**Sample Assessment Tasks**

Computer Science

ATAR Year 11

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# Sample assessment task

Computer Science – ATAR Year 11

## Task 1 – Unit 1

**Assessment type:** Project

**Conditions:**

Time for the task:

* Part 1: 3 weeks for the completion of the investigation and design of the project
* Part 2: 4 weeks for the development and evaluation of the project

**Task weighting:** 20 % of the school mark for this pair of units

**Introduction**

Use the software development framework, design and create an interactive game or puzzle using Python. Some classic game examples include:

* a card game (e.g., BlackJack or Uno)
* a board game (e.g., Snakes and Ladders or Connect 4)
* a puzzle game (e.g., 2048).

To successfully develop your game, you will need to make use of:

* variables and constants using appropriate naming conventions and data types
* data structures including one-dimensional arrays
* a variety of control structures, including sequence, selection and iteration
* a modular approach using functions and parameter passing.

Your final project needs to be complex enough to demonstrate your understanding of software development. If you are unsure if your idea for a game will meet the requirements, make sure you consult your teacher.

**Task Requirements**

## Part 1

**Investigate**

* Break down the steps required to produce your software project and develop a timeline for when each of these steps needs to be completed.
* Problem outline
  + Write a brief outline of the purpose game and its objectives.
* Problem description
  + Write a detailed description of the game that includes:
    - the objective of the game
    - the rules of the game
    - how the game is played
    - how the scoring system works
    - how the winner is decided
    - any other more advanced play techniques/strategies.
* Write a detailed list of requirements for your game or puzzle based on the problem description that you have written. Suitably classify these requirements.

**Design**

* Using pseudocode, write an algorithm showing the core logic for the game to show how the game works.  
  Note: this algorithm will not resemble your final, fully functioning code. It should simply demonstrate how the core logic for the game works.
* Test your algorithms using trace tables and appropriate test data.

## Part 2

**Develop**

* Using a modular approach, create your program using Python. Ensure you use good programming practices as indicated in the syllabus.
* Develop a test plan for your program to ensure that it is fully tested and documented. Your test plan should include appropriate test data, type and range checks. You should document this test plan in a table outlining the input, the expected output and what actually happened.

**Evaluate**

* Reflect on the success of your system and how well it meets the system requirements. To perform your user acceptance testing, you should:
  + consider how well your program meets the requirements you developed in Part 1
  + consider what aspects of your program could be improved and the quality of the user experience. You might want to get your peers to test your program and give feedback.
  + document any known bugs and/or limitations with your program and explain how they impact the performance of the system  
    Note: as part of your evaluation, you should consider any changes that you have made to your design and justify these changes.
* Reflect on the process you followed to develop your system and how you could improve this process. Some aspects you should consider include:
  + what worked well?
  + what didn’t work well?
  + what would you do differently next time?
* Document the sources you used to get information about how to develop your system, including all websites and textbooks.

# Submission Requirements

**Part 1**

For Part 1, you are to produce a **single, well formatted PDF** document. This document should include:

* a cover page
* suitable headings to make each section clear
* headers and footers
* appropriate terminology, explanations and written expression
* diagrams created using appropriate software

This file should be named **YourSurname\_Project1Part1.**

**Part 2**

For Part 2, you are to produce:

* a single, well formatted PDF document that includes all changes to the design and your evaluation. This document should be named **YourSurname\_Project1Part2Documentation** and should include:
  + a cover page
  + suitable headings to make each section clear
  + headers and footers
  + appropriate terminology, explanations and written expression
  + diagrams created using appropriate software (if appropriate)
* a single folder that includes your entire project, including any images and/or sound files that are required to run your program. This folder should be **compressed to a zip file** and named **YourSurname\_Project1Program**

