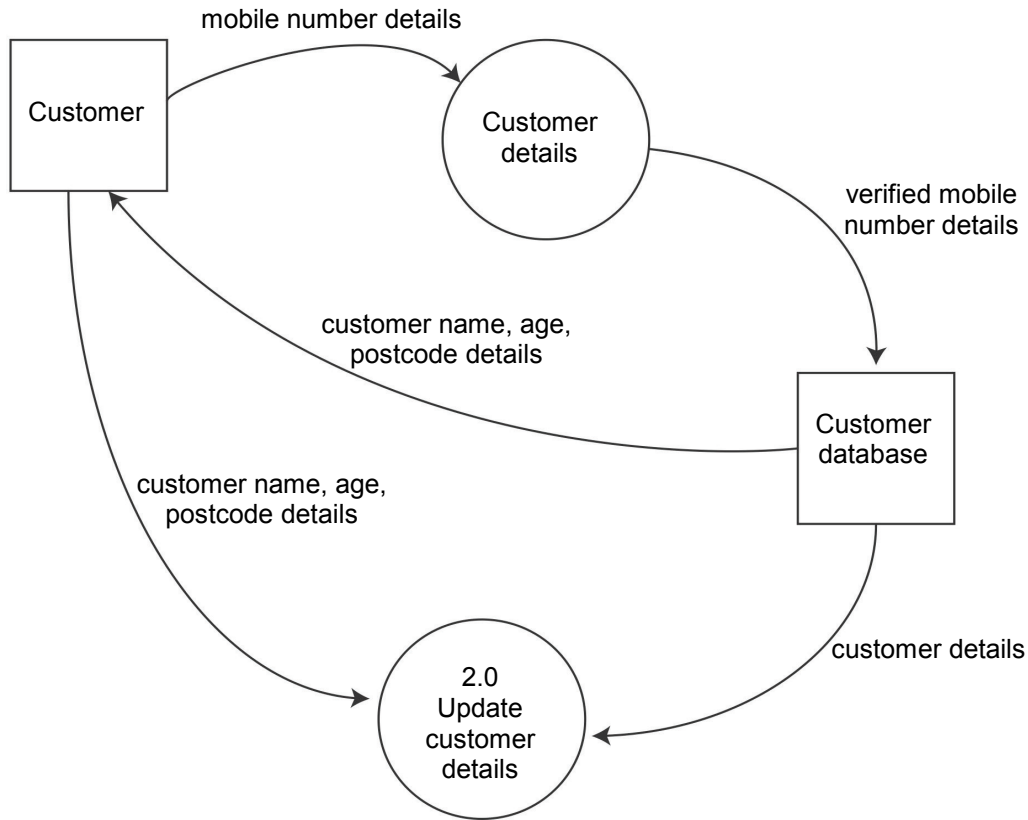
Two: _____

Three: _____

Question 31

(4 marks)

A local restaurant would like to keep some basic data relating to its customers. When a new or existing customer books a meal, the person entering the booking asks the customer for their mobile phone number. This is used to search the system, and then the customer's name, age and postcode is either entered or updated. The following is a Data Flow Diagram (DFD) representing these processes.



Identify **four** errors in the above diagram.

One: _____

Two: _____

Three: _____

Four: _____

Question 32

(3 marks)

A small business owner wants to purchase new software for his company. He has been told there are three different types of software he can purchase; open source, shareware or commercial software. Explain each of these types briefly.

Open source: _____

Shareware: _____

Commercial software: _____

Question 33

(3 marks)

Describe the function of the following network devices.

Switch: _____

Wireless access point: _____

Modem: _____

Question 34**(6 marks)**

The table below lists common input and output devices, some of which can be used for both input and output. Complete the table by placing a tick in the input, output or both input and output columns for each device.

Device	Input	Output	Both Input and Output
Mouse			
Speaker			
Printer			
Microphone			
Touch screen			
Scanner			

Question 35**(9 marks)**

A movie rental business wants to set up a relational database to keep track of the movies supplied by each distributor. The database will use two tables, one for the movie collection and one for the distributor details. Each movie is distributed by one distributor, e.g. the movie Red Riding Hood is only distributed by Carnival Collections, but Carnival Collections distributes many movies. The following fields will be used in the Distributor table: DistributorID, DistributorName, DistributorAddress, DistributorPhone, ContactName.

