Willetton Senior High School
Semester One 2020

Question/Answer Booklet

COMPUTER SCIENCE
WRITTEN PAPER
ATAR 11

Please write your first and last name in the box

Time allowed for this paper

Reading time before commencing work:	Ten minutes
Working time:	Two and a half hours

Material required/recommended for this paper

To be provided by the supervisor
This Question/Answer Booklet
Source Booklet – Single page only

To be provided by the candidate

Standard Items:	Pens, pencils, eraser or correction fluid, ruler.
Special Items:	Mathematical and/or system templates.
	(Optional) Non-scientific / non-programmable calculator.

Important note to candidates

No other items may be taken into the examination room.

Mobile phones, electronic/smart watches (eg. Apple watch) or other wearable technologies (fitbit, airpods etc) are explicitly forbidden to be worn and **MAY NOT** be brought **inside** the examination room. Any such devices must be **switched OFF** and **left OUTSIDE** 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	Suggested working time	Number of questions available	Number of questions to be attempted	Marks available	Percentage of exam
Section One: Short response	60 minutes	18	ALL	67	40
Section Two: Extended response/production	90 minutes	5	ALL	96	60
			Total	163	100

Instructions to candidates

1. The rules for the conduct of the Western Australian external examinations are detailed in the Year 11 Willetton Senior High School Handbook 2020. Sitting this examination implies that you agree to abide by these rules.

2. Answer ALL questions. Write your answers in the spaces following each question.

3. Extra pages for answering or making rough notes are available at the back of this booklet.

4. Clearly label any answers on the extra page at the end of the booklet.

5. It is strongly recommended that you **do not use pencil** except in diagrams.

6. Space provided for an answer does not necessarily indicate the expected length of the answer.

SECTION ONE — SHORT ANSWER

Answer **ALL** questions. Write your response in the spaces provided in this Question/Answer booklet.

Allow approximately 60 minutes for this section **(67 marks).**

Question 1 **(3 marks)**

Place the following 14 terms in the correct device/component category (column) below.

ROM, keyboard, printer, speaker, HDD, monitor, mouse, SSD, microphone, stylus, touchscreen, RAM, camera, SD Card

INPUT	OUTPUT	STORAGE

Question 2 **(4 marks)**

a) Using an example, explain the role of a peripheral device in a computer system? (3 marks)

b) What is the name of the general category of software, that the Operating System uses to communicate with peripheral devices? (1 mark)

Question 3 **(2 marks)**

Many consumers use the term “USB” to refer to small external storage devices for transferring/storing files.

Explain why a computer scientist would recognise that, though this is a common use of this term, it is in fact an incorrect use of the term “USB”.

Question 4 **(5 marks)**

Use the image below to answer this question.

	A	B	C	D	E
1					
2		January	February	March	April
3	2015	100	200	305	400
4	2016	130	210	300	405
5	2017	110	205	310	410
6	2018	105	210	315	400

a) Outline the difference between HLookup and VLookup in spreadsheets. (1 mark)

b) Identify which type of lookup should be used and write the syntactically correct formula you would use to find out the following: (4 marks)

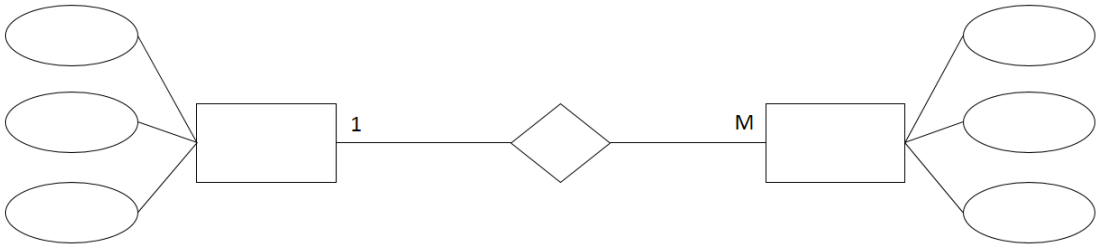
i) The amount in the third column for 2016:

ii) The amount in the fourth row for March:

Question 5 **(4 marks)**

Below is an example of an Entity Relationship diagram using Chen notation.
Clearly label **one** example of each of the following on the diagram.

a. Entity
b. Cardinality
c. Relationship
d. Attribute



Question 6 **(3 marks)**

Use the following spreadsheet to answer this question.

