

ATAR course examination, 2022
Answering Guide



**COMPUTER
SCIENCE**
Year 12 ATAR

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
Source booklet

Number of additional
booklets used (if
applicable):

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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: Short Answer	22	22	70		40
Section Two: Extended Answer	4	4	110		60
Total					100

Instructions to candidates

- The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2022: Part II Examinations*. Sitting this examination implies that you agree to abide by these rules.
- Write your answers in the spaces provided in this Question/Answer Booklet. A blue or black ballpoint or ink pen should be used. Wherever appropriate, fully labelled diagrams, tables and examples should be used to illustrate and support your answers.
- 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. Where no specific instructions are given, you should feel free to use a range of formats to express your knowledge and understandings.
- Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
 - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
 - Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

Section 1: Short answer**40% (Marks)**

This section contains **22** questions. You must answer **all** questions. Write your answers in the spaces provided.

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 70 minutes.

Question 1**(2 marks)**

Why is reading data to and from RAM more efficient than reading data to and from a USB device?

Description	Marks
Identifies why RAM more efficient by referring to geography and technology	2
Identifies a reason why RAM more efficient	1
Possible answer RAM is more efficient because it is located closer to the CPU and has a dedicated connection via a bus. These means data travels more quickly. In addition, RAM uses a technology that requires charge but can be stored faster than the flash memory on a USB	

Question 2**(6 marks)**

Create a trace table on the next page that represents the following algorithm after the loop is executed for the third time.

Score [12, 14, 13, 19]

$i \leftarrow 0$

TotalScore $\leftarrow 0$

for $i < 4$

TotalScore \leftarrow TotalScore + Score [i]

End

Print TotalScore

Description	Marks
Initialise the two variables in trace	2

Correct adding of TotalScore	1
Correct incrementing of for loop	1
Correct $i < 4$ in array	1
Output correct	1
	1
Possible answer See below. Students can also do condensed version	

Line	i	TotalScore	$i < 4$	Output
1				
2	0			
3		0		
4			y	
5	0	12		
4	1		y	
5		26		
4	2		Y	
5		39		
4	3		Y	
5		58		
4	4		N	
7				58

Question 3**(3 marks)**

Explain it is important to create test data that checks boundary data. Illustrate with an example algorithm.

Description	Marks
Students explains fully importance of the boundary checks in testing and illustrates with a good example	3
Student identifies boundary data check. Uses limited example	2
Statement only.	1
Possible answer In an algorithm where there is say a case structure, the boundaries of the data need to be tested to make sure the algorithm behaves as expected. For instance CASE of age age < 10: price ← \$5 age > 10: price ← \$7 end CASE in this, the age of 10 is at the boundary and should be checked. In this algorithm it is unclear what happens if the age is 10 and this is a potential weakness of the algorithm that may need to be amended.	

Question 4**(1 mark)**

Disc striping corresponds with which RAID level?

Description	Marks
Student identifies correct RAID level	1
Possible answer	
0	

Question 5**(2 marks)**

Identify and discuss which type of cabling media is most susceptible to electromagnetic interference.

Description	Marks
Student correctly identifies the cabling most susceptible to electromagnetic and discusses why	2
Identifies only	1
Possible answer	
UTP cabling is most vulnerable to EMI because it is unshielded so unprotected against EMI emitted from the environment or from machines.	

Question 6**(5 marks)**

Draw a line from the description to the correct protocol. Not all protocols have a description.

Description	Marks
Student identifies all 5 correctly	5
Student identifies all 4 correctly	4
Student identifies all 3 correctly	3
Student identifies all 2 correctly	2
Student identifies all 1 correctly	1
Student identifies all 0 correctly	0
Possible answer	
See below	

<p>A system containing mappings of domain names to various types of data, such as numerical IP addresses</p> <p>A network protocol providing an alternative solution to the manual allocation of IP addresses</p> <p>What is the name of a network protocol that specifies the format of packets and addressing scheme in network communications?</p> <p>Used to verify the absence of other traffic on a shared medium before transmitting to prevent collisions and loss of data</p> <p>A security protocol designed to strengthen existing WEP implementations without requiring the replacement of legacy hardware</p>	<p>TCP</p> <p>WPA2</p> <p>CSMA/CA</p> <p>DHCP</p> <p>IP</p> <p>DNS</p> <p>CSMA/CD</p> <p>TCP/IP</p>
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Question 7

(4 marks)

Question 7

(7 marks)

a) Explain what a Distributed Denial of Service (DDoS) attack is.

Description	Marks
Fully explains what a DDos Attack is by identifying impact	3
Explains what a DDoS attack is	2
Brief statement only	1
	1
<p>Possible answer</p> <p>A DDoS is a malicious attempt to stall or halt completely traffic going to and from a web page to disrupt the business. It is done by flooding the server with messages from systems that have been infiltrated and used to send these messages.</p>	

- b) Discuss the strategies that could be undertaken to protect a network from a DDoS attack.

Description	Marks
Discusses x 2 strategies that could be used	4
Discusses x 1 strategy or identifies another, no discussion	3
Discusses 1 strategy or identifies 2 no discussion	2
Identifies 1	1
<p>Possible answer</p> <ol style="list-style-type: none"> 1. The owner of the website could deploy more bandwidth so that in the event of a DDoS attack, the services are not interrupted because there is the bandwidth to deal with the message flooding. This is somewhat tricky as the hackers may simply up the ante. 2. Use a hardware/software firewall to block IP addresses from known DDoS attack launches. The problem with this is that it is retrospective and a DDoS attack could come from another previously unrecognised IP. 3. Plan for a DDoS attack by prioritising services you want to keep running while staff are dealing with the attack. Contact your ISP as they may be able to stop it from occurring. 	

