



COMPUTER SCIENCE

ATAR course sample examination two

Marking key

Marking keys are an explicit statement about what the examining panel expect of candidates when they respond to particular examination items. They help ensure a consistent interpretation of the criteria that guide the awarding of marks.

Section One: Short answer

40% (90 Marks)

Question 1

(4 marks)

- (a) Identify a type of error that has occurred. (1 mark)

Description	Marks
runtime error	1
Total	1
Accept other relevant answers.	

- (b) Justify your choice if error in part (a). (3 marks)

Description	Marks
Justifies why it is a runtime error	3
Describes why it is a runtime error	2
Outlines why it is a runtime error	1
Total	3
Answers could include: The program compiles and starts to execute but ends abnormally so the error must be a runtime error. A logic error occurs when a program executes but produces an unexpected value. Since the program does not produce any output, a logic error could also be attributed as logic errors can cause runtime errors. A syntax error occurs when the source code is not typed correctly, preventing the program from compiling and executing. Since the program compiles and executes, the error cannot be a syntax error.	
Accept other relevant answers.	

Question 2

(3 marks)

List **three** ways that IPv6 offers improved network services over IPv4.

Description	Marks
For each (3 x 1 mark)	
Lists a way that IPv6 offers improved network services over IPv4	1
Total	3
Answers could include: <ul style="list-style-type: none"> • IPv6 has more available addresses than IPv4 • IPv6 has built in security features such as encryption • networks are easier and cheaper to manage as IPv6 provides auto configuration capabilities and network configuration is cheaper and flatter. Accept other relevant answers.	

Question 3

(3 marks)

Explain the term 'version control' as it applies to computer programming, including reference to why it is useful in a large project.

Description	Marks
Explains the term version control as it applies to computer programming with reference to why it is useful in a large project	3
Describes the term version control as it applies to computer programming with reference to why it is useful in a large project	2
Outlines the term version control as it applies to computer programming	1
Total	3
Answers could include: <p>Version control is the process of managing the development and changes to source code during a development project. In a large project there are likely to be multiple people working on the source code, so it is important to be able to track the changes that different developers have made. This ensures that everyone is working on the same base code and that changes made by one developer are reflected in the code that other developers are working on.</p> Accept other relevant answers.	

Question 4

(1 mark)

Identify **one** reason why the table below is not normalised.

Description	Marks
Identifies a reason why the table is not normalised	1
Total	1
Answers could include: <ul style="list-style-type: none"> • the table doesn't contain a Primary key • table contains a repeating group (duplicated data). Accept other relevant answers.	

Question 5

(7 marks)

- (a) Complete the desk checking (trace table) for the algorithm using the following test data:
25, 10, 5, 0. (4 marks)

Description				Marks
For each row (4 x 1 mark)				
Completes the required data in the row				1
Total				4
numSales	totalSales	salesAmount	salesAmount > 0	
0	0	25	T	
1	25	10	T	
2	35	5	T	
3	40	0	F	

- (b) Rewrite the algorithm so that it uses a post-test loop. (3 marks)

Description		Marks
Includes REPEAT...UNTIL structure		1
Includes stopping condition for loop		1
Includes the remainder of the algorithm		1
Total		3
Answers could include:		
numSales = 0 totalSales = 0		
REPEAT		
INPUT(salesAmount)		
IF salesAmount <> 0 THEN		
numSales = numSales + 1		
totalSales = totalSales + salesAmount		
END IF		
UNTIL salesAmount = 0		
Accept other relevant answers.		

Question 6

(9 marks)

Complete the table below that shows the address and the most likely protocol or communications standard that will be used at each layer of the Department of Defence (DoD) transmission control protocol/internet protocol (TCP/IP) model as the data is sent from Afua's computer to Tāwhiri's computer.

Description				Marks																											
For each packet (3 x 1 mark)																															
Identifies the correct packet type				1																											
Subtotal				3																											
For each address (3 x 1 mark)																															
Identifies the correct address				1																											
Subtotal				3																											
For each protocol (3 x 1 mark)																															
Identifies the correct protocol				1																											
Subtotal				3																											
Total				9																											
<table border="1"> <thead> <tr> <th rowspan="2">Layer</th> <th rowspan="2">Packet type</th> <th colspan="2">Address</th> <th rowspan="2">Protocol/Standard</th> </tr> <tr> <th>Source</th> <th>Destination</th> </tr> </thead> <tbody> <tr> <td>Application</td> <td>Data</td> <td>N/A</td> <td>N/A</td> <td>FTP</td> </tr> <tr> <td>Transport</td> <td>Segment</td> <td>1200</td> <td>1200</td> <td>TCP</td> </tr> <tr> <td>Internet</td> <td>Packet</td> <td>10.45.190.145</td> <td>10.45.190.156</td> <td>IP</td> </tr> <tr> <td>Network</td> <td>Frame</td> <td>66:66:66:77:77:77</td> <td>22:22:22:33:33:33</td> <td>Ethernet 802.3</td> </tr> </tbody> </table>					Layer	Packet type	Address		Protocol/Standard	Source	Destination	Application	Data	N/A	N/A	FTP	Transport	Segment	1200	1200	TCP	Internet	Packet	10.45.190.145	10.45.190.156	IP	Network	Frame	66:66:66:77:77:77	22:22:22:33:33:33	Ethernet 802.3
Layer	Packet type	Address		Protocol/Standard																											
		Source	Destination																												
Application	Data	N/A	N/A	FTP																											
Transport	Segment	1200	1200	TCP																											
Internet	Packet	10.45.190.145	10.45.190.156	IP																											
Network	Frame	66:66:66:77:77:77	22:22:22:33:33:33	Ethernet 802.3																											
Accept other relevant answers.																															