- (a) List **three** fields that would be included in the Movies table. (3 marks)

One: _____

Two: _____

Three: _____

- (b) Identify the primary key field for each table. (2 marks)

- (c) State the purpose of a foreign key. (1 mark)

- (d) Which table would the foreign key be in – Movies or Distributor? (1 mark)

- (e) Is the relationship between the Distributor table and the Movies table a 1:M relationship? Justify your choice. (2 marks)

Question 36

(6 marks)

Mike is a producer of commercial videos and his current computer system keeps freezing when he is running his video editing software. He has found two possible computer systems, shown below, to replace his current system.

Product components	System 1	System 2
CPU	Intel Core 2 Duo 3.2 GHz processor	Intel i7 3.2 GHz processor
RAM	2 GB RAM	8 GB RAM
Hard Drive	500 GB	2 TB
Optical Drive	52 speed CD RW	16 speed DVD RW
VGA Card	On board video	768 MB NVIDIA GTX 460 PCI-E with TV connection
Monitor	17" LCD panel	24" LCD panel
Other	Swann DV Home Pro Firewire card	Swann DV Home Pro Firewire card
Operating System	Windows 7 (Home Premium)	Windows 7 (Professional 64-bit)

- (a) Which system would you recommend to Mike? (1 mark)

- (b) List **three** reasons to justify your choice. (3 marks)

One: _____

Two: _____

Three: _____

- (c) The hard drive in System 2 is 2TB in size. What does TB stand for? (1 mark)

(d) What is the purpose of RAM?

(1 mark)

Question 37

(4 marks)

Complete the following number conversions. Show all workings.

(a) Convert binary 10101010 to decimal.

(2 marks)

(b) Convert decimal 199 to binary.

(2 marks)

End of Section Two

See next page

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See next page

Section Three: Extended answer

55% (85 Marks)

This section has **(five) 5** questions. You must answer **all** questions. Write your answers in the spaces provided.

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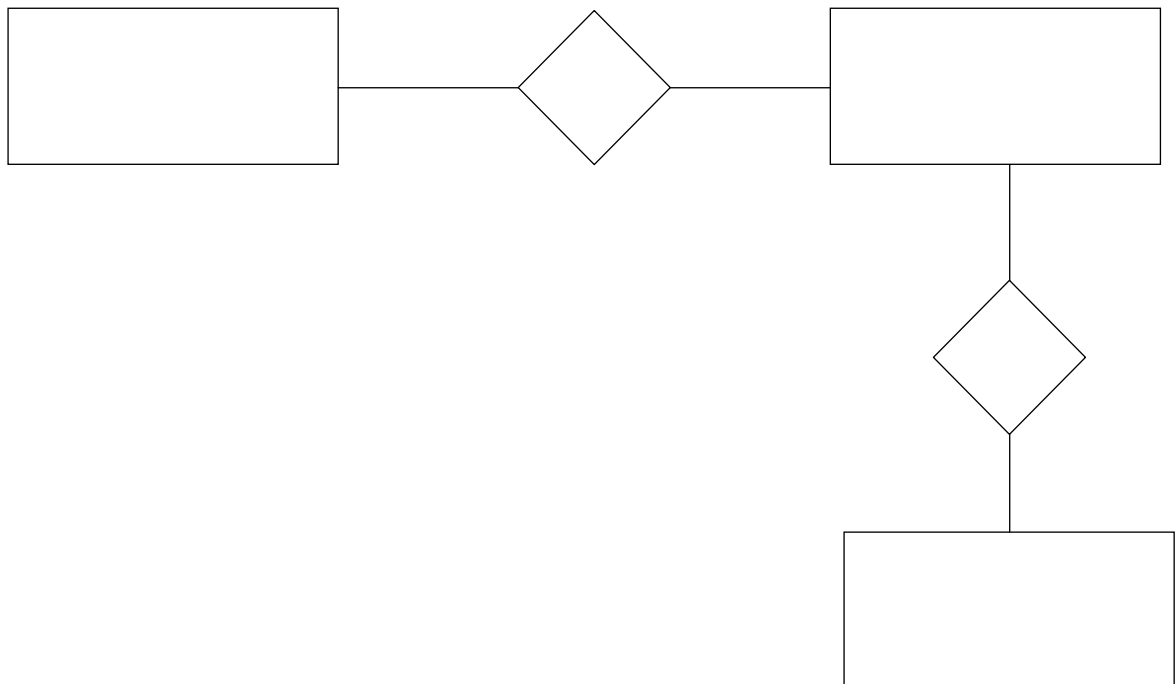
Suggested working time: 90 minutes.

