Logo, company name

Description automatically generatedSemester 1 2023

ATAR course examination

Question/Answer booklet

**Year 11 ATAR COMPUTER SCIENCE AECSC**

Surname:

Other names:

WA student number (if known)

SIDE Teacher:

SIDE Student Coordinator:

**Supervisor’s declaration**

I declare that this examination paper has been completed by the student named above. The time and resource restrictions have been observed and the student has NOT accessed notes, texts, reference books, the internet, a computer, a calculator or a mobile phone unless otherwise specified. I understand that breaches of the examination rules could lead to an examination paper being cancelled or having an examination mark significantly lowered.

## Solutions

Supervisor’s name:

Signature: Date:

**Time allowed for this paper**

Reading time before commencing work: ten minutes

Working time: two and a half hours

**Materials required/recommended for this paper**

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

This Question/Answer booklet

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

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: up to three calculators, which do not have the capacity to create or store programmes or text, are permitted in this ATAR course examination, 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 unauthorised material. 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 examination |
| Section One:  Short answer | 14 | 14 | 60 | 62 | 40 |
| Section Two:  Extended answer | 4 | 4 | 90 | 93 | 60 |
|  |  |  |  | **Total** | 100 |

## Instructions to candidates

1. Write your answers in the spaces provided in this Question/Answer booklet. A blue or black pen should be used. Wherever appropriate, fully labelled diagrams, tables and examples should be used to illustrate and support your answers.
2. You must be careful to confine your answers 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.
3. Additional working space pages at the end of this Question/Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/continued on and write the question number being planned/continued on the additional working space page.

## Section One: Short answer 40% (70 marks)

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

Supplementary pages for the use of planning/continuing your answer to a question have been 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: 60 minutes.

1. (3 marks)

Study the pseudocode below.

Line 1 BEGIN

Line 2 account\_balance = 45

Line 3 ticket\_price = 95

Line 4 IF ticket\_price ≥ account\_balance

Line 5 print (“Success, ticket purchased!”)

Line 6 ELSE

Line 7 print (“Insufficient funds, please deposit money into your account!”)

Line 8 END IF

Line 9 END

* 1. List the line number of the incorrect statement. (1 mark)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Correctly lists the line number of the incorrect statement | 1 |
| **Total** | **1** |
| Sample answer:  Line 4 (should also accept IF ticket\_price ≥ account\_balance) | |

* 1. Re-write the line from your answer a) to correct the code error. (1 mark)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Re-writes the code to be correct | 1 |
| **Total** | **1** |
| Sample answer:  Line 4 IF ticket\_price ≤ account\_balance | |

1. (3 marks)

Unicode and ASCII are the most popular character encoding standards used for the representation of text and symbols in computers.

In the ASCII and Unicode table, the lower-case letter ‘z’ can be represented as the hexadecimal value ‘7A’.

Convert this hexadecimal (base 16) number to a decimal (base 10) number and show your workings below.

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Correct answer showing conversion from hexadecimal to decimal | 3 |
| Correct answer showing superficial conversion | 2 |
| Only provide superficial working with incomplete answer | 1 |
| **Total** | **3** |
| Sample answer:  (7A)₁₆ = (7 × 16¹) + (10 × 16⁰) = (122)₁₀  Answer = 122 | |
| Accept other answers | |

1. (4 marks)

Outline the role of the following software in providing network security.

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **two** software | |
| Outlines the role of the software in providing network security | 2 |
| Makes a superficial statement about the role of the software and network security | 1 |
| **Total** | **4** |
| Sample answer:  Firewall - A Firewall is network security software that monitors and filters incoming and outgoing network traffic based on an organisation's previously established security policies. A firewall acts as a barrier or filter between your computer and another network such as the internet.  Operating system - play a pivotal role in computer and network security, the OS provides authentication to ensure that the user accessing the system and network is authorised. The OS monitors the system for vulnerabilities and analyses patters for anomalies and takes measures to stop attacks from happening. The OS also coordinates utility programs such as malware and anti-virus software. | |
| Accept other answers | |

1. (8 marks)

Write a pseudocode example for each of the following control structures and scenarios.

Sequence:

* 1. Input 3 numbers, add these together and divide by 2, then print the result. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Accurate example of the sequence control structure to address scenario | 2 |
| Limited example of the sequence control structure to address scenario | 1 |
| **Total** | **2** |
| Sample answer:  INPUT(num1)  INPUT(num2)  INPUT(num3)  answer = (num1 + num2 + num3) / 2  OUTPUT (answer) | |
| Accept other answers | |

Selection:

* 1. Input 2 numbers, print either “Num 1 is bigger than Num 2”, “Num 2 is bigger than Num 1” or “The numbers are equal”, depending on which condition is true. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Accurate example of the IF or CASE control structure to address scenario | 1-2 |
| Output statements are accurate and in the correct placement | 1 |
| **Total** | **3** |
| Sample answer:  INPUT (num1)  INPUT (num2)  IF num1 > num2 THEN  OUTPUT (“Num 1 is bigger than Num 2”)  ELSE IF num2 > num2 THEN  OUTPUT(“Num 2 is bigger than Num 1”)  ELSE  OUTPUT(“The numbers are equal”)  END IF | |
| Accept other answers | |