Question 7

(3 marks)

Explain the term 'back door' as an external network threat.

Description	Marks
Explains the term back door as an external network threat	3
Describes the term back door as an external network threat	2
States a relevant fact about a back door security threat.	1
Total	3
Answers could include:	
In network security, a back door is a technique that allows a user to gain access to a network by bypassing the regular security measures that are used on that network. This method is used to gain high level user access on a vulnerable network to steal personal or financial data or install malware.	
Accept other relevant answers.	

Question 8

(2 marks)

Describe the term 'IP spoofing'.

Description	Marks
Describes IP spoofing	2
Makes a general statement about IP spoofing	1
Total	2
<p>Answers could include:</p> <p>IP spoofing is a network security attack in which an attacker impersonates a different IP address to deceive a target or gain unauthorised access to a network, system, or service. It involves manipulating the source IP address field of IP packets to make it appear as if the packets originate from a different source than they actually do.</p> <p>Accept other relevant answers.</p>	

Question 9

(5 marks)

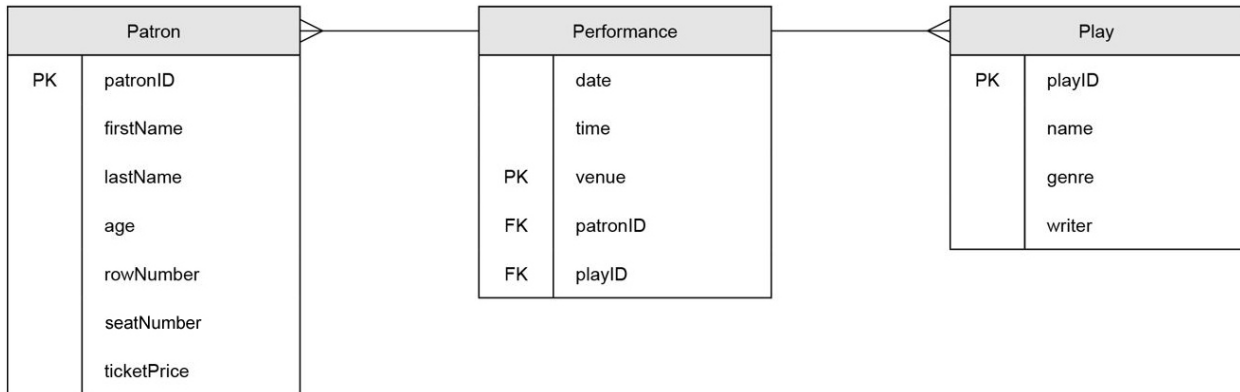
Complete the module *PopulateBoard* which takes in the number of rows and columns as parameters, and places a plus sign in each cell of the global array board.

Description	Marks
Outer loop for rows	1
Correct number of loops for rows based on parameter entered	1
Inner loop for columns	1
Correct number of loops for columns based on parameter entered	1
Set individual element of 2D array to "+"	1
Total	5
<p>Answers could include:</p> <pre> MODULE PopulateBoard(rows, columns) FOR row = 0 TO rows - 1 DO FOR column = 0 TO columns - 1 DO board[row][column] = "+" END FOR END FOR END PopulateBoard </pre> <p>Accept other relevant answers.</p>	

Question 10

(3 marks)

Examine the following entity relationship (ER) diagram that was designed to record who attends each performance of plays put on by the Joondalup City Theatre Company. Many patrons can attend many performances once and each play can be performed a number of times.



Outline **three** errors that exist within the ER diagram above.

Description	Marks
For each error (3 x 1 mark)	
Outlines an error in the diagram	1
Total	3
Answers could include:	
<ul style="list-style-type: none"> cardinality of the relationship between Performance and Plays is the wrong way around. Should be many performances of one play PK for the Performances entity is not unique. Needs to include Date and Time (or create a new attribute such as Performance ID) diagram does not indicate a M:N relationship between patron and performance rowNumber, seatNumber and ticketPrice are assigned to the patron. 	
Accept other relevant answers.	