# Marking Criteria

## Part 1 (40% of the total assessment task)

**Marking key for sample assessment task Part 1**

| **Description** | **Marks** |
| --- | --- |
| **Development Schedule** | |
| Breaks down the project planning into a series of meaningful steps and a realistic timeline for completing each step has been included | 2 |
| Breaks down the project into a limited series of steps with some attempt at showing a timeline. | 1 |
| **Subtotal** | **/2** |
| **Problem Outline** | |
| Accurately outlines of the purpose of the game. | 1 |
| **Subtotal** | **/1** |
| **Problem Description** | |
| Provides a clear and detailed explanation of the game, its rules and objectives and how it is played, with reference to scoring and determining a winner, and advanced gaming techniques/strategies. | 5 |
| Clearly explains of the game, its rules and objectives and how it is played, with reference to scoring and/or advanced gaming techniques. | 4 |
| Describes the game, its rules and objectives and how it is played, with reference to some scoring and/or advanced gaming techniques. | 3 |
| Gives a limited description of game with some reference to game play. | 2 |
| Gives a limited description of game that is unclear and/or incomplete. | 1 |
| **Subtotal** | **/5** |
| **Requirements** | |
| Provides a clear and detailed list of requirements that fully meet the needs of the problem description. Suitably classifies requirements. | 4 |
| Completes a list of requirements that meet the needs of the problem description. Classifies requirements. | 3 |
| Provides a list of requirements that mostly meet the needs of the problem description. Partially classifies requirements. | 2 |
| Provides an incomplete list of requirements that meet some of the needs of the problem description. Makes a limited attempt at classifying requirements | 1 |
| **Subtotal** | **/4** |
| **Algorithms** | |
| Provides a completed algorithm in pseudocode that provides a reasonable representation of the core game logic, using correct symbols and/or syntax. | 5 |
| Provides a completed algorithm in pseudocode that provides a representation of the core game logic, using correct symbols and/or syntax. | 4 |
| Provides a mostly complete algorithm in pseudocode that provides a partial representation of the core game logic, with symbols and/or syntax that is mostly correct. | 3 |
| Provides an algorithm with an partial solution to playing the game, with some errors in syntax, logic and/or symbols being used | 2 |
| Provides a partially correct algorithm and/or uses incorrect symbols/syntax. | 1 |
| **Subtotal** | **/5** |
| Develops an accurate algorithm that contains no logic errors, and demonstrates the use of a range of control structures | 3 |
| Develops an accurate algorithm that may contain minor logic errors, and uses a range of control structures. | 2 |
| Develops an algorithm that contains logic errors, and uses a minimal range of control structures. | 1 |
| **Subtotal** | **/3** |
| **Trace Tables** | |
| Completes comprehensive algorithm logic testing using appropriate test data in trace table provided | 3 |
| Partially tests algorithm using trace table using appropriate test data | 2 |
| Partially tests algorithm with trace table, using incorrect format and/or incomplete test data. | 1 |
| **Subtotal** | **/3** |
| **Total Part 1** | **/23** |