**Question 4** (continued)

Iteration:

* 1. Print the y values for the linear equation (y = x + 7) where x = 1 to 5. (3 marks)

|  |  |  |
| --- | --- | --- |
| **Description** | | **Mark** |
| Accurate example of the iteration control structure to address scenario | | 1 |
| Commands in a loop should be indented | | 1 |
| Output statements are accurate and in the correct placement | | 1 |
| **Total** | | **3** |
| Sample answer:  x = 1  WHILE x < 6 THEN  answer = x + 7  OUTPUT(answer)  x = x + 1  END WHILE | FOR x = 1 to 5  y = x + 7  OUTPUT(y)  END FOR | |
| Accept other answers | | |

1. (5 marks)
   1. Give an example of the following data types. The first one has been done for you.   
       (2 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **two** data types | |
| Correctly provides an example | 1 |
| **Total** | **2** |
| Sample answer:  Float: 3.14159  Boolean: True or FALSE | |
| Accept other answers | |

When the following python code is run, an error appears. The code and error are shown below.

Code: def add\_numbers(a, b):

return a + b

num1 = 5

num2 = "10"

result = add\_numbers(num1, num2)

Error: TypeError: unsupported operand type(s) for +: 'int' and 'str'

* 1. Outline the reason the error is occurring. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Correctly outlines the reason | 2 |
| Provides superficial comment about the reason | 1 |
| **Total** | **2** |
| Sample answer:  The error occurs when the two numbers, one an integer and one a string are attempted to be added together in the line (return a + b). This cannot happen between two different data types. | |
| Accept other answers | |

* 1. Rewrite the line with the error in Python code. (1 mark)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Correctly provides a corrected line | 1 |
| **Total** | **1** |
| Any of the following:   * result = add\_numbers(num1, int(num2)) * return a + int(b) OR return int(a) + int(b) * num2 = int("10") | |
| Accept other answers | |

1. (4 marks)

Describe how the following factors can affect network performance.

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Describes how each factor affects network performance | 2 |
| Makes a superficial statement about each factor | 1 |
| **Total** | **4** |
| Sample answer:  Bandwidth – The maximum amount of data transmitted over a network connection in a given amount of time. The bandwidth can affect network performance through the method of transmission and medium used. Network capacity is shared between all the users in the area using the same network.  Network design – The number and design of devices that transmit and receive data on a network, the transmission medium and speed at which data can travel, all affect network performance. If a device is installed i.e. an slower switch or router the devices connected to these will have slower network performance than if a faster devices were used. | |
| Accept other answers | |

1. (5 marks)

Rachel is researching the effects of sunburn and short-term over exposure to the sun’s rays. She would like to create a sun smart app which displays the current UV (Ultraviolet Light) levels for the user on their mobile phone in their current location. Rachel hopes to warn users of the dangers of prolonged exposure to high UV levels and aims to reduce the rates of skin cancer across the globe.

<https://api.openglobalweathermap.org>provide an API which Rachel can use for global weather data.

* 1. Expand the acronym API as used in this circumstance. (1 mark)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Correctly defines the acronym | 1 |
| **Total** | **1** |
| Sample answer:  API application programming interface | |
| Accept other answers | |

* 1. Using this scenario, explain how Rachael would use an API when developing her software. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Explains how the API would be used in this scenario | 4 |
| Describes how the API would be used in this scenario | 3 |
| Outlines how the API would be used in this scenario | 2 |
| Makes superficial comment(s) about how API’s are used | 1 |
| **Total** | **4** |
| Sample answer:  APIs allow apps to talk to one another and share data/information. In this scenario <https://api.openglobalweathermap.org> provides an API which Rachel can use for global weather data, her app would utilise her user’s current location (might be via GPS or map data) and connects to openglobalweathermap.org’s API to retrieve current weather data for that location. Rachel’s app will build useful information about UV levels for her user’s app based around this data and display current local UV level information to her users. | |
| Accept other answers | |

1. (6 marks)

Explain what occurs in the following stages of the Framework for development.