Question 11

(2 marks)

Kade has developed a large software package with multiple modules. However, he is getting several logic errors. Identify **two** methods of error detection and correction that he could use to locate the errors.

Description	Marks
For each method (2 x 1 mark)	
Identifies a method of error detection	1
Total	2
Answers could include:	
<ul style="list-style-type: none"> using print statements unit testing trace table. 	
Accept other relevant answers.	

Question 12

(6 marks)

- (a) Explain how the use of asymmetric encryption can be used to ensure that nobody else can read the message with the use of public/private keys. (3 marks)

Description	Marks
Explains how asymmetric encryption can be used to ensure that the data is secure in relation to the scenario	3
Describes how asymmetric encryption can be used to ensure that the data is secure in relation to the scenario	2
Provides a general statement about asymmetric encryption	1
Total	3
<p>Answers could include:</p> <p>Asymmetric encryption involves the use of two keys to encrypt and decrypt data. The public key is used to encrypt the data, and another, matching private key is used to decrypt the data. To ensure that the message is kept secure during transmission, Elizabeth should use Michael's public key to encrypt the message prior to transmission.</p> <p>Accept other relevant answers.</p>	

- (b) Explain why symmetric encryption is less secure than asymmetric encryption. (3 marks)

Description	Marks
Explains why symmetric encryption is less secure	3
Describes why symmetric encryption is less secure	2
Provides a general statement about using symmetric encryption	1
Total	3
<p>Answers could include:</p> <p>Symmetric encryption is generally considered as less secure than asymmetric encryption due to the challenges associated with maintaining the secrecy of the symmetric key. Asymmetric encryption remains safer because it uses two keys in encryption and decryption.</p> <p>Accept other relevant answers.</p>	

Question 13

(9 marks)

- (a) Using an example, describe the term 'encapsulation' as it applies to object-oriented programming. (3 marks)

Description	Marks
Provides an example	1
Description	
Describes the term encapsulation as it applies to object-oriented programming	2
Provides a general statement about the term encapsulation	1
Total	3
<p>Answers could include:</p> <p>In object-oriented programming, encapsulation is the process of hiding the internal structure and implementation of a class and only allowing other objects to interact through a specific interface.</p> <p>For example, if we have a class such as <i>person</i> and we want to include a property <i>age</i>. We do not want to allow other objects to directly modify the <i>age</i> of a person, so we make the <i>age</i> property private and then provide access to this through a modifier such as <i>setAge()</i> that will allow us to check that the age entered is ≥ 0.</p> <p>Accept other relevant answers.</p>	

- (b) Using an example, describe the term 'inheritance' as it applies to object-oriented programming. (3 marks)

Description	Marks
Provides an example	1
Description	
Describes the term inheritance as it applies to object-oriented programming	2
Provides a general statement about the term inheritance	1
Total	3
<p>Answers could include:</p> <p>In object-oriented programming the term inheritance refers to the ability to define a class that inherits the properties of another class. This allows you to define a base class with certain common characteristics and then define child classes that can build upon these characteristics.</p> <p>For example, we could define a class <i>animal</i> that has specific methods such as <i>eat()</i> and <i>sleep()</i>. We could then define new classes such as <i>cat</i> and <i>snake</i> that inherit these base methods but can also implement other properties that are specific to that animal.</p> <p>Accept other relevant answers.</p>	

Question 13 (continued)

- (c) Using an example, describe the term 'polymorphism' as it applies to object-oriented programming. (3 marks)

Description	Marks
Provides an example	1
Description	
Describes the term polymorphism with an appropriate example	2
Provides a general statement about the term polymorphism	1
Total	3
Answers could include:	
Polymorphism is a feature of object-oriented programming that refers to the ability of an object to be referred to in multiple forms. In the case of a class, this means that a class subclass is considered to be polymorphic since it can be referred to either by its class or its parent class.	
For example, we could define a class called <i>shape</i> that incorporates the method <i>perimeter</i> . When we define the subclasses <i>square</i> and <i>circle</i> the definition of the method <i>perimeter</i> will be different, although both classes can still be referred to as <i>shapes</i> .	
Accept other relevant answers.	

Question 14

(5 marks)

- (a) Describe how the use of unit tests will ensure the code performs correctly. (2 marks)

Description	Marks
Describes how unit tests will ensure that the code performs correctly	2
Provides a general statement about unit tests	1
Total	2
Answers could include:	
Kalina can use unit tests to test the functionality of each individual module of her code, ensuring that each module does what it is supposed to do. If the code is changed in the future, she can run all the unit tests again to ensure that the changes work correctly and do not have unintended impacts on other parts of the code.	
Accept other relevant answers.	

