



Semester 1 Examination, 2020

Question/Answer Booklet

# COMPUTER SCIENCE ATAR Year 11

## Unit 1 SAMPLE SEMESTER I EXAM PAPER

Student full Name: **ANSWERS**

Student Number:

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Date of Examination \_\_\_\_\_

Teacher's Name: Ms Wana Radzi

### Time allowed for this paper

Reading time before commencing work: 10 minutes

Working time for paper: 2.5 hours

### Materials required/recommended for this paper

#### *To be provided by the supervisor*

This Question/Answer Booklet

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

Standard items: pens, pencils, eraser, correction fluid/tape, ruler, highlighters

Special items: NIL

### 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: Short Answer	17	17	70	50	45
Section Two: Extended answer	7	7	80	60	55
<b>Total</b>				<b>110</b>	100

**Instructions to Candidate**

- Answer the questions according to the following instructions.  
Section One and Two: Write your answers in this Question/Answer Booklet.
- When calculating numerical answers, show your working or reasoning clearly unless instructed otherwise.
- 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 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 – SHORT ANSWER

(50 MARKS)

Question 1.

(6 marks)

Name each of the following devices, and state whether it is an input or output device.



**Name**  
Virtual Reality  
(VR) Goggles

**Device Type**  
Output

**Name**  
Flatbed scanner

**Device Type**  
Input



**Name**  
Head phone

**Device Type**  
Output

**Name**  
Speakers

**Device Type**  
Output



**Name**  
Joystick

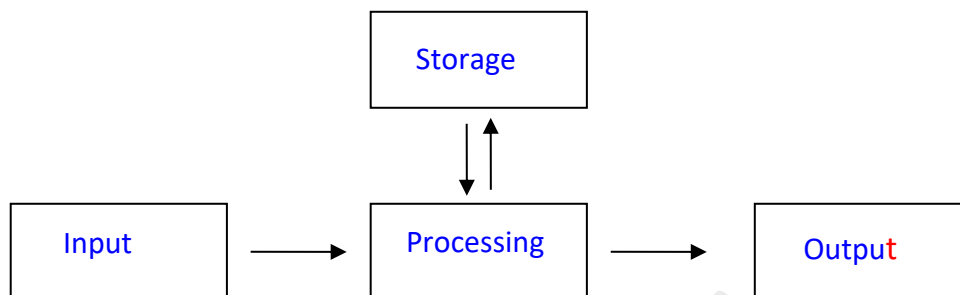
**Device Type**  
Input

**Name**  
Keyboard

**Device Type**  
Input

**Question 2.****(4 marks)**

Draw a sketch of a computer system .

**Question 3.****(8 marks)**

Computer storage is broadly categorised as Primary and Secondary Storage. Identify the storage types for the following and identify the features of each in the storing of data.

**SD card**

Storage Type: Secondary storage

Features: Flash memory, portable and non-volatile used in devices such as digital camera

**L3 Cache**

Storage Type: Primary storage

Features: Relatively small amount of very fast memory that stores data and instructions that are used frequently by the CPU

**CMOS**

Storage Type: Primary storage

Features: Low power usage, stores details about the configuration (setup) of the computer such as amount of memory, type of hardware like monitor, hard disks etc. This data is compared by the BIOS chip during POST.

**Solid state hard drive**

Storage Type: Secondary storage

Features: Typically uses flash memory to store data, instructions, and information. It has no moving parts. It generally has lower storage capacity, more expensive but it is significantly faster than mechanical drives

**Question 4.****(1 mark)**

Mike's hard drive is 500 MB in size, how many Gigabytes is this?

500 MB = 500 / 1024 GB = 0.488 GB

**Question 5.****(1 mark)**

Re-order these storage capacities from smallest to largest.

- gigabyte
- bit
- terabyte
- byte
- kilobyte
- megabyte

bit → byte → kilobyte → megabyte → gigabyte → terabyte

**Question 6.****(2 marks)**

The Central Processing Unit (CPU) is made up of a number of components, which include the Control Unit, the Arithmetic Logic Unit and Registers. Define the type of memory (primary or secondary) **registers** are and describe the information that they hold.