Question 8

(8 marks)

Discuss four factors that influence the performance of a network. Identify how each factor can be adjusted to optimise network performance

Description	Marks
Discusses all four factors fully, identifying how to factors can be adjusted to optimise	8
Discusses 3 fully identifying how to factors can be adjusted to optimise mentions 1	7
Discusses 3 fully identifying how to factors can be adjusted to optimise	6
Discusses 2 fully identifying how to factors can be adjusted to optimise mentions 1	5
Discusses 2 identifying how to factors can be adjusted to optimise fully	4
Discusses 1 fully identifying how to factors can be adjusted to optimise mentions another	3
Discusses 1 fully identifying how to factors can be adjusted to optimise	2
Mentions 1	1
<p>Possible answer</p> <ul style="list-style-type: none"> • Bandwidth: If the bandwidth on a network is limited, traffic may become congested and slow the network down. Increasing the bandwidth by changing to a gigabit switch or upgrading cables to Cat 6 or utp to stp would ensure greater bandwidth and better performance: 	

<ul style="list-style-type: none"> • network design: If there are a lot of devices on one switch – create subnets to manage traffic or upgrade to STP so that messages can be delivered with less congestion. • data collisions will occur if the network is congested or if signals are sent at the same time. Use CSMA/CD to avoid the additional load of resends after a collision. • excess broadcast traffic: In a business, if everyone is downloading big files at the same time, this will create greater traffic. In addition, having many devices in the one LAN will create excess broadcast traffic. Consider dividing into smaller segments. 	
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Question 9**(4 marks)**

Discuss two purposes of internal documentation.

Description	Marks
Discusses 2 purposes	2
Discusses 1 purpose	1
<p>Possible answer</p> <p>Internal documentation can be used for trouble shooting purposes for the users. If errors occur or results are not as expected, internal documentation such as comments can help pinpoint issues. In addition, internal documentation can help identify structures for the users. If the modules need to be used again, internal documentation will help. Internal documentation can also include meaningfully named variables to help tracking.</p>	

Question 10**(12 marks)**

Describe four tools that would assist a developer in applying the Software Development Cycle. Identify the stage each tool would occur at.

Description	Marks
Fully describes four tools and identifies stage in which they are used.	12
Fully describes four tools – identifies most stages	11
Fully describes 3 tools, one partially, identifies most stages	10
Fully describes 3 tools, Identifies stages in which they are used	9
Fully describes 3 tools – identifies most stages	8
Fully describes 2 tools, one partially, identifies most stages	7
Fully describes 2 tools, Identifies stages in which they are used	6
Fully describes 2 tools – identifies most stages	5
Fully describes 1 tool, one partially, identifies most stages	4
Fully describes 1 tools, Identifies stages in which used	3
Fully describes 1 tool – identifies stage	2
States a tool	1

<p>Possible answer</p> <p>A Structure chart can be used in the Design stage to identify the modules and the parameters required for the program to run. This will make it easier to keep track of each module and enable them to be re-used.</p> <p>A desk check – can be used in the test and debug stage. This will allow the developer to check for logic errors or unexpected results.</p> <p>Flowcharts -</p> <p>Pseudocode – can be used to create the overall structure in a manner that can be understood by a programmer of any language. The pseudocode will also allow for desk checks and trace tables to be done before any code is actually written. This would occur in the design and development stage.</p> <p>Internal documentation – this will allow the developers and the users to follow the program logic and examine it for updates and/or changes. This would occur in the development stage.</p> <p>External documentation -</p> <p>Develop a testing plan: This would occur in the test and debug stage and would allow for the developer to test live data that examines boundary data to ensure the program acts in accordance to objectives.</p>	
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Question 11**(10 marks)**

Processor architectures are classified as either a Reduced Instruction Set Computer (RISC) or as a Complex Instruction Set Computer (CISC).

a) Describe the purpose of these two architectures.

(4 marks)

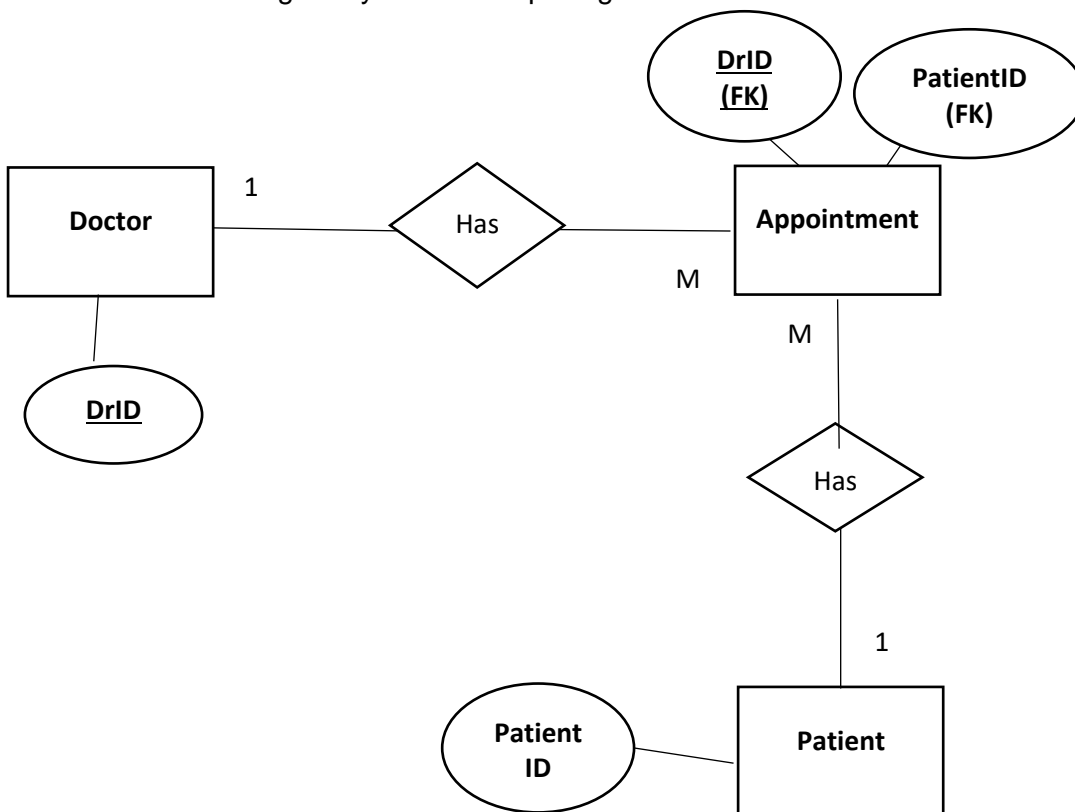
Description	Marks
Fully describes both architectures	4 marks
Fully discusses one , partially discusses the other.	3 marks
Fully discusses one	2
Partial discussion or brief statement	1
<p>Possible answer</p> <p>The different architectures relate to the different type of instruction sets available and/or needed. A full instruction set is known as CISC (Complete instruction set computers. The idea with this type of set is to complete the instruction in the least amount of code lines but each instruction could take more than one clock cycle. It will mean each line of code is more complex and will take longer to execute. A reduced instruction set computer will run a more limited list of shorter code lines. The idea being that this type of machine will be faster and require less hardware in transistors. Each instruction will be the length of the clock cycle. Pipelining is easier so instructions can be executed more quickly</p>	

b) Provide an example device for each architecture and explain why each is suited to that instruction set. (6 marks)