- (b) Explain whether this is sufficient testing to ensure that her software will operate as expected when deployed in the real world. (3 marks)

Description	Marks
Explains that sufficient testing has not been done with reference to situation	3
Describes that sufficient testing has not been done with reference to the situation	2
Makes a general statement about insufficient testing with reference to situation	1
Total	3
Answers could include:	
Kalina has not done enough testing to ensure that her software will work as expected when it is deployed. Her testing needs to include testing with expected loads and large file sizes to ensure that it will work appropriately under actual loads.	
Accept other relevant answers.	

Question 15**(3 marks)**

Mario would like to connect a new device to Network A and has been told that the subnet mask is 255.255.255.0. Complete the following details for him to connect his device to the network.

Description	Marks
IP address 192.168.15.X (2–254, except for .154 or .172)	1
gateway 192.168.15.1	1
DNS server 64.34.14.164	1
Total	3
Accept other relevant answers.	

Question 16**(3 marks)**

With reference to Network A and Network B in the diagram on page 14, explain the difference between a public and private IP address.

Description	Marks
Explains the difference between public and private IP addresses, including appropriate reference to the given networks	3
Describes the difference between public and private IP addresses with appropriate reference to the given networks	2
Provides a general statement about public or private IP address with limited or no reference to networks	1
Total	3
<p>Answers could include:</p> <p>A public IP address must use a public IP address range for devices outside of the LAN to connect to another network. A private IP address is an address within the LAN that can only be recognised and used by devices within the LAN. In the diagram for Network A, it has a router with a public IP address of 25.243.12.45. This can be used by devices on Network B to connect to network A via the internet. The private IP addresses within network A begin with 192.168.15. For example, one of the workstations has the IP address 192.168.15.154.</p>	
Accept other relevant answers.	

Question 17

(2 marks)

Mario is trying to test his network performance. Describe the difference between 'ping' and 'traceroute' when evaluating network performance.

Description	Marks
Describes the difference between ping and traceroute when evaluating network performance in relation to Mario's network	2
Provides a general statement about ping and/or traceroute when evaluating network performance	1
Total	2
Answers could include: Ping is used to determine if a network device is reachable from a particular network location and gives the time taken to transmit and receive data. Traceroute provides details on the precise route (hops) that the packet of data took to reach its destination as well as the time taken for each hop. Traceroute is only useful in interconnected networks and not inside a LAN.	
Accept other relevant answers.	

Question 18

(9 marks)

Using an example from the data on page 16, explain the following terms.

- Referential integrity
- Domain integrity
- Entity integrity

Description	Marks
For each term (3 x 3 marks)	
Explains the term with an appropriate example	3
Describes the term with an example	2
Provides a general statement about the term	1
Total	9
<p>Answers could include:</p> <p>Referential integrity – referential integrity ensures that there is a valid relationship between the tables in a database, checking that each foreign key refers to a valid primary key in the related table. For example, to enforce referential integrity it would be necessary to check that the data for each Competitor Number entered in the CompetitorEvent table so there is a valid entry in the Competitor table for that Competitor Number.</p> <p>Domain integrity – domain integrity ensures that the values entered in a specific field are valid and determines whether a null value is allowed. This involves checking that the data entered is the correct data type, format and/or within a range of acceptable values. For example, in the Event table, you could check the values in the Style field are one of either freestyle, breaststroke, backstroke, butterfly or medley.</p> <p>Entity integrity – entity integrity ensures that every table has a valid primary key that uniquely identifies each record in the table and is not null. For example, in the Competitor table of the database, each Competitor Number entered for each new competitor is unique and not null.</p> <p>Accept other relevant answers.</p>	

Question 19

(6 marks)

Complete the table below by identifying and describing the level of normal form for each table.

Description		Marks
Normal form identification (2 x 1 mark)		
Identifies each correct normal form		1
Subtotal		2
Description about the level of normal form (2 x 2 marks)		
Describes the level of normal form		2
Provides a general statement about appropriate normal form		1
Subtotal		4
Total		6
Answers could include:		
Table	Normal form	Description
Competitor	2NF	This table is in 2NF as it has a valid primary key, there is no repeating data and all values are atomic (1NF). There are also no partial dependencies as there is no composite key (2NF). It is not in 3NF, however, as there is a transitive dependency where the colour is dependent upon the Group, not the CompetitorNumber.
CompetitorEvent	2NF	This table is in 2NF as both place and time are wholly dependent on the composite key of EventNumber and CompetitorNumber. The table is not in 3NF because the Place is transitively dependent on the Time and EventNumber.
Accept other relevant answers.		

Question 20

(5 marks)

Complete the data dictionary below.