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **two** stages | |
| Discusses what occurs in the stage of the Framework for development | 3 |
| Outlines what occurs in the stage of the Framework for development | 2 |
| Makes superficial comment(s) about what occurs in the stage of the Framework for development | 1 |
| **Total** | **3** |
| Sample answer:  **Design**  Design data structure – When determining which data structure is needed to solve a problem, the programmer needs to analyse the problem to determine the basic operation, quantify the resources needed and select the appropriate data structure to meet the requirements.  Design and test algorithm – An algorithm is a method, or a process followed to solve a problem. The programmer designs and tests algorithms in this stage to solve problems.  **Evaluate**  User acceptance testing – this is one of the final stages in any software development as it determines that the software does what it was designed to do in real-world situations before the software is implemented into the live production environment. Clients/users test the software to ensure the requirements haven’t changed during development.  Developer retrospective – During the retrospective, the development team reflects on what happened in the development process and identifies actions for improvement going forward. | |
| Accept other answers | |

1. (8 marks)

Complete the table below to identify the missing layer names, descriptions, and **one** key protocol associated with the layers of the DoD TCP/IP model.

|  |  |  |  |
| --- | --- | --- | --- |
| **Layer Name** | **Description** | **Key Protocol** | **Marks** |
| Application | Defines TCP/IP application protocols  and how host programs interface with  Transport layer services. | DNS, FTP, HTTP | 2 |
| Transport | Provides a reliable data connection, divides data into packets, responsible for acknowledgement from recipient and sender. | TCP, UDP, RTP | 2 |
| Internet | Packages data into IP datagrams, which  contain source and destination address  Information that is used to forward the datagrams between hosts and across networks | IP, ARP | 2 |
| Network | Handles the physical infrastructure connecting devices on a network. | Ethernet, WiFi | 2 |
| **Total** | | | **8** |

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **four** rows | |
| Describes the layer | 2 |
| Provides superficial comment about the layer | 1 |
| **OR** |  |
| States layer name | 1 |
| Sates one key protocol | 1 |
| **Total** | **8** |
| Accept other answers | |

1. (7 marks)

Refer to the partial pseudocode below:

IF age > 13 AND age < 28

PRINT “GEN-Z”

END IF

* 1. Describe the test data you would use to check this algorithm for accuracy providing examples. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Describes the test data using an example as to how they would use to check the algorithm for accuracy | 3 |
| States the test data using an example as to how they would use to check the algorithm for accuracy | 2 |
| Limited information of the test data they would use to check the algorithm for accuracy. May provide an example. | 1 |
| **Total** | **3** |
| Sample answer:  Test data should be used on either side of the statement as well as in the middle. Need a number below 13, greater than 28 and in the range. To have further accuracy also use the numbers 13 and 28. | |
| Accept other answers | |

* 1. Describe the following activities that programmers often use to test their algorithms or coded solutions. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **two** activities | |
| Describes the activity | 2 |
| Provides superficial comment about the activity | 1 |
| **Total** | **4** |
| Sample answer:  **Trace tables**  Trace tables are used to track the values of variables and the flow of execution through a program or algorithm. They systematically record each change in variable values and boolean comparisons corresponding to each line of code executed, providing a clear visualisation of the program's behaviour during execution.  **Stepping through code**  Stepping through code in programming refers to the process of executing a program one instruction or line at a time, often with the aid of a debugger, to closely examine its behaviour and track the flow of execution. This technique allows programmers to identify errors, understand complex logic, and observe the changes in variable values and program state at each step, providing efficient debugging and code analysis. | |
| Accept other answers | |

1. (4 marks)

Rebecca was travelling in a car on her way to a holiday destination. For fun, she decided to create a program that would calculate the average speed her mother was driving based on the following formula.

Begin

average\_speed = 0

distance\_km = 240

time = 0

input(time)

average\_speed = (distance\_km / time)

print(average\_speed)

End

* 1. Identify the constant and a variable in the pseudocode. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Identifies the constant | 1 |
| Identifies the variable | 1 |
| **Total** | **2** |
| Sample answer:  Constant: distance\_km  Variables: average\_speed, time | |

* 1. Describe why it is important to use meaningful variable names. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Describes why meaningful names are important | 2 |
| States why meaningful names are important | 1 |
| **Total** | **2** |
| Sample answer:  It is much easier to read and understand what an algorithm is doing if the code uses meaningful names. Improve readability of your code if the names of the variables describe their purpose. | |
| Accept other answers | |

1. (2 marks)

Describe the key characteristics of a one-dimensional array.

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Identifies characteristics of a one-dimensional array | 2 |
| Makes a superficial statement about a one-dimensional | 1 |
| **Total** | **2** |
| Sample answer:  An array is always stored in consecutive memory locations.  It can store multiple values of the same data type, which can be referred with a single name.  The pointer points to the first location of memory block, which is allocated to the array name.  The array’s index starts at 0 and ends at the array[length-1] | |
| Accept other answers | |

1. (4 marks)

Describe the following coding errors and include an example for each.