Type of memory: **Primary**

Information it holds: **Temporary storage of data or instructions that is currently being used by the CPU**

**Question 7.****(2 marks)**

Inside Emma's computer, dust has built up heavily around the processor fan. Her computer has begun to switch off suddenly when it has been on for a while. Explain why this is most likely happening

**Fan is not working effectively as the dust is preventing air flow, hence the processor is overheating.**

**Question 8.****(4 marks)**

- a. Information from the *TreeSaver* charity volunteers and employees is always recorded. A large foresting company has a court order to collect the information of protesters it knows are members of the *TreeSaver* charity. The volunteers and employees gave their information to *TreeSaver* in 'good faith'. Giving employee and volunteer information is not illegal because of the court order, but what ethical issue does this present for *TreeSaver*.

(2 marks)

The ethical issues are:

- they have collected the details with workers believing that their data will remain confidential. Do they inform the workers or not?
  - how much of the workers details need to be handed over to the foresting company (want the least amount eg name without contact details)
- b. *TreeSaver* has recently suffered an attack by hackers on its' computer system. *TreeSaver* fears that the personal data of employees and volunteers has been compromised in the attack. Describe 2 things *TreeSaver* now has to do. (2 marks)
- Ensure that the database is no longer in a position or format where the data can be hacked (eg encrypt stored data, remove database to server that is not connected in Internet etc)
  - Inform all employees and volunteers that there has been an attack and recommend that (if possible) they check that their details haven't been used elsewhere (eg bank)
  - Ask employees and volunteers to ring and confirm the details being stored is still correct (hasn't been altered by hackers)

**Question 9.****(3 marks)**

Describe what occurs in the following stages of the Systems Development Life Cycle (SDLC).

**Analysis** Analysts gather information so as to get an understanding of what the system currently does and what the new system has to do. (They can record the details about the current system various techniques or "tools" may be used. These can include data flow diagrams (DFDs) and ERDs.)

**Development** developers use the design documents to build the solution ie write programs, create databases etc

**Implementation:** the new system solution is "rolled out" for everyone to use. This includes installing any new equipment and software; and training staff.

**Question 10.****(3 marks)**

In the diagram below, number the stages of the boot process from 1 to 7 in order (one has been done for you already).

Boot stage	Number
The power supply sends a signal to the components in the system unit.	1
The operating system loads configuration information, may request user information (eg username and password), start several background processes and display the desktop on the screen.	7
The BIOS may look for system files on a USB flash drive or CD or hard disk.	5
The system files and the kernel (core) of the operating system are loaded into memory (RAM) from secondary storage.	6
The processor finds the ROM chip that contains the BIOS (basic input/output system).	2
The BIOS performs the POST (power-on self test) which checks components such as the mouse, keyboard, and adapter cards.	3
The results of the POST are compared with data in a CMOS (complementary metal oxide semiconductor) chip.	4

**Question 11.****(2 marks)**

Newman College has many different computers with different operating systems and different applications installed.

Explain how creating a SOE would be beneficial for the school?

By creating an SOE, the school would have the same specifications for all hardware, operating systems and application software. This makes it easier for IT staff to add new computers, trouble shoot any problems etc.

**Question 12.****(4 marks)**

List the 4 steps that the central processing unit uses to perform each instruction.

- uses the address in the program counter to **fetch** (get) the instruction from memory
- **decodes** the instruction and determines the memory location of the data required
- moves the data from memory to ALU registers and directs the ALU to **perform the actual operation** on the data (**executes** the instruction)
- directs the ALU to **store** the result of the operation in memory or a register.

**Question 13.****(2 marks)**

Biometrics uses unique identifiable attributes of people for identification, for example a person's finger print. What is an advantage of using biometrics for a business?

It makes sure that the person logging in is the actual person is using the system and not someone who has been told the password.

**Question 14.****(2 marks)**

Define data decryption

Data decryption is translating the scrambled or coded (encrypted) message back into the clear text (original message) so that it can be understood.



**Question 15.****(2 marks)**

Explain why public key encryption may be used instead of private key encryption when communicating over the internet?

Public keys can be freely exchanged and only contain the information required to encrypt data but not the information required to decrypt data.

**Question 16.****(2 marks)**

SDLC and Prototyping are two types of system development methodology used to structure, plan, and control the process of developing an information system. Which method would you prefer to use if you were developing a system and why?

It really depends on the systems being developed.

If it is system that is small, owner/user not exactly sure of what they want then using prototyping would be the best option. This way they have a prototype to use and comment on, programmers use the feedback to make adjustments then give to the owner/user for more feedback.