Description					Marks
Element name	Data type	Size/ Format	Description	Constraint	
StudentID	Integer or number	6	Unique identifier for each student	Required. unique automatically created when record added	1
FirstName	text	25	First name of student	Required	1
LastName	text	25	Last name of student	Required	–
YearLevel	integer	2	The year level	Required	1
Email	text	255	Email address containing @ sign	Required	1
AccountBalance	real	6	The student's cash balance	Required	1
Total					5
Accept other relevant answers.					

Section Two: Extended answer

60% (104 Marks)

Question 21

(14 marks)

Rottnest Boat Charter would like to store this data in a more efficient manner. To help them with this, they have asked you to convert the data using the sample table on page 2 of the Source booklet, to third normal form (3NF).

Description	Marks
Entities (5 x 1 mark)	
Identifies an entity	1
Subtotal	5
Primary keys	
Identifies primary keys for all entities	3
Identifies valid primary keys for some entities (3–4)	2
Identifies valid primary keys for limited entities (1–2)	1
Subtotal	3
Foreign keys	
Identifies all necessary foreign keys	3
Identifies some necessary foreign keys (2–3)	2
Identifies limited necessary foreign key (1–2)	1
Subtotal	3
Non-key attributes	
Identifies all necessary non-key attributes in each entity	3
Identifies some non-key attributes for each entity (4–7)	2
Identifies limited non-key attributes for each entity (1–3)	1
Subtotal	3
Total	14
<p>Answers could include:</p> <p>Diver (<u>DiverID</u>, DiverFirstName, DiverLastName, DoB) DiverCertification (<u>CertificationNumber</u>, DiverID FK, DateAttained, CertificationID FK, InstructorID FK) Certification (<u>CertificationID</u>, DiverCertificationName, IssuingAgencyID FK) IssuingAgency (<u>IssuingAgencyID</u>, IssuingAgency) Instructor (<u>InstructorNumber</u>, InstructorFirstName, InstructorLastName).</p> <p>Accept other relevant answers.</p>	

Question 22

(22 marks)

Using the sample data provided, identify what values would be returned by the following SQL queries.

- (a) (i) `SELECT Boat.name, Boat.capacity
FROM Boat, Operator
WHERE Boat.operatorID = Operator.operatorID
AND Operator.name = "Sunny Dive Charters"` (1 mark)

Description	Marks
Ocean Explorer, 24	1
Total	1

- (ii) William has attempted to run the following SQL query that is supposed to return the names and locations of all the dive sites but did not get the expected results. Identify and outline the problem with his query.

`SELECT Site.name, Site.maxDepth, Site.waterType, Location.name,
Location.state, Location.country
FROM Site, Location
WHERE Site.locationID = Location.locationID` (2 marks)

Description	Marks
Outlines the error	1
Identifies the error	1
Total	2
Answers could include:	
The query is ambiguous because the SELECT clause does not use dot notation to clearly identify in which table the field is located. In this case a 'name' attribute is to be found in both Site and Location tables.	
Accept other relevant answers.	

Using the sample data on page 3 of the Source booklet from William's database create the following SQL queries.

- (b) Create an SQL query that lists the name and waterType of all the dive sites that are less than 15 metres deep. (3 marks)

Description	Marks
SELECT correct fields	1
FROM correct table	1
WHERE clause correct condition	1
Total	3
Answers could include:	
<pre>SELECT Site.name, Site.waterType FROM Site, Location WHERE Site.maxDepth < 15</pre>	
Accept other relevant answers.	

- (c) For each dive that William has completed, find the date, average and maximum depths of the dive and name of the site. Create an SQL query that sorts the dives based on the maximum depth for each dive in descending order (deepest dive first). (4 marks)

Description	Marks
SELECT correct fields	1
FROM correct table	1
WHERE clause correct condition	1
ORDER BY on correct field in correct order	1
Total	4
Answers could include:	
<pre>SELECT Dive.date, Dive.avgDepth, Dive.maxDepth, Site.name FROM Dive, Site WHERE Dive.SiteID = Site.SiteID ORDER BY Dive.maxDepth DESC</pre>	
Accept other relevant answers.	

Question 22 (continued)

- (d) Create an SQL query that will find the number of dives that William has completed in Australia where he went deeper than 20 metres. (6 marks)

Description	Marks
SELECT using COUNT function	1
FROM correct tables	1
WHERE clause for relationship between tables	1
AND Site.locationID = Location.locationID	1
AND Site.maxDepth condition	1
AND country condition	1
Total	6
Answers could include:	
<pre>SELECT COUNT(*) FROM Dive, Site, Location WHERE Dive.siteID = Site.siteID AND Site.locationID = Location.locationID AND Dive.maxDepth > 20 AND Location.country = "Australia"</pre>	
Accept other relevant answers.	