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Describes code error using an example | 2 |
| Describes code error or gives an example | 1 |
| **Total** | **4** |
| Sample answer:  Logic error – errors due to the fact that the specification is not respected or design flaw in the program.   * Multiplying when you should be dividing. * Adding when you should be subtracting. * Opening and using data from the wrong file. * Displaying the wrong message.   Syntax error – an error in the source code that does not meet the requirements of the specific programming grammar structure.   * Misspelled variable and function names. * Missing semicolons or colon.   Improperly matches parentheses, square brackets, and curly brackets.Incorrect format in selection and loop statements. | |
| Accept other answers | |

1. (1 mark)
   1. One of the differences between IPv4 and IPv6 is the number of possible IP addresses. Describe how IPv6 is capable of making so many more addresses available. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Describes how the addresses are available due to the use of 128 bit rather than 32 bit addresses | 2 |
| Provides superficial comment about how it is achieved | 1 |
| **Total** | **2** |
| Sample answer:  IPv6 uses 128-bit addresses, offering a significantly larger address space (2^128) compared to IPv4's 32-bit addresses (2^32). This massive increase in available IP addresses accommodates the growing number of internet-connected devices and allows for improved routing, network configuration, and security. | |

* 1. State two other advantages IPv6 has over IPv4. (2 marks)

|  |  |  |
| --- | --- | --- |
| **Description** | **Mark** | |
| For each of the **two** advantages | |
| States a correct advantage | 1 | |
| **Total** | **2** | |
| Any two from the following:   * Simplified header structure * Stateless address autoconfiguration * Improved multicast support * Enhanced security * Better support for Quality of Service (QoS) * Elimination of Network Address Translation (NAT) | | |
| Accept other answers | | |

1. (4 marks)

Outline **two** advantages and **two** disadvantages for a company who might be considering the use of open-source human resource management software for maintaining their employee information.

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Outlines two advantages of using open-source software | 2 |
| Outline one advantage of using open-source software | 1 |
| **Subtotal** | **2** |
| Outlines two disadvantages of using open-source software | 2 |
| Outline one disadvantage of using open-source software | 1 |
| **Subtotal** | **2** |
| **Total** | **4** |
| Sample answer:  Advantages may include:   * Less Ability to get started quickly and with reduces start-up costs. * Ability to start small and scale up as needed further reducing costs and time. * A fundamental advantage of open source is community involvement which reduce cost to problem solve solutions.   Disadvantages may include:   * time negotiating terms, conditions, and fees. * Could be vulnerable to malicious users, some users might use the open-source nature of the software to exploit vulnerabilities. * Might not be as user friendly as the commercial version of the software. * Might not come with extensive support. | |
| Accept other answers | |

**End of Section One**

## Section Two: Extended Answer 60% (105 Marks)

This section has **four** questions. Answer **all** questions. Write your answers in the spaces provided.

Supplementary pages for the use of planning/continuing your answer to a question have been 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: 90 minutes.

1. (44 marks)

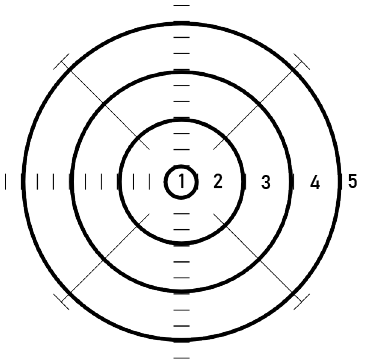
The Laser Arena laser game is played by teams of players in a misty maze, firing bright laser beams at each other from their laser guns. Each player wears a lightweight vest covered with electronic sensors that detect when it is hit by a laser beam. The microprocessor in the vest performs all the difficult calculations real-time during the game.

Individual players win points by hitting opponents with their laser beam and lose points by being hit. This way they contribute to the overall score of their team in team games. Team members also receive points for attacking the enemy base. Teams are recognised by the colour of the lights on the player’s vest and gun. The vests transmit their signals via wireless signals to wireless access points throughout the arena.

Refer to the page 1 of the Source Booklet for the partial written code.

Each player wears a vest. When an opponent hits the player’s vest a sensor detects which part of the vest has been hit. Points are awarded for accuracy. The following image and table show the zones and the value of points received for hitting the zone.

|  |  |
| --- | --- |
| **Zone** | **Points** |
| 1 | 100 |
| 2 | 75 |
| 3 | 50 |
| 4 | 25 |
| 5 | 0 |



1. Write an algorithm for the function *calcEnemyHit*. It should receive a zone value and return a point value based on the information provided above. The function must use a case statement. (9 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Function and correct function name used | 1 |
| zone used as a parameter | 1 |
| Correct CASE and END CASE | 1 |
| Zone to points correctly listed in the case statement | 0-5 |
| Return points | 1 |
| **Total** | **9** |
| Sample answer:  FUNCTION calcEnemyHit (zone)  CASE zone OF  ==1: points = 100  ==2: points = 75  ==3: points = 50  ==4: points = 25  ==5: points = 0  END CASE  RETURN points  END FUNCTION | |
| Accept other answers | |

When a player is hit by an opponent’s laser, the *calcPlayerDamage* module is called.

1. Write an algorithm for the *calcPlayerDamage* module.

The module should receive the player points so far (*playerPoints*) and the number of times the player has been hit (*playerHit*). The score should be reduced by 50 damage points for each time the player was hit.