	A	B	C	D	E	
1		**Section 1**	**Section 2**	**Section 3**	**Total**	
2	**James**	10	19	44	73	
3	**Khang**	14	26	36	76	
4	**Sharyn**	8	12	26	46	
5	**Mohammed**	12	25	35	72	
6	**Peter**	6	12	24	42	
7						
8	**Average**	10	18.8	33	61.8	
9	**Number of students who scored > 65%**				?	
10	**Highest score on each test**	?	?	?		
11						

Using the appropriate spreadsheet **function** in each case:

a) Write the formula to calculate the **average** in cell B8. (1 mark)

b) Write the formula in E9 to calculate the number of students who scored more than 65%? (1 mark)

c) Write the formula in D10 to find the highest score on Section 3 (1 mark)

Question 7 **(2 marks)**

Define the following terms

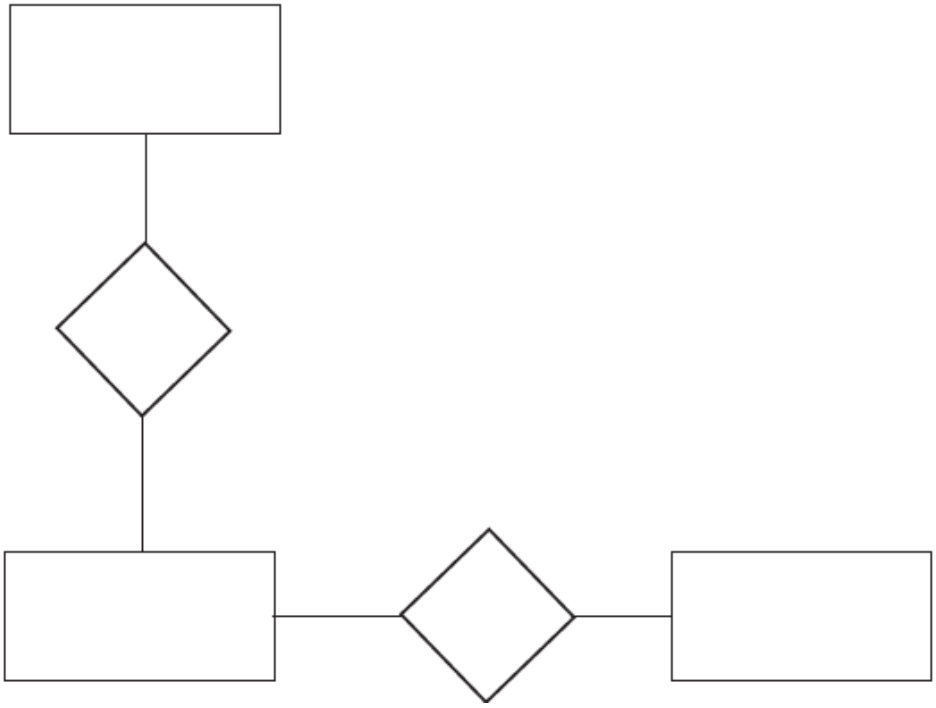
a) Data Integrity: (1 mark)

b) Data Redundancy: (1 mark)

Question 8 **(9 marks)**

Consider the statement below.
"A country may have many states. Each state can have many towns."

a) Complete the Entity Relationship (ER) diagram below, naming each entity, relationship and its cardinality that is needed to represent the situation described in the statement. (5 marks)



b) Propose **two** possible **primary** keys. (2 marks)

c) Propose **two** possible **foreign** keys. (2 marks)

Question 9 **(2 marks)**

a) Outline the purpose of the cache in a Hard Disk Drive.