## Part 2 (60% of the total assessment task)

**Marking key for sample assessment task Part 2**

| **Description** | **Marks** |
| --- | --- |
| **Use of programming structures** | |
| Makes consistent and appropriate use of a variety of control structures. Uses data types appropriately, including effective use of arrays, constants, variables, selection and iteration. | 5 |
| Makes appropriate use of a variety of control structures, including selection and iteration. Mostly uses data types appropriately with constants and variables. | 4 |
| Makes use of a variety of control structures, although may not use most appropriate structures at times. Attempts to make appropriate use of a variety of data types for variables, including some use of arrays. | 3 |
| Attempts to use a variety of control structures such as selection and/or iteration. Makes limited use of data types with variables and some attempt at using arrays appropriately. | 2 |
| Makes minimal use of selection and iteration in code, with inappropriate use of different data types. Provides arrays that are not used, or are used inappropriately, and do not serve required purpose. | 1 |
| **Subtotal** | **/5** |
| **Good programming practice** | |
| Appropriately structures code, making effective use of modularisation and parameter passing with appropriate naming conventions and use of white space. | 5 |
| Mostly structures code appropriately, making use of modularisation and parameter passing with use of appropriate naming conventions and white space. | 4 |
| Creates simplistic code using modularisation with some use of parameter passing. Mostly uses appropriate naming conventions with some use of white space. | 3 |
| Attempts to make code and use of modularisation with limited consideration of parameters. Uses some naming conventions used, although these may be inconsistent. | 2 |
| Produces poorly structured code that makes minimal or no use of modularisation. Uses naming conventions throughout the code are inconsistent and/or not meaningful. | 1 |
| **Subtotal** | **/5** |
| Uses accurate and useful comments throughout the code to explain the purpose of modules where necessary. | 3 |
| Uses comments that help make code readable. | 2 |
| Makes limited use of comments throughout code. | 1 |
| **Subtotal** | **/3** |
| **Functionality** | |
| Develops an effective and efficient program with minimal bugs. | 4 |
| Develops an effective program, but may contain some bugs. | 3 |
| Develops a program with a significant number of bugs. | 2 |
| Partially completes program implementing minimal system requirements. | 1 |
| **Subtotal** | **/4** |
| **Test Plan** | |
| Completes a detailed test plan and documents testing of the program. Considers all possible inputs and game scenarios. | 5 |
| Completes a test plan and documents testing of the program. Considers possible inputs and game scenarios. | 4 |
| Completes test plan and documents testing of the program. Considers some possible inputs and game scenarios. | 3 |
| Completes and documents a partial test plan. Considers limited inputs and game scenarios. | 2 |
| Develops a minimal test plan and/or provides minimal documentation of program testing. | 1 |
| **Subtotal** | **/5** |
| **User Acceptance Testing** | |
| Demonstrates a detailed evaluation of how the program meets the requirements identified in Part 1, including discussion of the user experience. | 5 |
| Evaluates how the program meets the system requirements , with discussion of the user experience. | 4 |
| Completes a partial evaluation of how the program meets the requirements, with a superficial discussion of the user experience. | 3 |
| Completes a limited evaluation of how the program meets the system requirements. | 2 |
| Completes a superficial evaluation of the program and how it meets the system requirements. | 1 |
| **Subtotal** | **/5** |
| Provides a detailed discussion of how the final product could be improved and documents any bugs and/or limitations. | 5 |
| Describes bugs and/or limitations with reference to how the final product could be improved. | 4 |
| Identifies bugs and/or limitations, without reference to their impact on the final product. | 3 |
| Attempts to identify bugs and/or limitations, with no or limited discussion. | 2 |
| **Subtotal** | **/4** |
| **Retrospective** | |
| Completes a detailed evaluation of the development process and suggests future impacts. | 3 |
| Completes an evaluation of the development process that was used including some suggested future impacts. | 2 |
| Completes a minimal evaluation of the development process with superficial comments on development process used and suggested future impacts. | 1 |
| **Subtotal** | **3** |
| **Total Part 2** | **/34** |
| **Total** | **/57** |

# Sample assessment task

Computer Science – ATAR Year 11

## Task 3 – Unit 1

**Assessment type:** Theory test: Network Communications and programming

**Conditions**

Time for the task: 60 minutes in class

**Task weighting:** 10% of the school mark for this pair of units

1. Describe the purpose of the DoD TCP/IP model. (2 marks)

1. List **one (1)** key protocol for each layer of the DoD TCP/IP model. (4 marks)

|  |  |
| --- | --- |
| **Application** |  |
| **Transport** |  |
| **Internet** |  |
| **Network** |  |

1. Describe **three (3)** key differences between IPv4 and IPv6. (6 marks)







1. Explain the role of IP addresses in relation to network communications. (3 marks)

1. List three factors that affect network performance. (3 marks)

1. Describe a risk of unauthorised access to a network. (2 marks)

1. Fibre optic cables are available in either single-mode or multi-mode. Outline one characteristic of each mode. (2 Marks)

1. Describe the function of a router and identify which layer of the TCP/IP model routers operate on.

(3 Marks)

1. Data collisions can affect network performance. Outline a way of reducing data collisions in a small network. (2 Marks)

1. Explain the role of a firewall and an operating system in contributing to securing a network. (6 marks)

1. GoodValue Supermarket Corporation provides a network to its physical warehouse, main office and online virtual customers.