Question 38

(15 marks)

Dr Painless and Dr Drill are two of the twenty dentists employed by the Government Dental Health Program. Each dentist is allocated about 40 schools. Each school has about 600 students.

- (a) The three tables used in the database are Dentist, School and Student. Complete the Entity Relationship (ER) diagram shown below. Ensure you indicate the correct cardinality of each relationship and the relationship type. You do not need to include attributes. (9 marks)



- (b) List **three** attributes for the School table.

(3 marks)

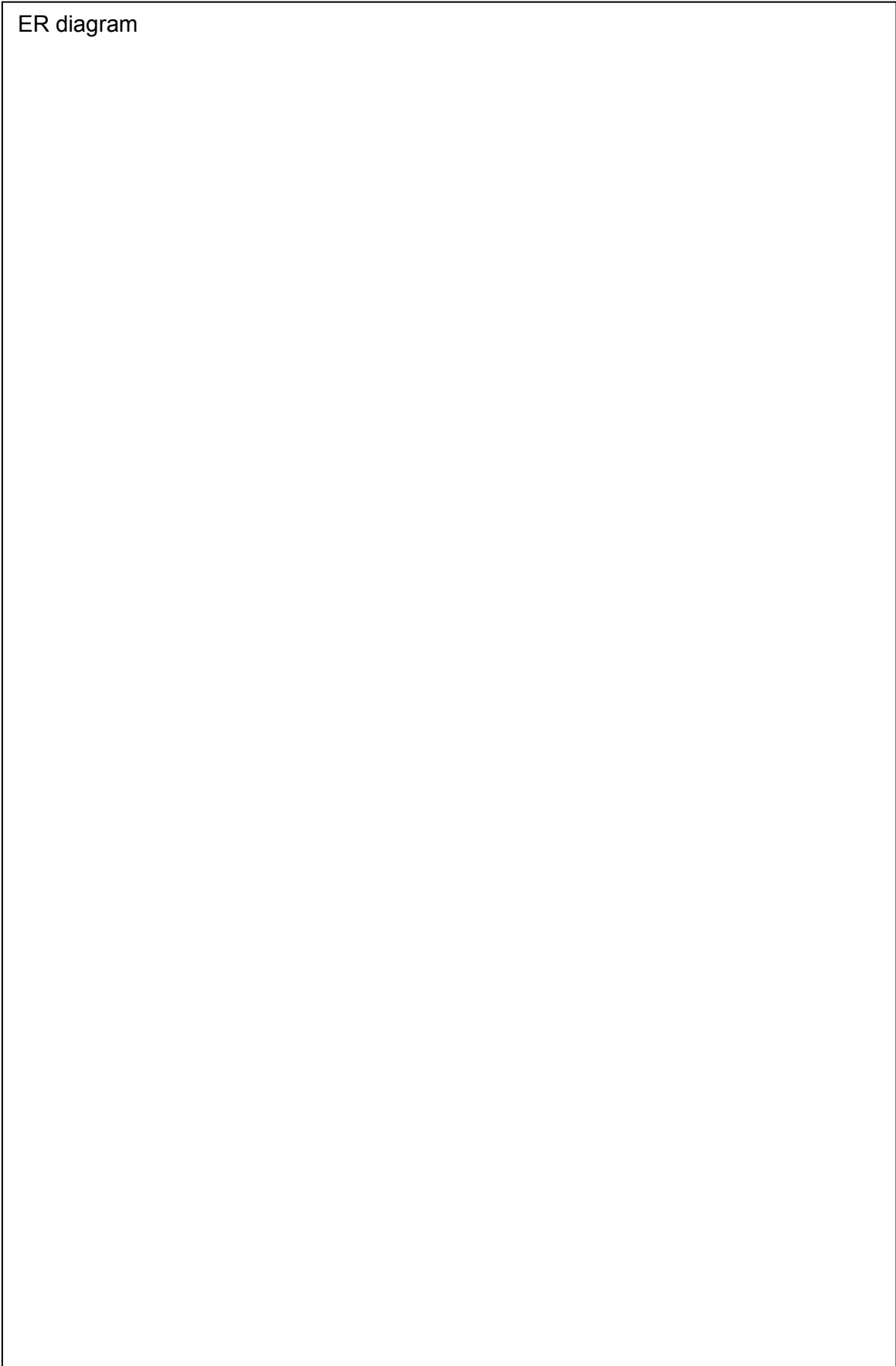
One: _____

Two: _____

Three: _____

- (c) The dental records for each student are now to be included. In the space provided redraw the original ER diagram to show how the new information could be incorporated. (3 marks)