(1 mark)

b) Outline the purpose of the cache in the CPU. (1 mark)

Question 10 **(3 marks)**

Explain what a disk defragmentation utility does to improve computer system performance *and* why such software is not relevant for modern SSD based systems.

Question 11 **(2 marks)**

Describe the difference between **Data** and **Information** when working with computer programs and relational database systems.

Question 12 **(2 marks)**

What is the purpose of creating a Standard Operating Environment (SOE)?

Question 13 **(4 marks)**

Describe each of the following types of data anomaly that can occur with databases.

a) Insertion Anomaly (2 marks)

b) Update Anomaly (2 marks)

Question 14 **(8 marks)**

Given an un-normalised table of data, outline the "rules" that must be satisfied to achieve each successive form of normalisation:

0NF → 1NF: (4 marks)

1NF → 2NF: (2 marks)

2NF → 3NF: (2 marks)

Question 15 **(2 marks)**

With respect to relational databases, define each of the following terms.

a) Primary Key (1 mark)

b) Foreign Key (1 mark)

Question 16 **(6 marks)**

Discuss **three** *physical* preventative maintenance/security measures you could recommend to an organisation to help keep their client & server equipment operational.

Question 17 **(4 marks)**

Describe the role of each of the following **two** components of a computer's CPU.

a) Control Unit (2 marks)

b) Register (2 marks)

Question 18 **(2 marks)**

The following is an example of a trouble-shooting procedure an end-user could use for a suspected faulty USB connected device.

1. Check USB connector
2. Plug into different USB port
3. Try a different USB device of the same type
4. Try the suspected faulty USB device on a different computer
5. Check software
6. Call Help desk

In a similar way, document a trouble-shooting procedure an end-user might use if it appears that their computer does not boot up and the screen remains blank.

End of Section One

SECTION TWO — EXTENDED ANSWER

Answer **ALL** questions. Write/draw your answers in the spaces provided in this Question/Answer booklet.

Allow approximately 90 minutes for this section **(96 marks).**

Question 19 **(20 marks)**

Refer to PART A of the source booklet to answer all parts of this question 19.

Western Districts College (WDC) stores its non-teaching employee details electronically. A small selection of this employee information is reproduced in the exam source booklet. Notice that some employees work in more than one **Department**.

a) Answer the following questions related to the table of Employment role information supplied.

i) Suggest **one** suitable **primary key** that may be used in this database? Explain your choice. (4 marks)

ii) In one of the fields an obvious **invalid** data entry error has been made.
Name the field and describe the **invalid** error in the space below. (3 marks)

iii) The error in this field could have been avoided by using a data validation rule to check on entries made into the field. Write an unambiguous data validation rule (logical expression) to prevent future invalid entries of this kind from occurring. (2 marks)

iv) When designing the database, what datatype would be best for **Start Date**? (1 mark)

Question 19 (continued)

b) **Western Districts College (WDC)** would like to upgrade the electronic employee system and you recommend it be converted to a relational database. (10 marks)

In the space below, draw an E-R Diagram that represents a possible solution for this conversion. In your diagram you need to:

- Identify all possible primary and foreign keys.
- Allocate appropriate attributes to each entity.
- Resolve any cardinality issues by creating extra tables and naming their associated relationships if necessary.
- Show the cardinality of each relationship.

Question 20 **(20 Marks)**

Western Districts College (WDC) also needs a database to keep track of its students, the subjects they study, who their teachers are, and the marks they achieve in each subject. Note that a pass result is only achieved if the average is 50 or higher.