If it is a larger project that the owner/user knows exactly what they want – then SDLC is the better option.

**Question 17.****(2 marks)**

There are 4 steps involved to complete a project in project management. Choose 2 steps from the list below and write down one task involved during each of the steps.

PLAN, BUDGET, SCHEDULE, TRACK

**Plan**

- Define the purpose of the project
- Break the project into a series of tasks. Each task should be substantial, but not so large and complex that running overtime will affect the completion date of the whole project.
- Estimate how long each task will take to be completed.

**Budget**

- Create a list of resources (human, material, technical, cost)

**Schedule**

- Develop a schedule that assigns resources and times to each task.
- Create a Gantt chart to display the schedule. A Gantt chart is a bar chart that shows the duration of tasks against the progression of time. It is used to plan how long a project should take as it lays out the order in which the tasks need to be carried out and how they are linked.

**Track**

- Once the project has started, the actual start and finish dates for each task can be entered into a tracking Gantt chart to provide an up-to-date picture of the tasks that are on time and those that are behind schedule.

## SECTION TWO - EXTENDED ANSWERS

[60 MARKS]

## Question 18.

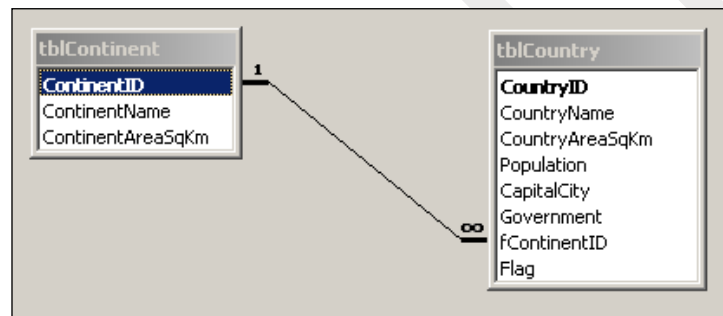
(15 marks)

tblCountry : Table								
	CountryID	CountryName	CountryAreaSqKm	Population	CapitalCity	Government	fContinentID	Flag
▶	1	Zambia	753,000	10,000,000	Lusaka	Republic	1	Picture
	2	Brazil	8,511,965	184,101,019	Brasilia	Federative republic	7	Picture
	3	Australia	7,686,850	19,913,114	Canberra	Democratic, federal-state system	4	Picture
	4	China	9,596,960	1,298,847,624	Beijing	Communist state	2	Picture
	5	Canada	9,976,140	32,507,874	Ottawa	Confederation with parliamentary democracy	6	Picture
	6	Norway	324,220	4,574,560	Oslo	Constitutional monarchy	5	Picture

- a. Use the table shown above to determine the most appropriate data type for each of the following fields. (2 marks)

CountryID **Number or AutoNumber**Population **Number**Government **Text**Photo **OLE Object**

- b. Use this diagram to answer the following questions. (4 marks)



- i. Write the name of the table which is on the primary side of the relationship.

**tblContinent (1 mark)**

- ii. Explain how you know which table is on the primary side and which table is on the related side.

**The table on the primary side has the 1 relationship (½ mark)****The table on the related side has the many (∞) relationship (½ mark)**

- iii. Which table takes priority of data to be entered first, primary side or the related side? Why?

**The data on the primary side has to be entered first. (1 mark)****The data on the primary side has to be entered first as the PK on the primary side need to exist before it can be entered onto the related side of the relationship as an FK or otherwise it will cause an error. (1 mark)**

- c. List the primary keys for the tables. (1 mark)

tblCountry **CountryID**tblContinent **ContinentID**

d. Explain 2 purposes (or uses) of a form. (2 marks)

1. Navigation through the objects in the database (1 mark)
2. View, edit, add and delete the records in the tables (1 mark)

e. Explain the purpose of a report. (1 mark)

A report provides a formatted summary and/or analysis of the data stored in the database; allows the data to be printed

f. List one difference between a filter and a query? (1 mark)

Choose one of the answers below:

A filter cannot be saved – a query can

A filter displays all fields in the table; a query allows you to choose the fields

A filter will only display data from one table; a query will allow you to choose one or more tables

Use the tables below to answer the following questions.