Description	Marks
Identifies device containing the CISC architecture and fully explains why it is suited to that task.	3
Identifies device containing the CISC architecture and explains why it is suited to that task.	2
Partial explanation only	1
Identifies device containing the RISC architecture and fully explains why it is suited to that task.	3
Identifies device containing the RISC architecture and explains why it is suited to that task.	2
Partial explanation only	1
<p>Possible answer</p> <p>RISC architecture is used in ARM chips that are integrated into mobile phones. Quick response times and a limited instruction set is ideal in this environment where common tasks are used over and over again and software is scaled down into portable and much smaller applications.</p> <p>CISC architecture is used on the x86 desktop PC where complex software and larger instruction sets are required. A more complex processor can be integrated as heating and componentry size is not as restricted as in RISC.</p>	

Question 12 (3 marks)

Examine the following Entity Relationship Diagram.



- a) Dr Jones had to see a Patient with ID J234 twice in one day. Discuss the issue this could create within the database.

(2 marks)

Description	Marks
Discusses the issue fully	2
Brief statement	1
Possible answer Because the primary key is doctor ID in appointment table it would not allow duplicates, therefore second record cannot be created leading to 'missing' data in the table/ database	

- b) How could this be resolved?

(1 mark)

Description	Marks
Identifies how it can be resolved – unique primary key that is automatically generated.	1

Question 13

(7 marks)

Here is a code snippet

```
i ← 0
```

```
total ← 0
```

```
For i < 10
```

```
    Input (age)
```

```
    total ← total + age
```

```
End for
```

```
Output ("Average age is:", total/10)
```

- a) Discuss which variable should be validated and why?

(2 marks)

Description	Marks
Discusses which variable should be validated and why	2
Statement only	1
Possible answer age should be validated so that nonsensical data is not entered not the algorithm. Ie – negative or really small/large data.	

- b) Which validation method could be used?

(1 mark)

Description	Marks
Identifies validation method – range check	1

- c) Change the code to incorporate a validation method

(4 marks)

Description	Marks
Uses if statement (or while)	1
Considers nonsense values	1
Reinputs age prompt	1
End the validation structure	1
Possible answer below	

```

i ← 0
total ← 0
For i < 10
    Input (age)
        If age < 0 or >120
            Output ("Please enter age between 0 and 120")
            Input(age)
        else
            total ← total + age
        end if
    End for
Output ("Average age is:", total/10)

```

Question 14**(12 marks)**

Examine the following algorithm:

```

testScore: integer
Begin
Display "Enter test score"
Input testScore
Case of testScore
    (testScore >= 90):Display "Your grade is A"
    (testScore >= 80):Display "Your grade is B"
    (testScore >= 70):Display "Your grade is C"
    (testScore >= 60):Display "Your grade is D"
    else
        Display"Your grade is F"
    End Case
End

```

- a) The teacher was wanting to automate grade distributions according to a test that was out of 100.

Discuss what could happen if testScore is negative or greater than 100. (2 marks)

Description	Marks
Discusses what would happen for both	2
Discusses what would happen for one	1
Possible answer If score is greater than 100, the displayed grade would be A but this would not make sense if the test was out of 100. It would be a logic error. However if the test score were negative, which is not possible, it would display F rather than get the user to input something more sensible.	

- b) What could be done to fix this problem? (1 mark)

Description	Marks
Identifies what could be done: A range validation or put data boundaries testScore <100	1

- c) Write a function below that : (9 marks)

- Accepts maximum and minimum integer values as parameters
- Inputs testScore
- Checks that testScore is an acceptable value
- returns a new variable **grade** to the main line.

Description	Marks
Function name	1
Parameters	3
Validation (can be a loop or if) use of min max correctly	3
Return	1
Case change to reflect variable	1
Possible answer See below	

Input(min)

Input(max)

Function GradeCalc (min, max, grade)

 Input(testScore)

 if min > testScore or testScore > max

 Output("please enter test between", min "and", max)

 Input(testScore)

 End if

 Case of testScore

 (testScore >= 90):Grade← A

 (testScore >= 80):Grade← B

 (testScore >= 70):Grade← C

 (testScore >= 60): Grade← D

 Else Grade← F

 End case

 return Grade

end

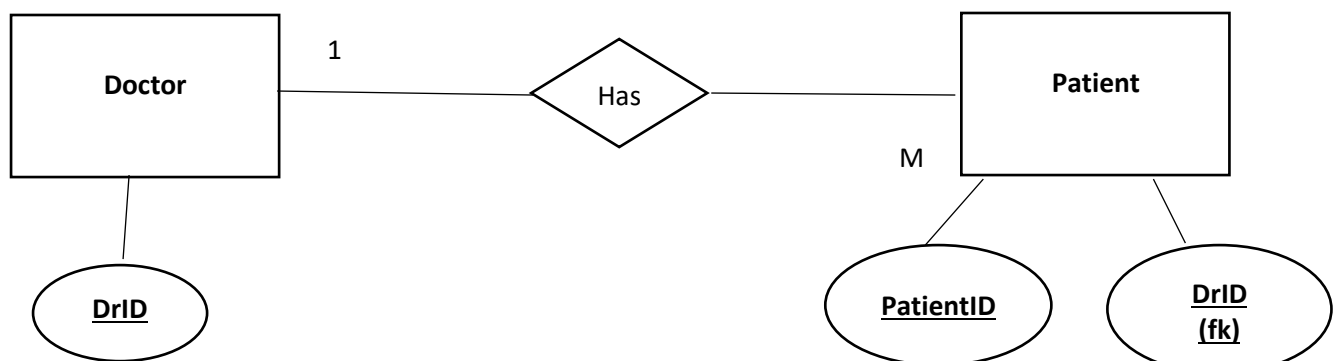
Question 15**(4 marks)**

Discuss two advantages and two disadvantages of an online database compared to a locally stored database.