The main office network comprises of a web server, wireless access points, laptops, desktop PC, firewall, a switch and a router. The main office and the warehouse are connected via the internet. The warehouse requires a modem to complete this connection. As yet, no devices are installed in the warehouse; this needs to be rectified to allow for wireless tablets to be used in the warehouse. The warehouse will require a secure connection with minimal data collisions. Numerous network devices are required to achieve this.

Using Cisco conventions, draw a network diagram containing both the warehouse connections and the main office for GoodValue Supermarket Corporation. Label all transmission media and devices when appropriate. (17 marks)

1. A local cricket team would like an algorithm written that adds the runs of the 11 players and provides the total number of runs. Write an algorithm using pseudocode for this requirement.

(7 marks)

Begin

End

1. Write an algorithm to calculate the average age in years of 40 students at an after-school club (5 marks)

1. Below is a Module to test which number is the largest. Based on this algorithm, complete desk checking (trace table) with the numbers **2, 3, 6, 5, 7, 1000**. (6 marks)

Module DisplayLargestNumber

Largest = 0

Input (Number)

Repeat

If Number > Largest then

Largest = Number

End If

Input (Number)

Until (Number>999)

Output (‘The largest number is,’ +Largest)

End Module

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Largest** | **Number** | **Number**  **>**  **Largest** | **Largest**  **=**  **Number** | **Number** | **Number**  **>**  **999** | **Output** |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

**Total = 68 marks**

## Task 3 Unit 1 Marking key

1. Describe the purpose of the DoD TCP/IP model.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Describes the purpose of the DoD TCP/IP model. | 2 |
| States the purpose of DoD TCP/IP. | 1 |
| **Total** | **2** |
| Answer could include, but is not limited to:   * standardised communication protocol for networking * specify how data is transferred from one device to another * allows for long distance communications. | |

1. List **one (1)** key protocol for each layer of the DoD TCP/IP model.

|  |  |  |
| --- | --- | --- |
| **Description** | | **Marks** |
| One mark per each correct protocol | | 1–4  (1 mark for each key protocol) |
| **Total** | | **4** |
| **Answer could include, but is not limited to:** | | |
| Application | SMTP, FTP, HTTP, DHCP, DNS, PING | |
| Transport | TCP & UDP | |
| Internet | IPV6, IPv4, ARP | |
| Network | Ethernet | |

1. Describe **three (3)** key differences between IPv4 and IPv6.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| For each key difference: | |
| Describes a key difference between IPv4 and IPv6 | 2 |
| Identifies a key difference between IPv4 and IPv6 | 1 |
| **Total** | **6** |
| **Answer could include, but is not limited to:**   * IPv6 provides a larger number of address possibilities IPv4 has a limited amount of addresses * IPv4 uses a 32-bit address for its Internet addresses. IPv6 uses a 128-bit Internet addresses. * IPv6 uses both letters and numbers IPv4 only uses numbers * IPv6 doesn’t have checksum fields while IPv4 does have checksum fields * IPv6 binary bits are separated by colons (:) and IPv4 uses dots(.) * IPv6 is Hexadecimal while IPv4 is dot decimal notation. | |

1. Explain the role of IP addresses in relation to network communications.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Explains the role of IP addresses in relation to network communications. | 3 |
| Gives a limited explanation of the role of IP addresses in relation to network communications. | 2 |
| Makes superficial comment/s about IP addresses. | 1 |
| **Total** | **3** |
| **Answer could include, but is not limited to:**   * IP addresses are used to identify device so that data packets can be sent and received by a device * Devices will not receive data if an IP address is incorrectly set * IP addresses can be assigned statically or dynamically * IP addresses identify the host or device on a network. | |

1. List three factors that affect network performance

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Correctly lists three factors that affect network performance. | 1–3  (1 mark for each factor) |
| **Total** | **3** |
| **Answer could include, but is not limited to:**   * bandwidth * network design * data collisions * excess broadcast traffic. | |