- (e) Find the total number of divers that each dive operator can take out on a boat dive at the same time. Create an SQL query that lists the name of each diver operator using the alias 'Dive Operator' and the total number of divers using the alias 'Total Dives'. (6 marks)

Description	Marks
SELECT operator name	1
Correct use of SUM function	1
Correct use of aliases for operator name and total dives	1
FROM correct tables	1
WHERE clause for relationship between tables	1
GROUP BY correct field	1
Total	6
Answers could include:	
<pre>SELECT Operator.name as "Dive Operator", SUM(capacity) as "Total Dives" FROM Boat, Operator WHERE Boat.operatorID = Operator.operatorID GROUP BY Operator.name</pre>	
Accept other relevant answers.	

Question 23

(21 marks)

(a) Complete the partial pseudocode below as one function

(10 marks)

Description	Marks
Input new item	1
Loop to allow multiple items to be entered	1
Adding new item to list	1
Loop through items in list itemsToHire	1
Access cost of item in dictionary	1
Calculate totalCost	1
Multi-way selection to check memberLevel	1
Assign discount rate	1
Calculate discount	1
Calculate finalCost	1
Total	10
<p>Answers could include:</p> <pre> def main(): itemsToHire = [] item = input("Enter an item to hire (or press Enter to finish): ") while item != "": itemsToHire.append(item) item = input("Enter an item to hire (or press Enter to finish): ") costOfGear = { "mask": 2.00, "wetsuit": 5.00, "BCD": 5.00, "fins": 2.00, "tank": 5.00 } totalCost = 0 for i in range(len(itemsToHire)): totalCost += costOfGear.get(itemsToHire[i], 0.00) discountRate = 0 memberLevel = input("Enter your membership level (Gold/Silver/Bronze): ") if memberLevel == "Gold": discountRate = 0.20 elif memberLevel == "Silver": discountRate = 0.12 elif memberLevel == "Bronze": discountRate = 0.05 discount = totalCost * discountRate finalCost = totalCost - discount print(finalCost) main() </pre> <p>Accept other relevant answers.</p>	

Question 23 (continued)

- (b) Explain how a modular approach could be used to improve the structure of the code in part (a) on page 24. (3 marks)

Description	Marks
Explains how a modular approach could be used to improve the structure of the code	3
Describes how a modular approach could be used to improve the structure of the code	2
Provides a general statement about a modular approach	1
Total	3
Answers could include: A modular approach could be used to improve the structure of the code to make it more readable and easier to debug. The Main module could be split into at least three modules that reflect the different sections of the code. For example, a module to input the list of items, a module to calculate the total cost by reading through the list of items and a third module to calculate the discount rate. Accept other relevant answers.	

- (c) (i) Using a dictionary, create a Python function to calculate totalCost and returns itemsToHire to the main module. (4 marks)

```
def calculateTotalCost(itemsToHire)
```

Description	Marks
Uses appropriate iteration with a correct condition	1
totalCost = totalCost + costOfGear(itemsToHire[j])	1
Returns totalCost	1
Ends function	1
Total	4
Answers could include: <pre>def calculateTotalCost(itemsToHire) costOfGear = { "mask", 2.00; "wetsuit", 5.00; "BCD", 5.00; "fins", 2.00; "tank", 5.00 } totalCost = 0 for i in range(len(itemsToHire)): totalCost += costOfGear.get(itemsToHire[i], 0.00) return totalCost</pre> Accept other relevant answers.	

- (ii) Create a Python function to calculate the discount based on the appropriate member level. (4 marks)

```
def getDiscountRate(memberLevel)
```

Description	Marks
Initialises variable (discountRate = 0)	1
Uses accurate nested IF statements or CASE	1
Returns discountRate	1
Ends function	1
Total	4
Answers could include:	
<pre>def getDiscountRate(memberLevel) discountRate = 0 if memberLevel == "Gold": discountRate = 0.20 elif memberLevel == "Silver": discountRate = 0.12 elif memberLevel == "Bronze": discountRate = 0.05 return discountRate</pre>	
Accept other relevant answers.	
Note: A CASE can be used.	