Description	Marks
Fully discusses two advantages	2
Statements only	1
Fully discusses two disadvantages	2
Statements only	1
Possible answer	
<p>An advantage of an online database is that it is accessible at any time and from anywhere whereas a local database is only available to the local users. Another advantage is that a third party is managing the storage of the data. A local database needs to be stored somewhere and this could cost money. A disadvantage is that a third party is managing the storage so there is a loss of control of the data and leaves it vulnerable if the third party are breached or suffer a disaster or share the data with people they should not. With a locally stored database, control is centralised to the company that owns the data. Whilst an online database is available 24/7, it isn't if the internet is down. A locally stored database does not have this concern.</p>	

Question 16**(5 marks)**

David's database has been designed following the Entity Relationship Diagram depicted below.



Next page

ID	Firstname	Surname	Address 1	Address 2	Suburb	Postcode	State	Phone numl	DrID
1	Frankie	Yelland	12	Patterson Plac	Dalkeith	6005	Wa	0513 546 845	
2	Dominic	Gill	34	Sockton Rd	Bassendean	6054	WA	0352 134 533	Giles
3	Mary	Stuart	25	Royal Plc	Midland	6055	WA 2135435	0516 513 213	Marcot
4	Sally	Glover	4	Plessant Plc	Mt Pleasant	6153	WA	0865 132 136	Giles
5	Peitro	Sadler	21	Royal St	East Perth	6004	WA	0963 155 654	James

- a) He has noticed that there are records within the Patient table that have been left blank on the Dr Field. What methods could have been implemented to ensure this did not occur? (2 marks)

Description	Marks
Identifies 2 methods to ensure this does not occur	2
Identifies 1 method	1
Possible answer Method 1: Enforcing referential integrity would mean that a patient cannot be entered into the database without being allocated to a doctor Method 2: Creating a drop down that does not have the option of leaving the field blank. In the database dictionary, changing the rules so that blank cells are not accepted in this field Method 2: validation rules by setting the fields as NOT NULL	

- b) If not corrected, discuss what impact would null values in this field have upon data integrity? (3 marks)

Description	Marks
Discusses fully the likely impact on data integrity	3
Discusses the impact on data integrity	2
Brief statement only	1
Possible answer In this case, the null field is the foreign key that establishes the link between the tables. This would make querying and developing data associated with which patients see which doctors making business decisions on this matter tricky. Any information would lack correctness and integrity because the null fields are leaving patients without a dr – not ideal and potentially a dr seeing more or less patients than they should	

Question 17

- a) What is an assembly language translated into before it can be executed? (1 mark)

Description	Marks
Identifies that assembly language is translated into machine code	1

- b) Provide two reasons why a programmer chose to develop in a high-level language rather than a low-level language? (2 marks)

Description	Marks
Provides two reasons	2
Provides one reason	1
Possible answer High level language is easier to understand where as dealing with the bits and bytes of machine code not. High level language makes it easier to debug whereas machine code difficult It can run on any platform unlike machine code	

Question 18

To be in third normal form (3NF),

1. the data must be in 2NF
2. be free of transitive dependencies.

Using the data below:

Patient (PatientID, PatientFirstName, PatientSurname, PatientDOB, Address1, Address2, Suburb, State)

Doctor (DoctorID, DoctorName)

Appointment (AppointmentID, DoctorID (FK), PatientID(FK), DoctorName, PatientFirstName,)

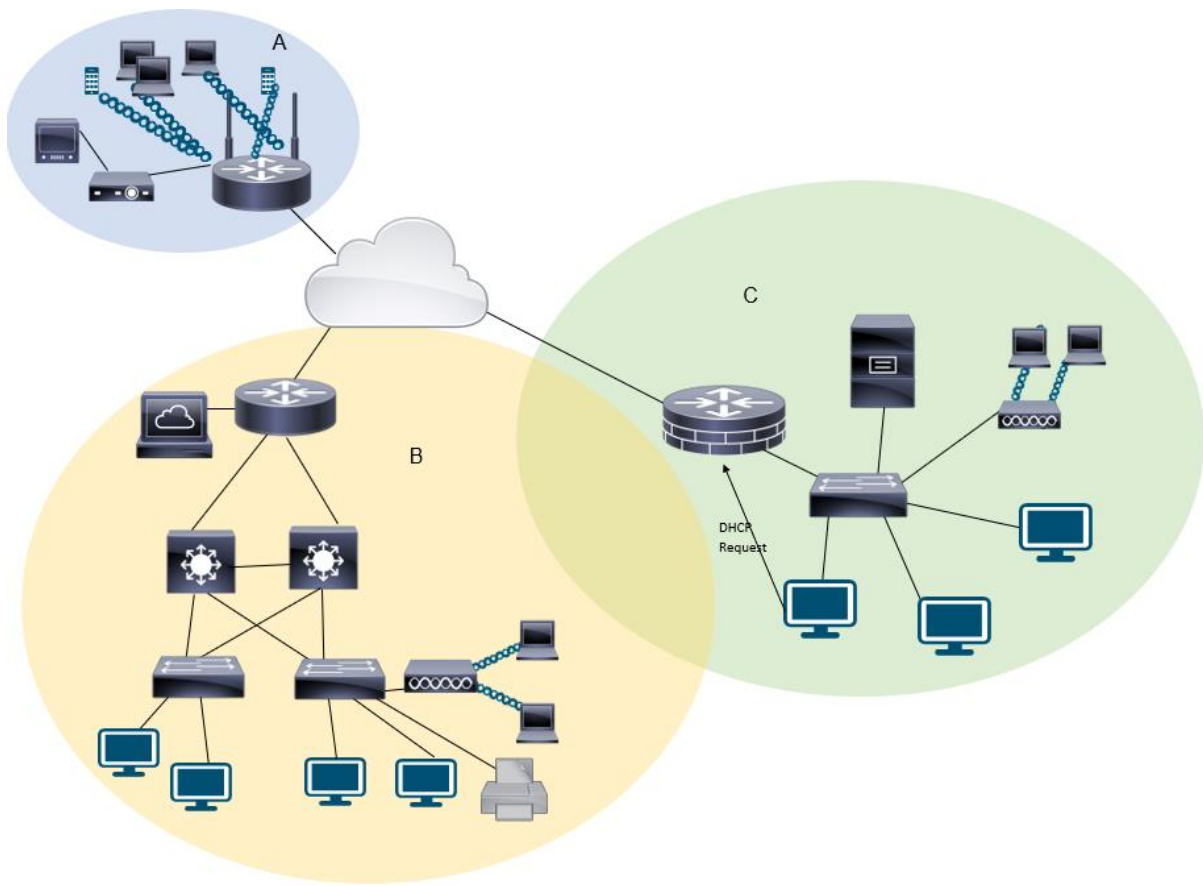
- a) Describe what the term transitive dependency means. (2 marks)

Description	Marks
Describes the term transitive dependency using an example in the data	2
States meaning	1
Possible answer Transitive dependency occurs when a on-key field is dependent on another non-key field and not on the primary key of the table. In this instance, non-key field PatientFirstName is transitively dependent on the nonkey field PatientID on the appointment.	