ER diagram



Question 39

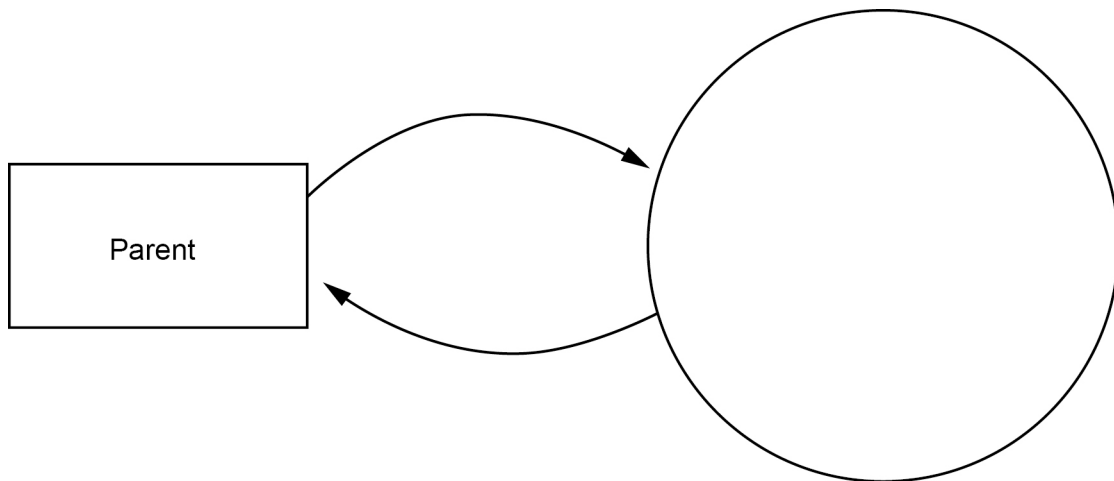
(13 marks)

When the dentists are due to visit a school, the school sends forms home to the parents of students, who fill out the students' details and sign the form. On the day of the appointment, each student gives the form to the dental assistant, who checks that it has been completed correctly and signed by a parent. The dental assistant enters the details into the Student table in the database.

When the student sits in the dentist's chair, the dentist calls up their personal details and their dental records. During the examination the dentist looks at each tooth and calls out the tooth number to the assistant, who enters into the student dental record the condition of the tooth, e.g. OK, filling, etc.