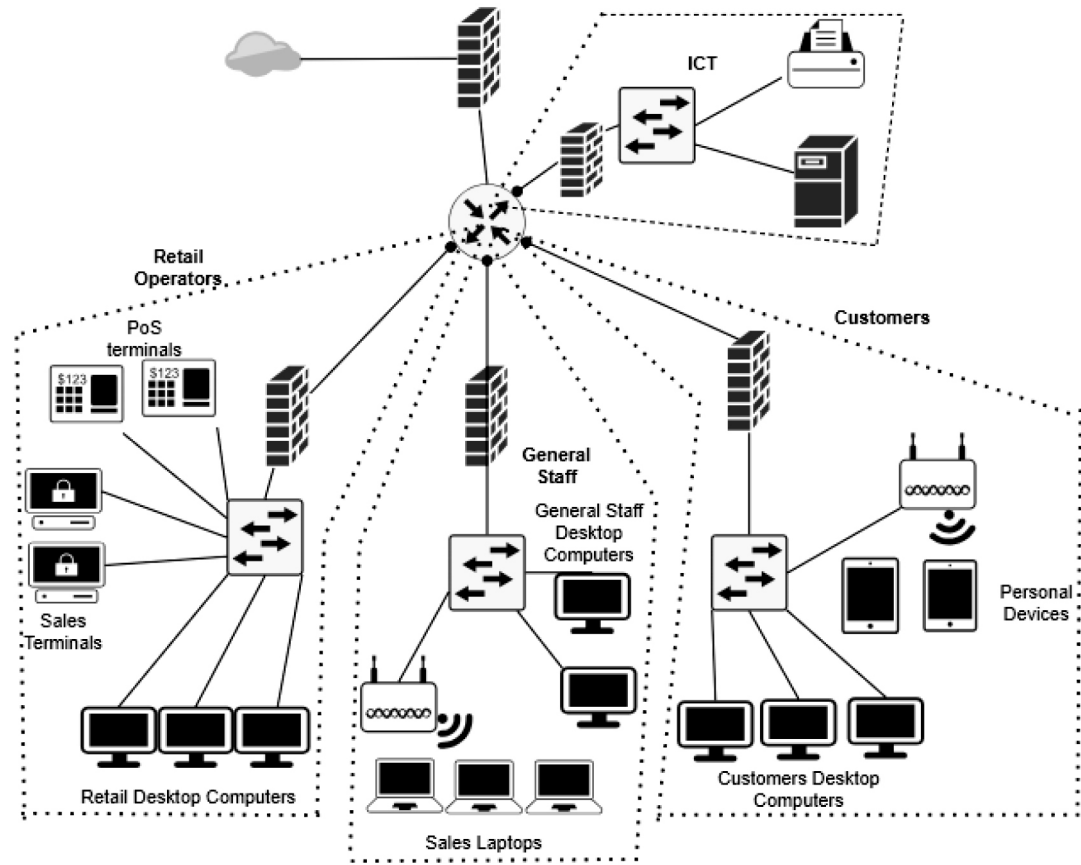
Question 24

(38 marks)

- (a) Using appropriate Cisco conventions, draw a network diagram to show the logical layout of the dive centre network. You should clearly indicate the different subnets of the network and the components within each subnet. (17 marks)

Description	Marks
Organisation's network	
Includes all necessary components for the entry point to the network connected in an appropriate order, including printer and file server	4
Includes most necessary components for this subnet connected in an appropriate order	3
Includes some of the necessary components for this subnet, with some errors in the order devices have been connected	2
Includes limited necessary components for this subnet	1
Subtotal	4
Retail operations subnet	
Includes all necessary components for the office subnet connected in an appropriate order, terminal and desktop computers. Note: terminal could also be connected via wi-fi	4
Includes most necessary components for this subnet connected in an appropriate order	3
Includes some of the necessary components for this subnet, with some errors in the order devices have been connected	2
Includes limited necessary components for this subnet	1
Subtotal	4
General staff subnet	
Includes all necessary components for the General staff subnet connected in an appropriate order, including some indication of devices that are likely to be connected to this subnet. Note: question does not specify what devices this portion of the network should contain so accept any reasonable choices	4
Includes most necessary components for this subnet connected in an appropriate order	3
Includes some of the necessary components for this subnet, with some errors in the order devices have been connected	2
Includes limited necessary components for this subnet	1
Subtotal	4
Customer subnet	
Includes all necessary components for the shared subnet connected in an appropriate order, including appropriate user devices and desktop computers	4
Includes most necessary components for this subnet connected in an appropriate order	3
Includes some of the necessary components for this subnet, with some errors in the order devices have been connected	2
Includes limited necessary components for this subnet	1
Subtotal	4
CISCO Conventions	
Uses CISCO conventions appropriately for all devices	1
Subtotal	1
Total	17

Answers could include:



Accept other relevant answers.