tblContinent : 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	North America	24,000,000
+	7	South America	18,000,000

tblCountry : Table								
	CountryID	CountryName	CountryAreaSqKm	Population	CapitalCity	Government	fContinentID	Flag
▶	1	Zambia	753,000	10,000,000	Lusaka	Republic	1	Picture
	2	Brazil	8,511,965	184,101,019	Brasilia	Federative republic	7	Picture
	3	Australia	7,686,850	19,913,114	Canberra	Democratic, federal-state system	4	Picture
	4	China	9,596,960	1,298,847,624	Beijing	Communist state	2	Picture
	5	Canada	9,976,140	32,507,874	Ottawa	Confederation with parliamentary democracy	6	Picture
	6	Norway	324,220	4,574,560	Oslo	Constitutional monarchy	5	Picture

g. Write the name of the foreign key field. (1 mark)

fContinentID

h. What is the purpose of a foreign key? (1 mark)

The purpose of the foreign key is to store a value that matches a value in the linked table's primary key field, so that it can link back to a valid Continent.

- i. Explain what will happen if you try and add the following data to the Country table. Make sure you use the previous tables to help you with your explanation. (2 marks)

CountryID	CountryName	CountryAreaSqKm	Population	Capital City	Government	FContinentID	Flag
7	New Zealand	268,680	4,239,300	Wellington	Parliamentary democracy	9	Picture

An error message will be displayed indicating the ContinentID number 9 does not exist in the Continent table. It will not disappear until a valid ContinentID is entered. This is ensuring referential integrity.

**Question 19.**

**(16 marks)**

Windy West Car Hire is a small business whose owners want to improve its efficiency and they have contacted you to analyse how their system operates.

- a. The Windy West Car Hire owners have been told they need to use a System Development Life Cycle (SDLC) to create their new system. You have been given the six stages but they have been scrambled. Place them in order by using the numbers 1–6

**(3 marks)**

Stage Name	Order number
Design	3
Evaluation and maintenance	6
Preliminary analysis	1
Implementation	5
Analysis	2
Development	4

The following description describes how vehicles are hired out in the current system:

When a customer wishes to hire a vehicle, they go online to the business's website and search the vehicle database for availability of the type of car they want to hire. The customer makes a note of the car ID and then contacts the office.

The receptionist records the hire details by:

- Getting from the customer;
  - customer's name, home address, driver's license number and credit card details
  - the car ID and the length of time they wish to hire it for.
- entering the customer's details into the customer database and getting a customer ID from the database.
- The customer ID and car ID are entered into the hiring file.