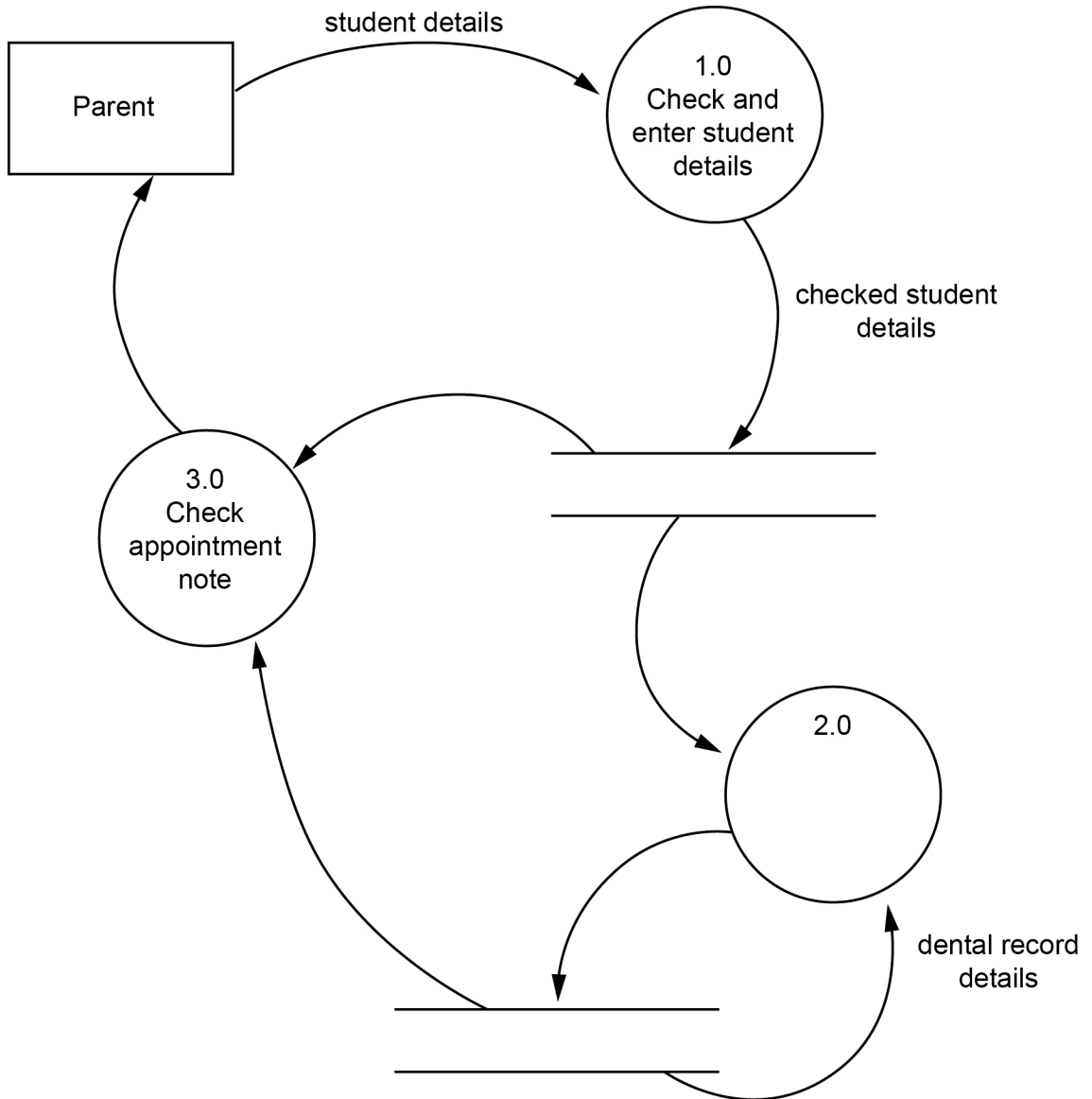
At the end of the appointment the dental assistant retrieves the student's home address and parents' details from the Student table. A note is posted to the parents containing the student's dental record and stating whether any further appointments are needed.

- (a) Use the description above to complete the context diagram below. (3 marks)



- (b) What is the purpose of a context diagram? (1 mark)

- (c) Use the description on page 18 to complete this data flow diagram. You should ensure all data flows, processes and data stores are labelled. (8 marks)



- (d) What is the purpose of a Data Flow Diagram? (1 mark)

Question 40

(23 marks)

XYZ Printing is a small business that prints a range of different products, including invitations, flyers, posters and annual reports. It charges customers according to the number of sheets to be printed.

A computer program is needed that accepts from the user the number of sheets to be printed, calculates the charge based on the following price list and outputs the total charge.