- b) What needs to happen for this data to be in 3NF. (1 mark)

Description	Marks
Identifies what should occur to be in 3NF	1
Possible answer Both PatientFirstName and DoctorName need to be removed from the Appointment relation into their respective Doctor and Patient relations.	

Questions 19 through to 21 relate to the following network diagram.



Question 19

(9 marks)

a) Describe the purpose of each network A, B and C.

(3 marks)

Description	Marks
Correctly describes the purpose of each network	3
Correctly describes the purpose of 2 networks	2
Correctly describes the purpose of 1 network	1
Possible answer See below	

A: Looks like a home or small office and the purpose of this network would be connect home devices such as the television and mobile phones to the home network and the internet.

B: this is a larger network connecting 2 LANS together. The purpose would be to connect the LANS and provide website services as well as mobile coverage and share a printer.

C: A small business that requires a LAN to be created so that wireless services can be provided and access to the internet can be organised for all devices through the router

- b) Explain the functions of the router in each linking them to their identified purpose.
(6 marks)

Description	Marks
Describes the router functions in each scenario (at least 2 functions)	2
Identifies one function in the scenario	1
Possible answer below	

A: In the home/office context, the router is providing a **connection to the internet** and for this to happen, it must have a **modem** on board. In addition, this router is providing a **wireless access point** for devices to connect to the internet wirelessly. It is also delivering television data to the set top box and internet services to the laptops and mobiles. It is likely to have a **DHCP service** operating so that devices can access an internal IP address to access the internet.

B: In this environment, the router is likely to be operating as a modem and possibly a firewall. It is delivering internet services to the web server and the gateways.

C: In this context, the router is providing a **firewall** and a **modem**. In addition, it is handling the **DHCP requests** from the devices on the network wanting to access the internet.

Question 20 (3 marks)

Describe the role of the gateways in Network B.

Description	Marks
Fully describes the role of the gateways	3
Describes the role of the gateway	2
Statement only	1
Possible answer In network B, the gateways are connecting the LAN's together and then connecting them to the router and to each other. This will allow the free exchange of information and sharing of resources such as the printer. Gateways connect like networks so these two LAN's are using the same protocols	

Question 21 (6 marks)

Explain how the role of the Dynamic Host Control Protocol (DHCP) is managed in each of the networks above.

Description	Marks
Explains correctly how the Dhcp is managed	2
Brief statement only but correct	1
Possible answer See below	

A: In the home environment, the router is likely managing the requests to the internet via the router. The router will assign the spare IP addresses according to web access requests it receives. It has been pre-programmed.

B: In context b, it is likely that the dedicated web server will be managing the DHCP requests the router receives. There will be a lot more control in this environment and there may be someone who has configured how this server assigns the IP addresses for internet access.

C: In this small office environment, the router will again be assigning the IP addresses according to the DHCP protocol. This router is also a firewall and may be a more expensive router that has more features including the ability to control how the IP addresses are assigned.

Question 22

(5 marks)

Discuss convergence in relation to the development of mobile phones. Provide examples.

Description	Marks
Fully discusses convergence providing 3 examples within smart phones.	5
Fully discusses convergence providing 2 examples within smart phones	4
Fully discusses convergence providing an example	3
Discusses convergence but with limited use of an example	2
Convergence definition of brief statement only.	1
<p>Possible answer</p> <p>Convergence in smart phones is the merging of what was separate technology onto one device. For example a digital camera was a separate device but has been converged onto all smart phones who can incorporate the digital data. In addition, smart phones can act as wireless access points for your laptop to connect to the internet. Hotspotting is the function of the radio signal associated with a WAP being emitted by the smart phone. This means mobile phones are increasingly being used as computers putting pressure on CPU specs and storage space.</p>	

Section2: Extended answer**60% (Marks)**

This section contains 4 questions. You must answer **all** questions. Write your answers in the spaces provided.

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 110 minutes.

Questions 23 through 26 refer to pages 1-2 in your Source Booklet.

Question 23**(21 marks)**

- a) Explain which project management methodology would be best suited to developing the new systems for Ivan's business. (5 marks)

Description	Marks
Correctly identifies SDLC with at least three supporting observations linking the business characteristics with features of using SDLC	5
Correctly identifies SDLC with at least two supporting observations linking the business characteristics with features of using SDLC	4
Correctly identifies SDLC with a supporting observation linking the business characteristics with features of using SDLC	3
Links defining features of the project management methodology with business characteristics	2
Brief statement about features of the project management methodology and why it should be used	1
Possible answer Ivan's business has legislative compliance requirements associated with the products that they produce for clients. This would require the documentation associated with an SDLC approach as opposed to a more rapid or iterative approach. In addition, the timeline and the money involved would suggest the more managed approach would be suitable. Ivan does not present as a knowledgeable user of the current systems and a rapid or non-linear approach would require his expert involvement. For these reasons I would suggest the SDLC would be the best choice.	