If the player does not have sufficient points, the player score should be set to 0. The module should return *playerPoints* to the calling module.

Ensure appropriate use of variables and/or constants within this module. (7 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Correct use of module and appropriate module name | 1 |
| Correct use of playerPoints, playerHit as parameters | 1 |
| Assign 50 points to the variable damage | 1 |
| Calculate totalDamage (playerHit x 50) | 1 |
| Correct use of IF, ELSE, END IF | 1 |
| playerPoints set to 0 if insuffient points to cover damage | 1 |
| updated playerPoints calculated | 1 |
| **Total** | **7** |
| Sample answer:  Module calcPlayerDamage (playerPoints, playerHit)  damage = 50  totalDamage = 50 \* playerHit  IF totalDamage > playerPoints THEN  playerPoints = 0  ELSE  playerPoints= playerPoints - damage  END IF  End Module | |
| Accept other answers | |

Each team defends their own base and attacks the enemy base. If a team member hits the enemy base with one of their lasers, their team receives 1000 team points.

1. Write an algorithm for the module *calcBaseHit* that calculates the points your team receives for hitting the enemy base.

The module should receive the team score so far (*teamPoints*) and the number of times the base has been hit (*baseHit*). It then calculates the updated *teamPoints* based on this information and returns this to the calling module.

Ensure appropriate use of variables and/or constants in this module. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Correct use of module and appropriate module name | 1 |
| Correct use of hits and teamPoints as parameters | 1 |
| baseHitPoints set to 1000 | 1 |
| Total baseHitPoints are added to the teamScore | 1 |
| **Total** | **4** |
| Sample answer:  Module calcBaseHit (teamScore, baseHit)  baseHitPoints = 1000  teamPoints = teamPoints + baseHitPoints\*baseHit  End Module | |
| Accept other answers | |

1. The constant holding the value for the number of points received for a base hit for this module is said to have local scope. Explain what this means. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Explains local scope | 3 |
| Outlines local scope | 2 |
| Provide superficial comment about local scope | 1 |
| **Total** | **2** |
| Sample answer:  A variable is only available from inside the region it is created. This is called scope. A variable created inside a function or module belongs to the local scope of that function or module and can only be used inside that function or module. | |
| Accept other answers | |

1. After the game is over, a scorecard is printed. (12 marks)

You are required to develop the main module for the program. The main module should:

Ask the user for how many players in their team (“How many players?”)

Calculate the player score for each player in the team.

Print a score card that includes:

* The last player’s total points – eg. Your individual player points are: 200
* Number of times the last player was hit by the opposition – eg. You shot 15 enemies
* The number of times the team hit the base – eg. Your team shot the enemy base 3 times
* The team’s total points – eg. Your total team points are 2150 points

Graphical user interface, text, application

Description automatically generated

|  |  |
| --- | --- |
| **Description** | **Mark** |
| teamPoints set to 0 | 1 |
| Input number of players | 1 |
| FOR loop from 1 to numPlayers | 1 |
| Call calcPlayerPoints (playerPoints, enemyHits, playerHits) | 1 |
| teamPoints = teamPoints + playerPoints | 1 |
| Input(baseHits) | 1 |
| Call calcBaseHit(teamPoints, baseHits) (1) | 1 |
| Output(“Your individual player points are: “,playerPoints) | 1 |
| Output(“You shot “,enemyHits,” enemies”) | 1 |
| Output(“You were shot “,playerHit,” times”) | 1 |
| Output(“Your team shot the enemy base “,baseHits,” times") ( | 1 |
| Output(“Your total team points are: “, teamPoints,” points”) | 1 |
| **Total** | **12** |
| Sample answer:  Main Module  teamPoints = 0  Output(“How many players?”)  Input(numPlayers)  FOR count = 1 TO numPlayers DO  Call calcPlayerPoints (playerPoints, enemyHits, playerHits)  teamPoints = teamPoints + playerPoints  END FOR  Output(“Number of base hits”)  Input(baseHits)  Call calcBaseHit(teamPoints, baseHits)  Output(“Your individual player points are: “,playerPoints)  Output(“You shot “,enemyHits,” enemies”)  Output(“You were shot “,playerHit,” times”)  Output(“Your team shot the enemy base “,baseHits,” times")  Output(“Your total team points are: “, teamPoints,” points”)  End Module | |
| Accept other answers | |

1. Draw a structure chart for the score card program in the area below. (9 Marks)

Graphical user interface, diagram, application, Teams

Description automatically generated

|  |  |
| --- | --- |
| **Description** | **Mark** |
| All five modules included and labelled correctly | 1 |
| Parameters from Main to calcPlayerPoints | 1 |
| Parameters from calcPlayerPoints to Main | 1 |
| Parameters from Main to calcBaseHit | 1 |
| Parameter from calcBaseHit to Main | 1 |
| Parameter from calcPlayerPoints to calcEnemyHit | 1 |
| Parameter calcEnemyHit to calcPlayerPoints | 1 |
| Parameters from calcPlayerPoints to calcPlayerDamage | 1 |
| Parameters from calcPlayerDamage to calcPlayerPoints | 1 |
| **Total** | **9** |
| Accept any other correct answer | |