Question 24 (continued)

- (b) For each of the following network threats, explain the threat and its relevance to the Rottneest Dive Centre's network drawn on page 27. (9 marks)
- Social engineering (phishing)
 - Man-in-the-middle
 - Cross-site scripting

Description	Marks
For each (3 x 3 marks)	
Explains the threat in relation to the network	3
Describes the threat in relation to the network	2
Provides a general statement about the threat	1
Total	9
<p>Answers could include:</p> <p>Social engineering (phishing): is when an attacker user trickery to convince another person to give them information or access that others should not be privileged to. This can be in the form of emails, phone calls or in person. Once the attacker phishes enough information from the victim, if limited security is in place, the attacker can gain access to the system through the use of the victim's credentials.</p> <p>Man-in-the-middle: a man-in-the-middle attack involves the attacker intercepting network traffic by placing themselves between the sender and receiver. They are then able to retrieve important information such as login credentials and bank details by analysing the traffic that they intercept. In this network, an attacker could intercept and possibly alter communications between two parties who believe they are directly communicating with each other. The attacker secretly relays and possibly modifies the communication, making it appear as if nothing has changed to the two parties involved.</p> <p>Cross-site scripting: A cross-site scripting attack involves inserting a script into a website that is designed to run malicious code in a client's web browser. This code could be designed to alter the contents of a webpage that is displayed to the user or gain access to data such as cookies that are stored by the browser. For example, intercept an invoice and change the bank account details so the dive centre pays the hacker and not the business.</p> <p>Accept other relevant answers.</p>	

- (c) For each of the following security solutions, explain how the solution could be used to protect the Rottnest Dive Centre network. (9 marks)
- Anti-malware
 - Access control lists
 - Physical security

Description	Marks
For each (3 x 3 marks)	
Explains how the security solution could be used to protect the Rottnest Dive Centre network	3
Describes how the security solution could be used to protect the Rottnest Dive Centre network	2
Provides a general statement about the security solution	1
Total	9
<p>Answers could include:</p> <p>Anti-malware: anti-malware software is designed to scan systems for the presence of malware and attempts to remove the malware from the system. Rottnest Dive Centre should make sure that they install anti-malware software on all the devices in the centre and they keep the software up to date with the running of regular scans on the devices to detect malware.</p> <p>Access control lists: access control lists are a list of rules that specify which permissions users have been granted. ACLs control and manage the flow of traffic into and out of network devices such as switches and routers. Rottnest Dive Centre should incorporate an ACL in order to help mitigate DoS attacks, restrict parts of the network that are sensitive and to filter traffic in and out of the network.</p> <p>Physical security: maintaining the physical security of a network involves making sure that unauthorised people are not able to gain physical access to the company's network or devices. Rottnest Dive centre should ensure that all devices with network access or that store important information are kept in a locked room that is monitored.</p> <p>Accept other relevant answers.</p>	

- (d) Explain the role of ethical hacking in improving network security. (3 marks)

Description	Marks
Explains the role of ethical hacking in network security with reference to Rottnest Dive Centre	3
Describes the role of ethical hacking in network security	2
Provides a general statement about the role of ethical hacking in network security	1
Total	3
<p>Answers could include:</p> <p>Ethical hackers play an important role in improving network security. Ethical hackers are people who are employed by companies and attempt to break into networks with the intent of finding vulnerabilities and reporting those vulnerabilities to the company so they can be fixed. In this case, ethical hackers could be employed to test the Rottnest Dive Centre network for vulnerabilities to see if they can find any weaknesses. If they do find any vulnerabilities, Rottnest Dive Centre will then be able to fix the issues before a potential malicious actor can exploit the vulnerability and potentially steal and sell customer data or damage the dive centre systems.</p> <p>Accept other relevant answers.</p>	

Question 25

(9 marks)

- (a) Write an algorithm that will allow William to find the deepest dive in the dives array. If there are two dives of the same depth, then your algorithm should return the first dive in the array of that depth. (6 marks)

Description	Marks
Initialise variables appropriately	1
Loop through array correct number of times	1
Check depth of current dive against previous maximum depth	1
Set variable for current deepest dive	1
Update maximum depth	1
Returns diveArray[deepest]	1
Total	6
<p>Answers could include:</p> <pre> FUNCTION findDeepest(diveArray) deepest=0 maxDepth=0 FOR i=0 to diveArray.length-1 DO IF diveArray[i].depth > maxDepth THEN maxDepth = divesArray[i].depth deepest = i END IF END FOR RETURN diveArray[deepest] END findDeepest MAIN CALL findDeepest(dives) ENDMAIN </pre>	
Accept other relevant answers.	

- (b) Justify which search algorithm would be the most appropriate to use in this situation. (3 marks)

Description	Marks
Justifies an appropriate search algorithm	3
Describes an appropriate search algorithm	2
Provides a general statement about a search algorithm	1
Total	3
<p>Answers could include:</p> <p>Binary algorithm is the most appropriate algorithm to use. Binary search has a computational efficiency (Big O) of $\log_2 n$, where $n = 800$, $\log_2 800 = 9.6$. However, linear search has a computational efficiency (Big O) of n. So, where $n = 800$, potentially 800 comparisons are required. Therefore, binary search maybe up to $800/9.6 = 83.3$ times faster. Although the linear algorithm may be written with a few less lines of code (5 or 6) the few extra lines for the binary algorithm will improve processing efficiency significantly.</p>	
Accept other relevant answers.	

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