- b) The manager of the company you work for has given you the following estimate of how long each stage of the project should take. (16 marks)

ACTIVITY	DEPENDENCY	DURATION
1 Preliminary Analysis		5
2 Analysis Document Study	1	6
3 Report to Ivan	1, 2	4
4 Design	3	8
5 Development Software	4	5
6 Hardware purchase	4	5
7 Implementation	5,6	3
8 Evaluation and Maintenance	7	3

Using this information:

a) develop a Gantt chart (8 marks)

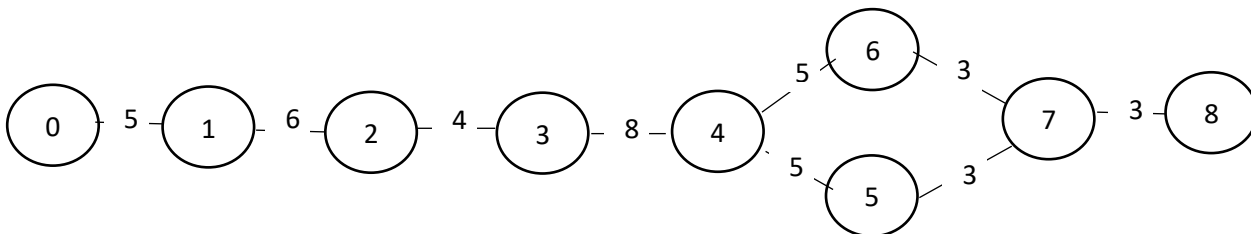
Description	Marks
All dependencies	3
Correct duration of tasks	4
Correct end time in days	1
Possible answer	

Ivan's System Analysis

ACTIVITY	DEPENDENCY	DURATION	Days
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32			
1 Preliminary Analysis		5	█
2 Analysis Document Study	1	6	█
3 Report to Ivan	1, 2	4	█
4 Design	3	8	█
5 Development Software	4	5	█
6 Hardware purchase	4	5	█
7 Implementation	5,6	3	█
8 Evaluation and Maintenance	7	3	█

b) and a pert chart.(8 marks)

Description	Marks
All tasks	3
Correct durations	4
Correct end time in days	1
Possible answer	
See below	



Question 24

(15 marks)

a) Explain to Ivan what a context diagram is and why you will be creating one. (3 marks)

Description	Marks
Fully explains what a context is and it's purpose in this context	3
Explains what a context is and it's purpose	2
Brief statement about what a context is.	1
Possible answer A context diagram establishes the system boundaries. In this situation, Ivan is wanting his invoice and manufacturing system to be improved. A context will establish the boundaries of this system so it does not include say the payroll system. Provide a concise snapshot of the actual system being developed	

b) Create the context diagram for Ivan's Sales and Invoice System below. (12 marks)

Description	Marks
System	1
Vectors	10
Correct entity	1
Possible answer 	

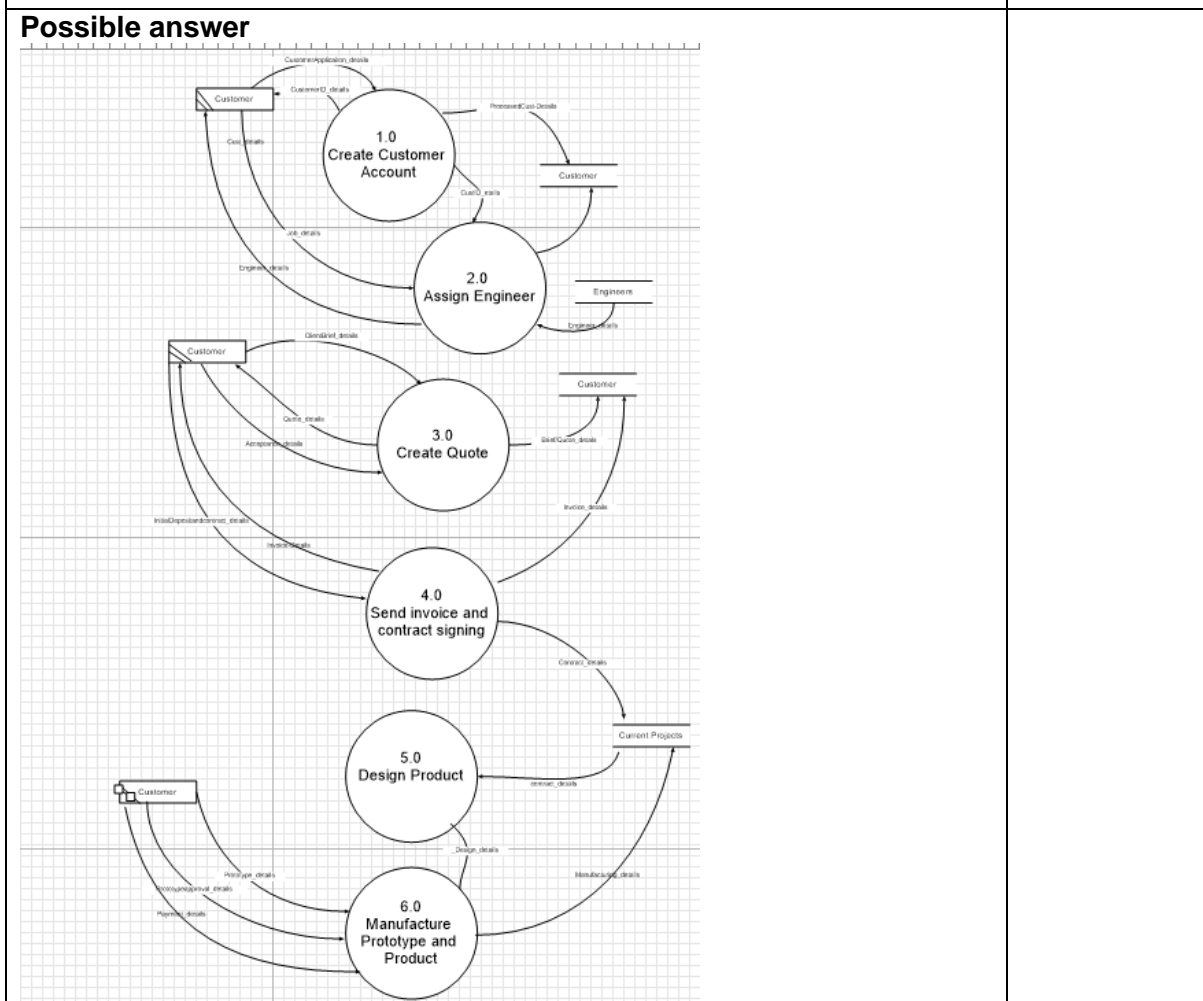
Question 25

(22 marks)

a) Create a data flow diagram level 0 below.

(19 marks)

Description	Marks
Balancing	1
No drawing errors	1
Data Stores (customers, current projects)	2
Process 1: Create account	3
Process 2: Assign engineer	3
Process 3: Create quote	3
Process 4: Send invoice	3
Process 5/6 Design product/ manufacture prototype	3



b) One of your processes has multiple vectors going in and out and uses two data stores. Explain why a level 1 data flow diagram would be required. (3 marks)

Description	Marks
Fully explains why further levelling is required.	3
Explains why further levelling is required	2
Brief statement about further levelling	1
Possible answer A process that has multiple vectors and accesses more than one store may not show enough detail to implement the new system. Exploding the process into further sub processes will enhance the developers understanding of how the data is flowing through the system and being processed for use within the system. Further levelling provides this detail	

Question 26**(32 marks)**

Ivan would like to automate the client contract development as much as possible.