1. (24 marks)

The Laser Arena wants to encourage customers to return and have developed a leader board points system. The Laser Arena records player points each time they play a game. If the player has played more than 5 games, their total number of points is greater than 500 points and they get their highest score, the player gets a voucher for 50% of their next game.

gameScores = [105, 55, 200, 100, 50]

playerPoints = 205

* 1. Write an algorithm for a module in pseudocode that receives the game scores and the player points, adds a player’s points to a game scores array and returns the number of games played as gamesPlayed.  
      (5 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| correct inclusion of all parameters - gameScores, playerPoints, gamesPlayed | 1 |
| Uses the value gameScores.length +1 to append value to array | 1 |
| Correct algorithm to add player points to array | 1 |
| Count the length of the array and assign it to the gamesPlayed variable | 1 |
| Correct output (may be in a different format) | 1 |
| **Total** |  |
| Sample answer:  Module addPlayerScore(gameScores, playerPoints, gamesPlayed)  nextIndex = gameScores.length +1  gameScores[nextIndex] = playerPoints  gamesPlayed = gameScores.length  END | |
| Accept other answers | |

* 1. Write an algorithm for a function in pseudocode that adds up the total number of points the player has scored from the array, store it in the variable, totalPlayerPoints and outputs the total.  
      (6 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Correct inclusion of parameter gameScores | 1 |
| Initialise totalPlayerPoints = 0 | 1 |
| Correct use of a FOR loop to step across all values in the array | 1 |
| Add player points to the totalPlayerPoints variable | 1 |
| Correct output (may be in a different format) | 1 |
| Returns totalPlayerPoints | 1 |
| **Total** | **6** |
| Sample answer:  FUNCTION calcTotalPoints (gameScores)  totalPlayerPoints = 0  FOR i = 0 to gameScores.length -1 DO  totalPlayerPoints = totalPlayerPoints + gameScores[i]  END FOR  OUTPUT(“The total points scored: ‘totalPlayerPoints’”)  RETURN totalPlayerPoints  END FUNCTION | |
| Accept other answers | |

* 1. Write an algorithm for a module in pseudocode that finds the maximum value in the array, checks to see if it is larger than the value stored in playerPoints and, if so, outputs “This was your top score, well done!”. (7 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Correct inclusion of parameters – gameScore and playerPoints | 1 |
| Create and assign values to maxNum variable | 1 |
| Correctly use the for loop to iterate over values in the gameScore array | 1 |
| Check to see if the gameScores are larger than the max number | 1 |
| Correctly add largest game score to the max number variable | 1 |
| Check to see if the max score is equal to the playerPoints variable | 1 |
| Correct output used | 1 |
| **Total** | **7** |
| Sample answer:  MODULE checkIfLargest (gameScore, playerPoints)  maxNum=gameScores[0]  for i = 1 to gameScores.length – 1 DO  IF gameScores[i] > maxNum THEN  maxNum = gameScores[i]  END IF  END FOR  IF playerPoints == maxNum THEN  OUTPUT(“This was your top score, well done!”)  END IF  END MODULE | |
| Accept other answers | |

* 1. Identify and briefly outline three techniques considered as good programming practices that could be used when developing the Laser Arena’s system. (6 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **three** techniques | |
| Sates a technique from the list below (from syllabus) | 1 |
| Briefly outlines the technique | 1 |
| **Total** | **6** |
| Sample answer:   * Validate input before processing: Ensure that input data is valid and error-free before processing it to avoid unexpected errors or bugs. * Use of meaningful variable names: Use descriptive names for variables that accurately represent their purpose and usage in the code. * Use constants for readability and maintenance: Use constants for values that do not change during program execution to improve code readability and maintainability. * Use of comments to explain code: Use comments to explain the functionality of the code and provide additional context to make it easier to understand and modify. * Appropriate use of standard control structures: Use standard control structures like loops and conditional statements when appropriate to improve code readability and maintainability. * Use of appropriate indentation and white space: Use indentation and white space to improve code readability and make it easier to follow the logic of the code. * One logical task per module: Limit each module to a single logical task or purpose to improve code organisation and maintainability. * Meaningful names for modules: Use descriptive names for modules that accurately represent their purpose and function within the code. * Exception handling: Implement error handling and exception handling mechanisms to gracefully handle unexpected errors and prevent program crashes. | |
| Accept other answers | |

1. (21 marks)
   1. The owners of Laser Arena want to provide free Wi-Fi to their customers who are in the café during the laser games. The owners have hired you to design their network.