Number of Sheets (NumSheets)	Cost per sheet (Cost)
<1000	5c
1000–5000 sheets	3c
>5000 sheets	2c

- (a) Complete the algorithm for the program. (6 marks)

Input (_____)

Case NumSheets of

<1000: _____

<=5000: _____

>5000: _____

End Case

TotalCharge ← _____

Output (_____)

- (b) Which data type would be most appropriate for the following variables in the algorithm above? (2 marks)

NumSheets _____

TotalCharge _____

- (c) Which **two** program constructs are used in the algorithm above? (2 marks)

One: _____

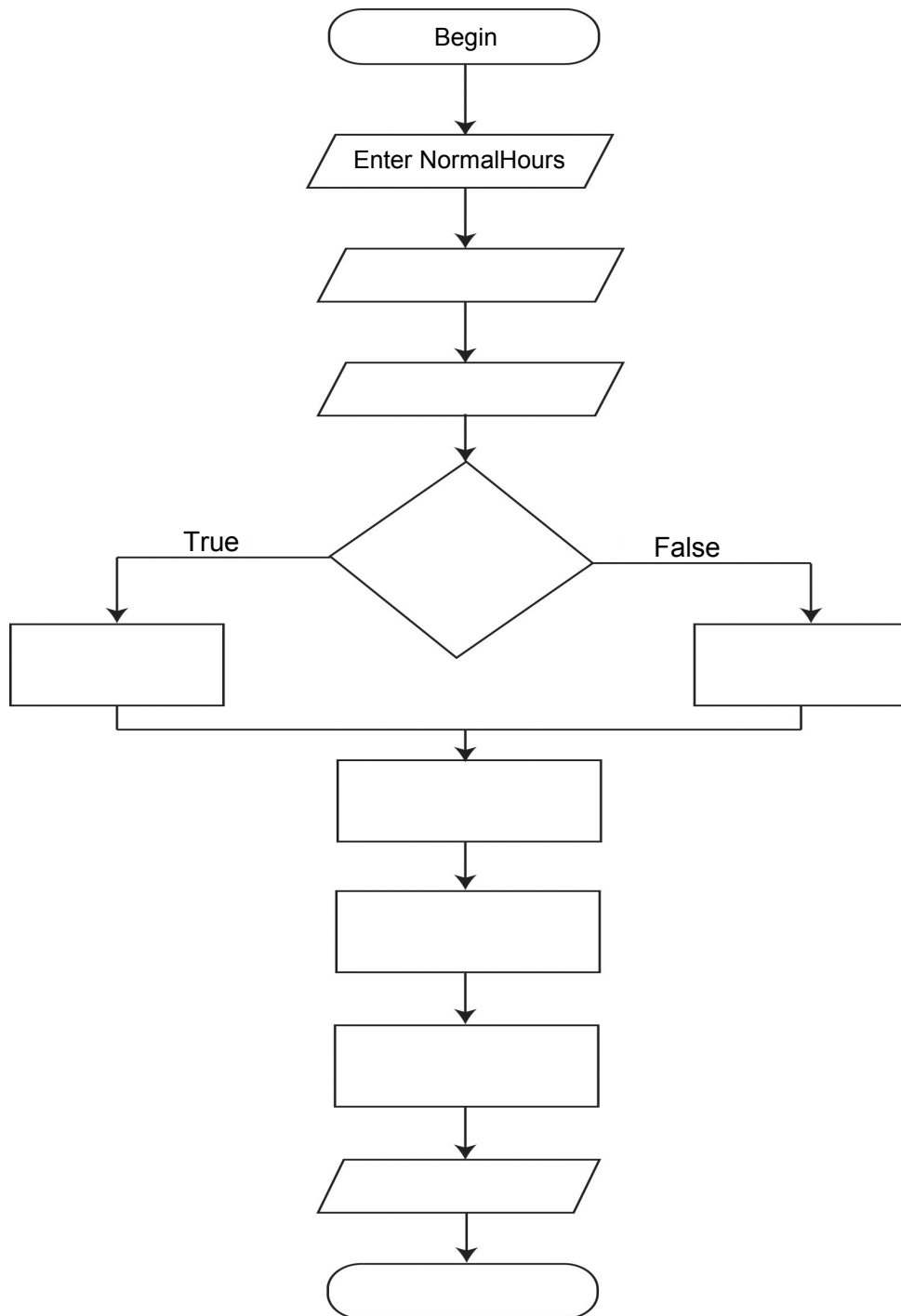
Two: _____

- (d) Use a test last loop to modify the program to check that the input in the first line is valid, i.e. greater than 0. Write the lines of code required below. (3 marks)