When the client accesses the webform they are initially presented with the following:

- Existing client
- New client

If they are an existing client, **Module 1** is called.

If they are a new client, **Module 2** is called.

These are the following modules

Module 1 clientID_check: Asks the client to enter their unique client number called clientID. This will be checked against an array called ClientID[] containing all the client numbers. If their client number exists, it will be passed back to the Main. If it doesn't exist, they will receive the message "Please contact our friendly administration team on 98764546".

Module 2 New_Customer: This webform module is yet to be written, but when called, it will ask clients for some contact details to be emailed to Ivan who will arrange contact.

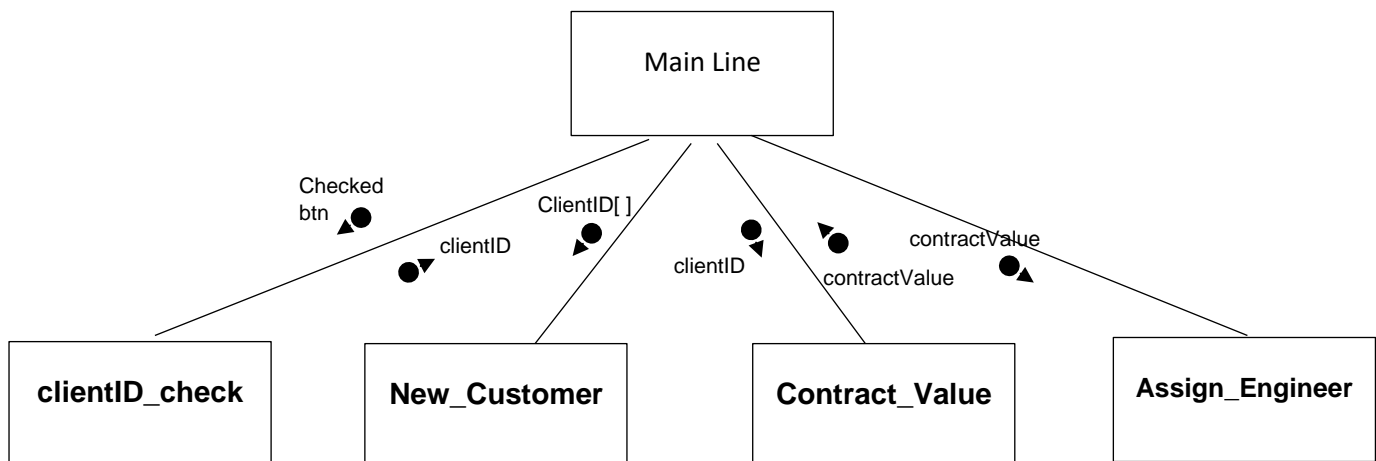
Module 3 Contract_Value: The Webform Module is yet to be written but the variable ClientID is passed to the module and the variable contractValue is passed back to the Main Module.

Module 4 Assign_Engineer: Is a function that accepts the variable contractValue and based on the amount. Based on this contractValue a Design Engineer is assigned to liaise with the client. The function returns the Engineers name to the Main module.

a) Create the structure chart for this algorithm showing all parameters passing. (10 marks)

Description	Marks
All modules	4
All parameters passed	6
Possible answer	

See below



Description	Marks
Module with correct parameters passed and returned	3
Variable initialisation	3
Loop with array and length	2
Found selection (or loop) with output statement and return	3
Possible answer	
See below	

b) Write the pseudocode for Module 1 below.

(11 marks)

```

clientID_check(ClientID[ ], clientID )
Begin
i ← 0
found ← false
input(clientID)
  for i < len(ClientID[ ]) -1
    if clientID = ClientID[i]
      found ← true
    else
      i++
    end if
  end for
if found ← true
  return clientID
else
  Output("Please contact our friendly administration team on 98764546")
End if
end

```

c) Why is Module 1 not a function?

(2 marks)

Description	Marks
Identifies why Module 1 not a function on 2 characteristics	2

Identifies why module 1 not a function on 1 characteristic	1
Possible answer It has an output statement It does not return a value via module name (or function name)	

d) Using the following data, write the pseudocode for Module 4. (9 marks)

contractValue	Design Engineer Name
>= \$500,000	Andrew
>=250,000 < 500,000	Brian
>= 100,000 < 250,000	Lucy
>= 50,000 < 100,000	Mike
<50,000	Wayne

Description	Marks
Correct function name and parameter passing	2
Correct case or nested if (5) and returns(1) being/end(1)	7
Possible answer See below	

```
Function Assign_Engineer(contractValue)
Case of contractValue
    contractValue >= 500,000: return Andrew
    500,000 > contractValue >= 250,000: return Brian
    250,000 > contractValue >= 100,000: return Lucy
    100,000 > contractValue >= 50,000: return Mike
    Else return Wayne
End case
Assign_Engineer = contractValue
Return Assign_Engineer
End Function
```

e) For the Webform Module 3, a stub has been written that returns a manually entered contractValue. What does a stub do? (2 marks)

Description	Marks
Identifies what a stub does in this situation	2
Identifies function of stub	1
Possible answer A stub becomes a placeholder for a module or function yet to be written. There will be enough code in the stub for the Main module to still run. In this situation, the main code will still run for Ivan's organisation. The contractValue is likely to be manually input until the module is written.	