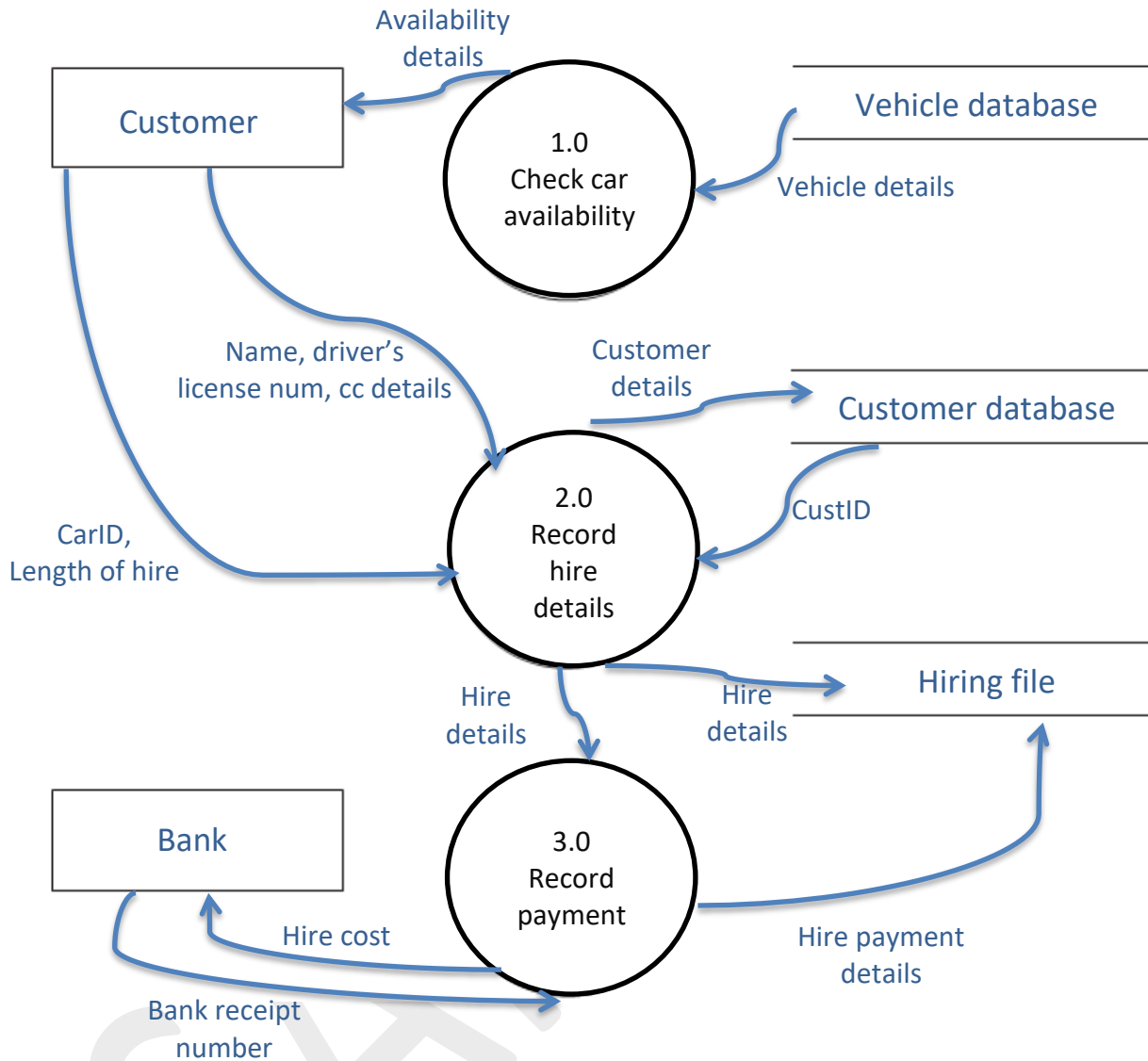
The receptionist calculates the cost of the hire by

- Using the carID to get the car type and rate from the vehicle database
- Multiplying the car rate with the length of hire

She tells the customer the total cost of the hire then uses the customer's credit card details to make an electronic transaction for the full hire amount via the EFTPOS machine to the bank. The bank receipt number is then entered into the hiring file.

- (b) List two entities referred to in the description. (2 marks)  
Customer, Bank
- (c) List two data stores referred to in the description. (2 marks)  
Vehicle database, customer database, hiring file
- (d) List two processes referred to in the description. (2 marks)  
Check car availability, Record hire details, Record payment
- (e) List two data flows referred to in the description. (2 marks)  
Customer details (could be separated to customer name, customer home address, driver's licence etc), car details, hire length, hire cost, credit card details, receipt number

- (f) Windy West Car Hire has been presented with the following partially completed Level 0 Data Flow Diagram (DFD). **Complete the data flow diagram** (5 marks)



**Question 20.**

**(8 marks)**

The data below is part of the hiring datastore that is kept on a spreadsheet by Windy West Car Hire. The following notes describe the process.

When the vehicle is hired, the hirer’s first name, the car type, the number of days for which it is initially hired and the number of kilometres on the odometer at the start of the hire are entered into the spread sheet.

- A VLookup function uses the car type to return a value for hire cost per day, which is used to calculate the total cost for basic car hire.

When the car is returned the following actions occurs:

- the final kilometre reading is entered into the spread sheet
- the total kilometres travelled is calculated
- A VLookup function returns the car type cost per day
- A formula is used to calculate the total hire cost. Worked examples have been provided

	A	B	C	D	E	F	G	H	I	J	K
1	Hirer	Car type	Days hired	Car type hire cost per day (\$)	Total cost for basic car hire (\$)	Start kilometres	Final kilometres	Total kilometres travelled	Car type cost per kilometre	Total kilometre cost (\$)	Total hire cost (\$)
2	Harold	sedan	3	35.00	105.00	12900	13201	301	1.00	301.00	406.00
3	Ahmed	wagon	1	40.00	40.00	21909	22309	400	1.25	500.00	540.00
4	Greg	people mover	4	65.00	260.00	15191	15775	584	2.25	1314.00	1574.00
5	Khang	ute	2	37.50	75.00	8321	8707	386	3.25	1254.50	1329.50
6	Ben	wagon	2	40.00	80.00	2235	2572	337	1.25	421.25	501.25
7	Jill	sedan	1	35.00	35.00	25009	25336	327	1.00	327.00	362.00
8											
9											
10		Per Day Cost									
11		Car type	Car hire cost per day (\$)								
12		sedan	35.00								
13		wagon	40.00								
14		people mover	65.00								
15		ute	37.50								
16											
17											

The following formulas need to be supplied.