Current network architecture

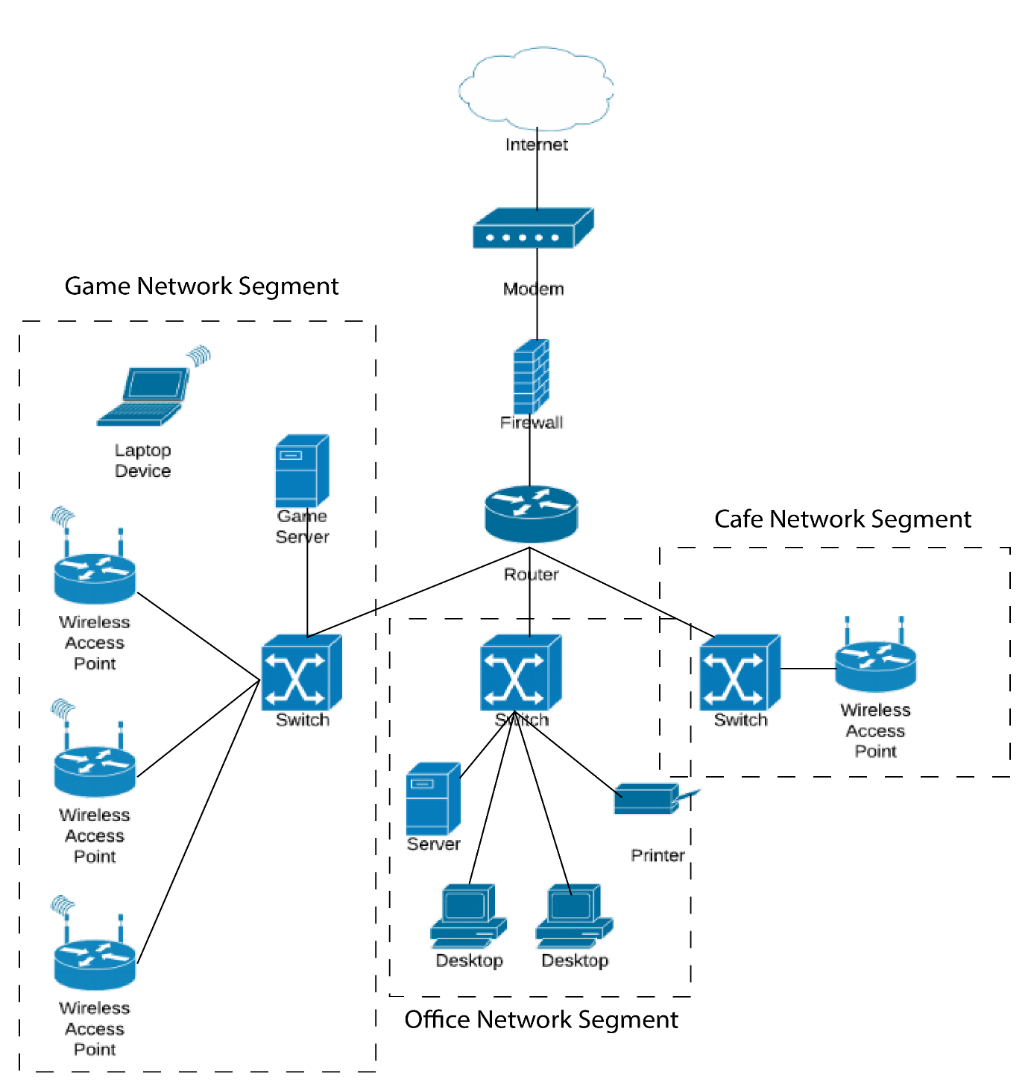
* The business connects to the internet via a modem and a router.
* A firewall protects the Laser Arena business.
* 3 WAP’s connect 30 vests to a game server and laptop in the laser game area.
* The accounts office has a switch, 2 desktop computers, printer, and a business server.

New network architecture

* Wi-Fi to the café

Show that the café area, laser game arena and accounts office are all in different network segments.

Draw a networking diagram in the area below using CISCO network icons.  
 (14 marks)



|  |  |
| --- | --- |
| **Description** | **Mark** |
| Cloud – correct icon used | 1 |
| Modem – correct icon used | 1 |
| Firewall – correct icon used | 1 |
| Router – correct icon used | 1 |
| Switch x 3 (Cafe, Office and Game Networks) – correct icons used and connected to router | 3 |
| Wireless access points – correct icon used and connected to the switches  1 mark for the WAPs in the game network segment and 1 mark for café WAP | 2 |
| Server (Office) – correct icon used connected to the switch | 1 |
| Server (Game) – correct icon used connected to the switch | 1 |
| Wired workstations in the office (two required for mark) – correct icon used | 1 |
| Printer – correct icon used and connected to switch in the office | 1 |
| Wireless notebook - correct icon used and must show wireless communication to Wireless access point in the Game Network Segment | 1 |
| **Total** | **14** |