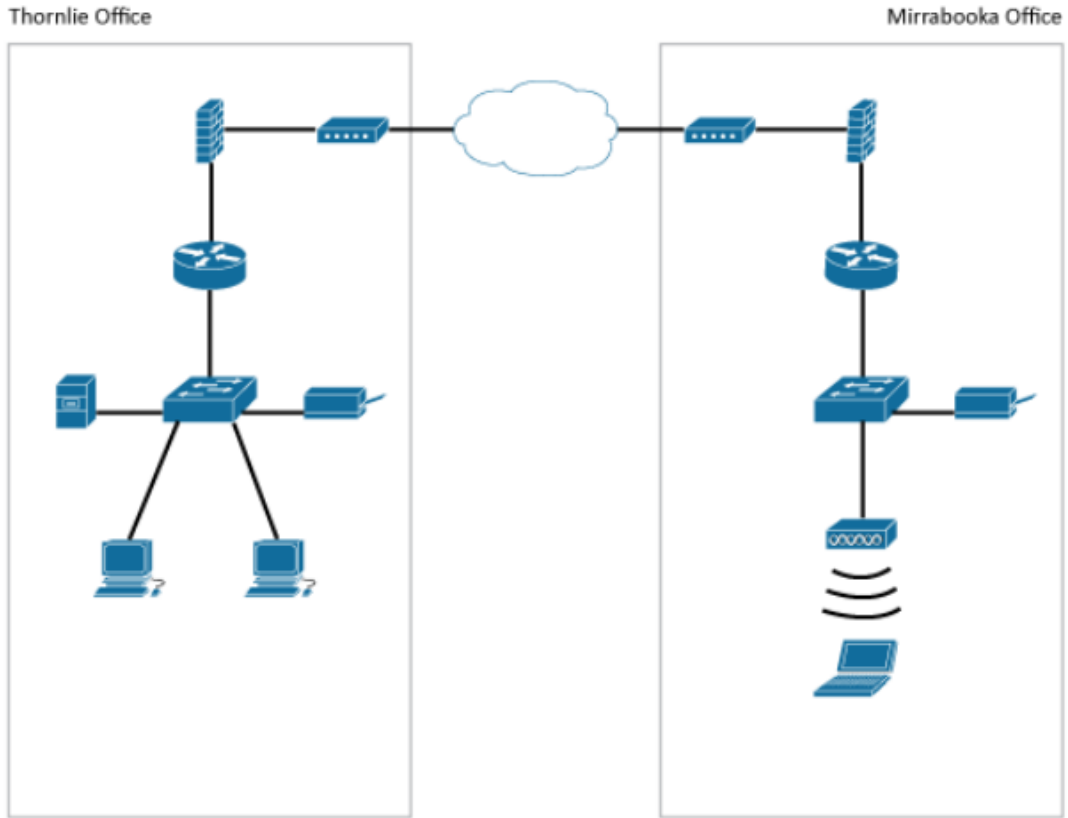
Description	Marks

- f) When developing the software solution, Ivan has been advised that encryption of the data stored in the software is not required because users must log on with their unique ClientID.

Discuss why authentication and encryption should be an important part of the software solution. (3 marks)

Description	Marks
Fully discusses why authentication and encryption should be an important part of the software in this context	3
discusses why authentication and/or encryption should be an important part of the software in this context	2
States why authentication and or encryption important	1
<p>Possible answer</p> <p>Authentication of the users by forcing them to input user name and password would be an important part of the development so that the software is not accessed by unauthorised personnel. Ivan has sensitive commercial data stored so he would not want unauthorised users. In addition, if someone maliciously deletes data, authentication means they can be identified. Encrypting the data would be important in case the data is stolen. This would ensure it cannot be read.</p>	

Question 27



Description	Mark
Thornlie Office	
Firewall – correct icon used and must be hard wired (solid line) to modem and router. Also accept firewall placed after router – ie hardwired to switch and router.	1
Router – correct icon used and must be hard wired (solid line) to firewall and switch. Also accept router placed before firewall – ie hardwired to modem and firewall.	1
Switch – correct icon used and must be hardwired to router (or firewall as described above)	1
Server – correct icon used and must be hardwired directly to switch	1
Network printer - correct icon used and must be hardwired directly to switch	1
Workstations - correct icons used and must be hardwired directly to switch – 1 mark each	2
Subtotal	7
Mirrabooka Office	
Firewall – correct icon used and must be hard wired (solid line) to modem and router. Also accept firewall placed after router – ie hardwired to switch and router.	1
Router – correct icon used and must be hard wired (solid line) to firewall and switch. Also accept router placed before firewall – ie hardwired to modem and firewall.	1
Switch – correct icon used and must be hardwired to router (or firewall as described above)	1
Network printer - correct icon used and must be hardwired directly to switch	1
Wireless access point (WAP) - correct icon used and must be hardwired directly to switch	1
Notebook PC - correct icon used and must show wireless communication to WAP	1
Subtotal	6
Total	13

- 1 drawing the cloud and connecting the two networks
 1 for labelling the two offices Thornlie and Mirrabooka

15 marks

- a) The company is dependent on the network for their work. Discuss three potential threats to this network and how they can be prevented or intercepted and how any damage can be overcome. (6 marks)

Description - each	Marks
Discusses threat identifying the damage it does and how it can be prevented.	2
Identifies threat and damage/or prevention.	1
Possible answer Threat 1: A DDoS attack. All networks are vulnerable to this sort of attack and this could potentially impact Ivan's ability to take orders over the internet, thus stalling sales and client relationships. To prevent this, the web server should be updated continually with the IP details of known DDoS attacks. If the network fails, the company should have a backup plan to compensate for any data loss	

<p>Threat 2: Back doors; Often left in software for troubleshooting purposes, Ivan will need to ensure that when his software solutions are installed, these are closed as they provide a vulnerability for hackers to enter his network via the insecure software. The damage could be quite significant and include theft of commercially sensitive data to data destruction.</p> <p>Threat 3: Phishing: An email or message arriving that looks like a legitimate message from a bank. These types of scams are a threat to the network as they can turn computers into bots or introduce spyware. To prevent, Firewalls and general knowledge about avoiding opening messages that look suspicious.</p>	
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b) Explain why the data for this company would be stored on a dedicated server. (3 marks)

Description	Marks
Explains fully why the data is on a server. Providing at least 2 reasons for this.	3
Explains fully why the data is on a server. Providing at least 1 reason for this.	2
Brief explanation without linking to context	1
<p>Possible answer The data is located on a server in a server/client arrangement. This allows easy back up from a central location. The data is commercially sensitive so it can also be protected on the server by putting it in a secure and separate room. Accessing the data would require authentication which can then be tracked via audit logs. As long as there is an off site back -up done regularly, this is a sensible choice for sensitive data.</p>	

c) Explain why all the applications are stored on the server rather than locally?
(2 marks)

Description	Marks
Explains fully why the applications are on separate server	2
Brief answer	1
<p>Possible answer Applications are easier to update in one location and easier to deploy in the client/server arrangement. Installing them locally means logging onto each machine for updates and installation.</p>	