(Do not attempt to calculate any answers, as only the formulas are required.)

a) Write the formula for Cell H2 that calculates the total kilometres travelled. (1 mark)

= G2 – F2

b) Write the formula for Cell E2 that calculates the total cost for basic car hire. (1 mark)

= C2 \* D2

c) Complete the VLookUp function below to calculate the car type cost per day value into Cell D2. (2 marks)

=VLookUp ( B2 , \$B\$12:\$C\$15, 2)

Note: We would normally define the area (eg define B12:C12 as Rate\_table), then use the area name in the vlookup (eg =vlookup(B2, Rate\_table, 2)

d) In spread sheets, what does a formula always start with? (1 mark)

An equal sign ( = )

Windy West Car Hire wants to convert its spreadsheet into a database. Part of the change requires that all data types match between the two systems.

e) Explain the term data type. (1 mark)

Data type is the characteristics of data that can be stored in a cell, such as integer, real, Boolean and string (text)

f) What data type is being used in Cell A2? (1 mark)

Text/String

g) What data type is being used in Cell F2? (1 mark)

Number – Long integer (also known as double in programming)



Question 21.

(6 marks)

	Angler-PK	AName	Aphone	AAddress	DDOB
+	1	John	(08)93770666	10 William St Canning	1/01/1988
+	2	James	(08)93770777	10 Bentley Dr Bentley	11/11/2000
+	3	Will	(08)62776666	42b Reid Prom Perth	22/03/1999

Diagram 1

- a. Refer to Diagram 1 (shown above) to determine the best data type for each of these fields. (4 marks)

Angler-PK: Number – integer (this could be set as an autonumber)

Aphone: text as it has ( ) included

AName: text

ADOB: Date/Time

- b. Use examples from Diagrams 1 and 2 to help explain the following database terms: (2 marks)

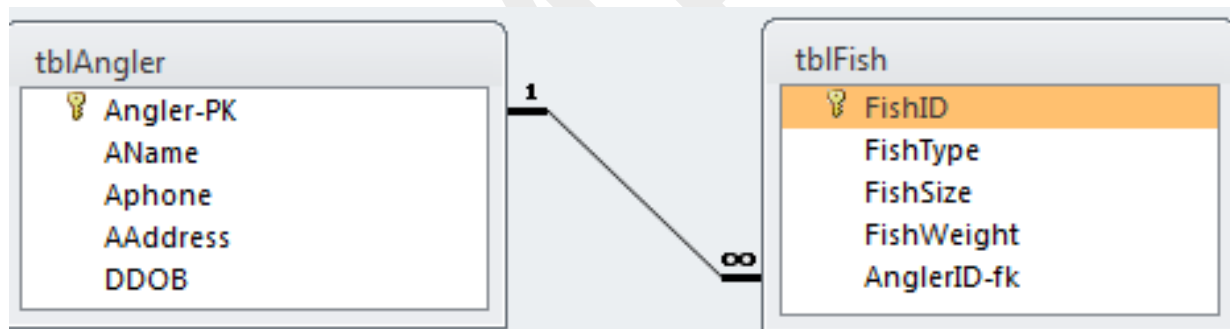


Diagram 2

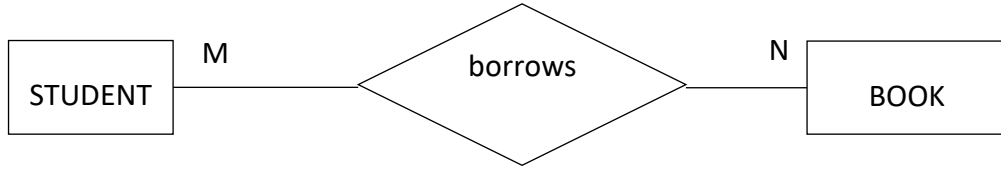
**Record** A record is the set of data about 1 particular item. The set of fields is the same for each record in the table. For example each angler record will store have the Angler\_PK, AName, Aphone, AAddress and DDOB.