- (e) Another program is required that will help the owner of the printing company to calculate the weekly wages for employees. The program should
- input the number of normal hours worked by an employee
 - input the number of overtime hours worked by an employee
 - input the age of an employee
 - determine if the employee's age is under 18. If it is, then the hourly rate is \$7.50; otherwise, the hourly rate is \$12.50
 - calculate the normal hours pay
 - calculate the overtime hours pay. Overtime is paid at time and a half, e.g. a 17 year old who works 1 hour overtime would be paid \$11.25
The calculation is 7.50×1.5
 - calculate the total wage for an employee
 - output the total wage.

Complete the flow chart for the program below.

(10 marks)



See next page

Question 41

(14 marks)

The owner of the printing company uses a spreadsheet to record the staff roster. A sample of the data in the spreadsheet is shown below.

Date	9.00am - Noon	Noon - 3.00pm	3.00pm - 6.00pm	Department
1/1/11	Joe Smith Erin Blade	Cathy Smart Ann Blyth	Frank Moine Judy Lane	Binding
1/1/11	Cam Wright	Cam Wright	Cam Wright	Reception
1/1/11	Xiao Liu Ben Magro	Xiao Liu Ben Magro	Jason Toms	Loading bay
2/1/11	Cathy Smart	Cathy Smart	Joe Smith	Reception
2/1/11	Cam Wright Joe Smith	Ann Blyth Joe Smith	Ann Blyth Jason Toms	Binding
2/1/11	Xiao Liu Ben Magro	Jason Toms Ben Magro	Judy Lane	Loading bay

- (a) Each staff member is rostered to work in one department only per shift. Each department may have several staff members rostered to work in that department per shift. The owner intends to create the staff rosters using a relational database with the following tables – Staff, Roster, Department.

In the space provided draw an Entity Relationship (ER) diagram to show how the new database will be arranged. You do not need to show the attributes for each table.

(7 marks)

ER diagram

See next page

- (b) List **two** reasons why the new database structure will result in greater efficiency of stored data. (2 marks)

One: _____

Two: _____

- (c) Once the new database is implemented the owner of the printing company will need to prepare a personalised roster for each employee. Two database system components that will be used are queries and reports. Explain the purpose of each of these components. (2 marks)

Query: _____

Report: _____

- (d) Ann Blyth has recently been married and her surname is now Nguyen. Explain **two** problems that could occur during the process of updating her surname in the database. (2 marks)

One: _____

Two: _____

- (e) The new database will store personal details about each staff member, including contact details and their tax file number. Describe **one** technique the printing company can use to ensure the safety of the staff details in the database. (1 mark)

Question 42**(20 marks)**

Sarah is the owner of a small hairdressing salon in an inner-city suburb. She has decided to expand the business and open three more salons in the outer suburbs. The city salon will become the head office for the salon chain.

Each salon will have three workstations, a file server and a print server. The client database (approximately 500 clients) is held on the file server.

- (a) In the space provided draw a labelled diagram that could be used as a plan for the network set-up for any of the salons. Network media should be indicated. (5 marks)

Diagram



See next page

- (b) Explain what is meant by a star topology. List **two** advantages a star topology has over a bus topology. (3 marks)

Explanation: _____

Advantage one: _____

Advantage two: _____

- (c) If Sarah wishes to use a wired network, which type of network cabling would be most suitable for each salon? Give **two** reasons to justify your choice. (3 marks)

Suitable cabling: _____

Reason one: _____

Reason two: _____

- (d) Sarah intends to use a wireless network. Explain why she will need to install wireless network interface cards (NICs) in each computer and a wireless access point in each store. (2 marks)

Wireless NICs: _____

Wireless access point: _____

- (e) State **one** advantage a wireless network has over a wired network. (1 mark)

- (f) Is the network arrangement for each salon client/server or peer-to-peer? Explain your choice. (2 marks)

- (g) Which network protocol would be used to transmit data between the salons? (1 mark)

- (h) List **two** factors that should be considered when designing the network for a salon. (2 marks)

One: _____

Two: _____

- (i) Explain why Sarah should back up the client database. (1 mark)

End of questions

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