The following data is a sample of the student enrolments at WDC:

Student Name	Student Number	Subject	Subject Code	Lecturer	Average	Result
Jack SPRATT	3563	Engineering Studies Chemistry Physics	N-201 S-220 S-241	Dr Drey Dr J Sumner-Miller Mr M Schumacher	71 66 46	Pass Pass Fail
Lyla KICKETT	3421	Biology Chemistry Computer Science	S-210 S-220 M-267	Ms S Kendrick Dr J Sumner-Miller Ms G Hopper	72 69 80	Pass Pass Pass
Jane DOE	3278	English Maths Computer Science	E-281 M-225 M-267	Ms F Grazioso Dr S Nadella Ms G Hopper	61 70 84	Pass Pass Pass
Hasya MATAMURA	3789	Chemistry Biology Physics	S-220 S-210 S-241	Dr J Sumner-Miller Ms S Kendrick Mr M Schumacher	44 64 49	Fail Pass Fail

Using the information above:

a) In which Normal Form is the data currently? (1 mark)

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b) Normalise the data in the table above to Third Normal Form (3NF) (13 marks)
Show the stages of normalisation in your answer 1NF, 2NF & 3NF in the space below.

Each table should be defined using standard notation indicating the table's name, its primary and any foreign keys and non-key fields, as follows:

TABLENAME (field names etc)

i) First Normal Form (1NF):

ii) Second Normal Form (2NF):

iii) Third Normal Form (3NF):

Question 20 (continued)

c) In the space below, create a data dictionary for the 3NF table that stores the "results" field. (6 marks)

Question 21 **(15 marks)**

Refer to PART B of the source booklet to answer all parts of questions 21 – 23.

Tabletop Events Corporation have begun planning their new database application. You have been tasked with developing the user interface (UI) for the main "Bookings Form" that will be used by staff to enter details into the computer when clients call up on the phone. In the space provided, design a suitable UI that demonstrates your knowledge and application of visual design principles. Annotate your design to highlight the principles that you have used and why, from the point of view making the interface more intuitive to use and better at communicating the information being displayed.

Question 22 **(16 marks)**

Refer to the image of **Worksheet One** in the source booklet to answer the following:

a) Describe the issues associated with using a spreadsheet instead of a database to create invoices for the business such as the one depicted in the worksheet. (4 marks)

b) This invoice has a number of calculations using different formulas and functions. Write the most efficient formulas and functions for the following cells. (8 marks)

i) C21:

ii) C23:

iii) C25:

iv) C11:

c) The database administrator has stated that when the information represented on the invoice is represented as a table, some of the fields may not be *atomic*. Using your understanding of the term *atomicity*, identify **one** *non-atomic* field from the invoice and describe what is required in order for this to be fixed. (4 marks)

Question 23 **(25 marks)**

Refer to all the information provided in **Part B of the source booklet** to answer the following:

a) In the space below, use Chen's notation to create an ER Diagram for the Tabletop Events database system ensuring you resolve any many to many relationships. Indicate and name Primary keys, Foreign keys, cardinality and relationships. (10 marks)

Question 23 (continued)

b) Tabletop Events have had some issues with the security of their database. Previously they have been told not to worry as "why would anyone bother to hack into their system?" You disagree and justify your position through responding to the following issues:

i) Give **two** reasons that Tabletop's system is worth hacking and describe each. (6 marks)

Further, as a result of the potential security vulnerabilities of Tabletop's systems, you feel you need to make them aware of the legal and ethical risks associated with *collecting*, *storing* and *using* people's information in light of Australia's Privacy Principles laws.

ii) Describe **one** legal requirement regarding the **collection** of information for Australian citizens that organisations must follow. (3 marks)

iii) Describe **one** legal requirement regarding the **storage** of information for Australian citizens that organisations must follow. (3 marks)

iv) Describe **one** legal requirement regarding the **use** of information for Australian citizens that organisations must follow. (3 marks)

END OF EXAM

Semester One Examination 2020

Computer Science ATAR 11

Source Booklet – PART A

Use this information to answer question 19.