**Relationship** The relationship is the line or link between two tables, it describes how two tables are related to each other via the use of primary and foreign keys. The relationship between tblAngler and tblFish is 1:M. This means that 1 angler many catch many fish.

**Question 22.**

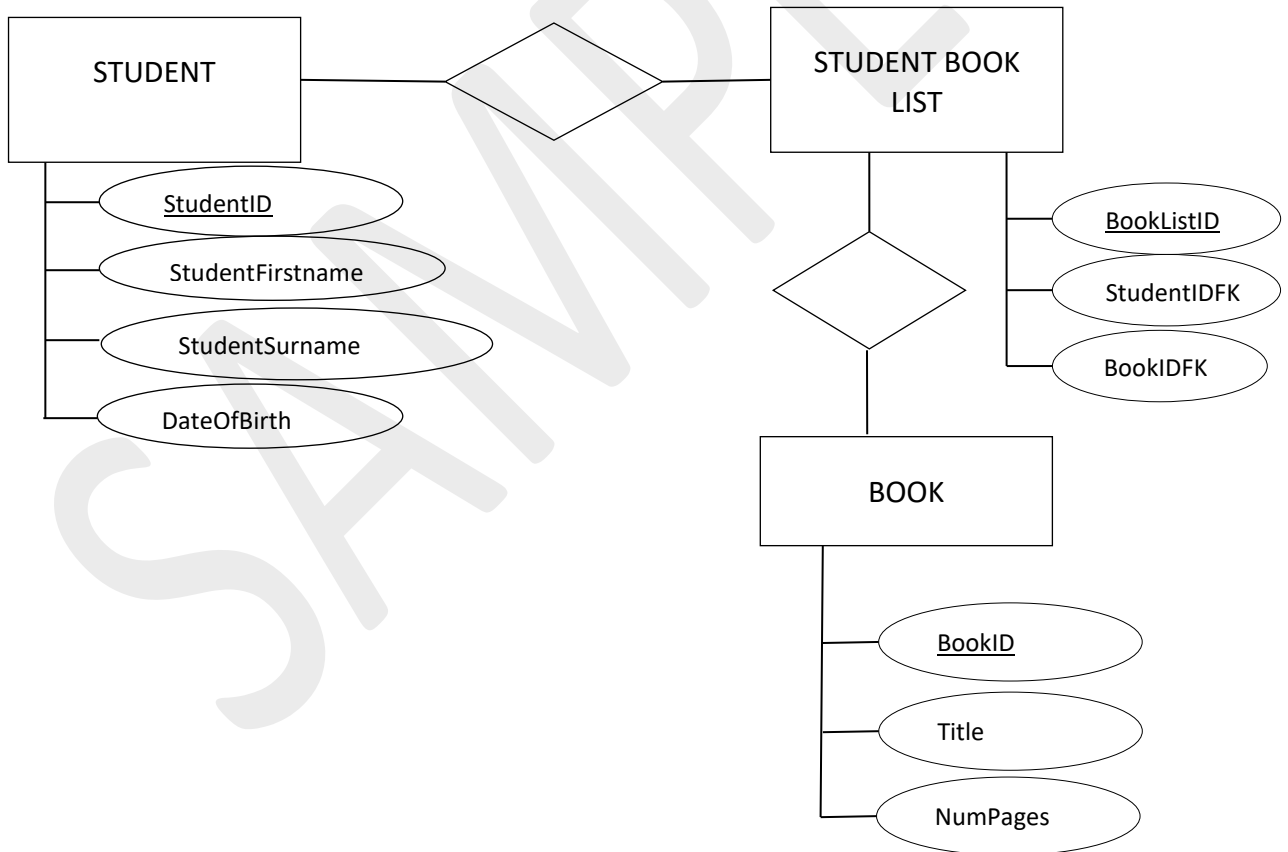
**(8 marks)**

Draw the Entity Relationship Diagram (ERD) to show the relationships between a student borrowing books from the library. (A student can borrow many books and a book can be borrowed by many students.)



**Resolve the M:N relationship. Relationship Cardinality – Relationship type**

- a. Underline all the primary keys including one primary **composite key**



**End of Section 2**

**END OF EXAM**