* 1. Outline the function of the following network components required for the network.  
      (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **three** hardware components | |
| Correctly provides the key information about the network component | 1 |
| **Total** | **3** |
| Sample answer:  **Router**  Used to connect multiple networks **OR** used to forward data between networks  **Switch**  A network switch forwards data packets between devices. Switches send packets directly to devices as they learn which devices are connected to its ports.  **WAP** – (Wireless access point – no marks)  A WAP is a component that allows wireless devices to connect to a wired network. | |
| Accept other answers | |

* 1. The owners are considering upgrading their transmission media. Outline one advantage and one disadvantage for each of the following transmission media.  
      (4 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **two** transmission media | |
| Outlines an advantage for the use of the transmission media | 1 |
| Outlines a disadvantage for the use of the transmission media | 1 |
| **Total** | **4** |
| Sample answer:  **UTP**  Advantage – UTP is less expensive than most other network transmission media, less expensive to install, the cables are thin, flexible, and robust. Most common.  Disadvantage - Generally lower bandwidth and higher latency than most other forms of media transmission. Susceptible to interference. Only good for approximately 100m.  **Fibre**  Advantage - Higher level of bandwidth. Low latency. Long distances. Thin and lightweight. Less interference (no cross talk).  Disadvantage – Fragile as it is made from glass. Costly. Installation by trained professionals as it is dangerous to handle. | |
| Accept other answers | |

1. (16 marks)
   1. Laser Arena is planning for the addressing structure for the existing and new parts of their network.

The following is information about the IP address, subnet mask and default gateway for one of the hosts on the accounts office segment of the network.

A picture containing black

Description automatically generated

1. Explain the role of an IP address on a computer network. (3 mark)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Explains the role of an IP address on a computer network | 3 |
| Outlines the role of an IP address on a computer network | 2 |
| Makes a superficial statement about the role of an IP address on a computer network | 1 |
| **Total** | **3** |
| Sample answer:  An IP is an internet protocol address. An IP address serves two principal functions: it identifies the host, or more specifically its network interface, and it provides the location of the host in the network, and thus the capability of establishing a path to that host. An address indicates where it is. A route indicates how to get there. | |
| Accept other answers | |

1. State how many usable IPv4 addresses (hosts) they currently have in the network using a 255.255.255.0 subnet mask. Justify your answer. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Explains the number available addresses justifying the response | 3 |
| Outlines the number available addresses justifying the response | 2 |
| Makes a superficial statement about the number of address available | 1 |
| **Total** | **3** |
| Sample answer:  When the final octet is assigned to host address, we have 28 (256) total addresses. The first value (0) is reserved for the network address and the final number (255) is reserved for the broadcast address. This leaves 254 valid host addresses for a /24 network (1 to 254). | |
| Accept other answers | |

1. Describe the role of subnet masks. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Describes the role of subnet masks | 2 |
| Makes a superficial statement about subnet masks | 1 |
| **Total** | **2** |
| Sample answer:  A subnet mask is used to divide an IP address into two parts. One part identifies the host (computer), the other part identifies the network to which it belongs. | |
| Accept other answers | |

The game area and café will be on separate subnets to the accounts office devices. All three networks will have the same number of usable hosts.

1. Provide a valid IP address and subnet mask for one device on each of the other network segments. (2 marks)

Your answer should use the same first two octets as the accounts office network.

|  |  |
| --- | --- |
| **Description** | **Mark** |
| For each of the **two** devices on each network | |
| Provides a valid network address AND subnet mask | 1 |
| **Total** | **2** |
| Sample answer:  NOTE: Subnet mask for both MUST be 255.255.255.0  Device addresses from:  192.168.1.1 – 192.168.255.154  DO NOT accept anything starting with 192.168.0 | |

* 1. Explain the impact of having the game area, café and accounts office on different subnetworks with regard to the following:
     1. Network performance (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Explains how subnetting impacts network performance | 3 |
| Supplies some relevant facts about how subnetting impacts network performance | 2 |
| Makes a superficial statement about how subnetting impacts network performance | 1 |
| **Total** | **3** |
| Sample answer:  Separating sections of a large network into smaller networks improves performance by reducing congestion and increasing bandwidth availability, while also minimising excess broadcast traffic within each subnet. This segmentation enhances network security and simplifies troubleshooting by isolating issues to specific subnets. Overall, dividing a large network leads to better control, management, and more efficient utilisation of network resources. | |
| Accept other answers | |

* + 1. Data security (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Explains how subnetting impacts data security | 3 |
| Supplies some relevant facts about how subnetting impacts data security | 2 |
| Makes a superficial statement about how subnetting impacts data security | 1 |
| **Total** | **3** |
| Sample answer:  Separating sections of a large network into different networks can significantly enhance data security and privacy by creating isolated environments, limiting unauthorised access, and facilitating tailored security measures. Network segmentation restricts potential intruders from easily moving laterally across the entire network, containing breaches within a specific subnet. Additionally, network administrators can implement customised security policies and access controls for each subnet, ensuring sensitive information remains protected and privacy is maintained. | |
| Accept other answers | |

**End of Examination**