Western Districts College stores its non-teaching employee details electronically. A small selection of this employee information is reproduced below. Notice that some employees work in more than one **Department**.

Surname	First Name	Address	Department	Role	Start Date
Carriss	Verdana	3 Basalt Way	Maintenance	Cleaner	2017
Pavlock	Mark	15 Parry St	Management	Advertising	2019
Mayden	Gerry	4 Cranny Rd	Grounds	Gardener	2009
Conroy	William	98 High St	Planning	Timetabling	1999
Jens	Mark	2 Union Way	Education	Aide	2011
Hopkins	Ken	152 Alber St	Administration	Manager	2124
Stuart	Robert	66 Cliff St	Administration	Assistant	2000
Mayden	Gerry	4 Cranny Rd	Grounds	Toilet cleaner	2009
Henderson	Ewan	2 Edward Pl	Production	Photocopying	2019
Black	Hermione	6 Hogarth Rd	Canteen	Cook	2002
Hopkins	Ken	152 Albert St	Enrolment	Officer	2002
Bright	Knott	66 Kraken Lp	Production	Photocopying	2002
Klements	Harry	43 Ellen St	Maintenance	Waste disposal	2008
Carriss	Verdana	3 Basalt Way	Maintenanse	Painter	2017
Pavlock	Mark	51 Parry St	Managemint	Human Resources	2019

See over for Part B

Source Booklet – PART B

Use this information to answer questions 21 – 23

Tabletop Events Corporation is an organisation that people can hire to arrange their function. They organise the venue, catering and entertainment.

- Clients interested in hiring the company go to the website and complete an online form to enquire about availability. They provide personal details, date of their function and the number of invited people. This information gets saved to an enquiry file.

- Within 24 hours this information is retrieved and venues are checked for availability and size to cater for the number of people. An email is sent to the client with details of various available venues.

- When the client is ready to book the venue, they will be asked to create a login accoun, which includes a username and password. They will then be asked to pay a 10% deposit with their credit card to hold the booking. This information is kept in a booking file. A contract and a receipt is emailed to the client.

- The client has a choice of different food menus to choose from and ranging in price from $50 per person to $110 per person. Once they choose the menu for their event, this information is also saved in the booking file. The catering company is informed of the menu chosen.

- One week before the function, an invoice is sent to the client requesting full payment. The client authorises payment via their credit card and receives a receipt confirming the payment has been processed.
- **One** client can have **more than one** event booking
- **One** catering type (Buffet) can be on **more than one** event booking

Worksheet One

	A	B	C
1			INVOICE
2	Tabletop Events Corporatio	DATE:	April 17, 2018
3	*We serve you well!*	INVOICE #:	100
4		BILL TO:	DATTA
5	123 ABC Road		10 Adelaide Tce
6	Perth, WA, 6000		Perth WA 6000
7	Phone: 08 9345 3456		ClientContactNo
8	Fax: 08 9345 3455	GUEST NO;	10
9			
10	CODE	DESCRIPTION	AMOUNT
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21		SUBTOTAL	$ -
22		GST RATE	10%
23	Reference Invoice No in your transaction	SALES TAX	$ -
24	If you have any questions concerning this invoice, Mr Smith, 08 9345 3457	OTHER	$ -
25	THANK YOU FOR YOUR BUSINESS!	TOTAL	$ -
26			

Invoice Template | Lookup | Sheet1

Worksheet Two

	A	B	C
1			
2	**Catering**	**Description**	**Cost PP**
3	Catering01	Cocktail	15
4	Catering02	Buffet	50
5	Catering03	Two course	65
6	Catering04	Four course meal	99

Worksheet Three

Client Table	Catering Table	Booking Table
ClientUserName	CateringID	BookingID
ClientPassword	CateringName	TotalCost
ClientFirstname	CateringContactFN	Date
ClientSurname	CateringContactSN	
ClientAddress	CateringAddress	
ClientContactNo	CateringContactNo	
ClientEmail	CateringEmail	