1. Describe a risk of unauthorised access to a network

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Describes a risk of not preventing unauthorised access to a network | 2 |
| Identifies a risk of not preventing unauthorised access to a network | 1 |
| **Total** | **2** |
| **Answer could include, but is not limited to:**   * Unauthorised access to a network can lead to the loss of data, the creation of a backdoor, installation of malicious software and can lead to destruction of the network. | |

1. Fibre optic cables are available in either single-mode or multi-mode. Outline one characteristic of each mode.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Outlines a characteristic of single-mode. | 1 |
| Outlines a characteristic of multi-mode. | 1 |
| **Total** | **2** |
| **Answer could include, but is not limited to:**   * single-mode allows for faster data transmission and bandwidth * multi-mode has higher attenuation and is less expensive | |

1. Describe the function of a router and identify which layer of the TCP/IP model routers operate on.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Describes the function of a router. | 2 |
| Identifies the function of a router. | 1 |
| **Subtotal** | **2** |
| Correctly identifies the internet layer. | 1 |
| **Subtotal** | **1** |
| **Total** | **3** |
| **Answer could include, but is not limited to:**   * The function of the router include connecting two networks whilst managing and directing network traffic. | |

1. Data collisions can affect network performance. Outline a way of reducing data collisions in a small network.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Outlines a way of reducing data collisions. | 2 |
| Identifies a way of reducing data collisions. | 1 |
| **Total** | **2** |
| **Answer could include, but is not limited to:**   * Network design can reduce data collisions. Designing the network into smaller segments and placing and using networking devices effectively will both aid in the reduction of data collisions. CSMA/CD can be used for collision detection if a collision occurs. CSMA/CA is used in wireless networks to avoid collisions. | |

1. Explain the role of a firewall and an operating system in contributing to securing a network.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| For both explanations: | |
| Explains the rolel of firewall/operating systems in securing a network | 3 |
| Describes the role of firewall/operating systems in securing a network | 2 |
| Identifies the role of firewall/operating systems in securing a network | 1 |
| **Total** | **6** |
| **Answer could include, but is not limited to:**   * Firewalls help secure networks by creating a barrier for unauthorised access via only allowing access to know or approved IP addresses and blocking unauthorised IP addresses. Firewalls reduce the likelihood of intrusion by malicious third parties. * Operating systems can be used in networks to help secure the network by including Authentication, Authorisation and Accounting of accounts and privileges of the users. Operating systems are responsible for security updates and patches to help reduce threats to a network. | |

1. Using Cisco conventions, draw a network diagram containing both the warehouse connections and the main office for GoodValue Supermarket Corporation. Label all transmission media and devices where appropriate.

| **Description** | **Marks** |
| --- | --- |
| Draws a network diagram that features following devices correctly sequenced/placed: | |
| * internet connection | 1 |
| * firewalls (1 mark per correctly placed firewall) | 2 |
| * modem | 1 |
| * routers (1 mark per correctly placed router) | 2 |
| * switches (1 mark per correctly placed switch) | 2 |
| * wireless access points (1 mark per correctly placed access point) | 2 |
| * printer | 1 |
| * laptop | 1 |
| * tablet/mobile device | 1 |
| * desktop | 1 |
| * correct placement of UTP copper cables (cat 5 or cat 6) | 1 |
| * correct placement of fibre optic cables | 1 |
| * correct use of CISCO conventions | 1 |
| **Total** | **17** |
| **Answer could include, but is not limited to:** | |
| Note: students may choose to place the firewall after the router. This is also an acceptable answer. | |

1. A local cricket team would like an algorithm written that adds the runs of the 11 players and provides the total number of runs. Write an algorithm using pseudocode for this requirement.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Total = 0 | 1 |
| Player = 0 or 1 | 1 |
| Repeat until structure | 1 |
| Input new\_score (name can vary) | 1 |
| Calculation of total | 1 |
| Count of player | 1 |
| Output total | 1 |
| **Total** | **7** |
| **Answer could include, but is not limited to:**  Begin  total = 0  player = 1  Repeat  Read (new\_score)  total = total + new\_score  player = player + 1  until player > 11  Output (total)  End | |

1. Write an algorithm to calculate the average age in years of 40 students stored in an array at an after‑school club.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Begin/End | 1 |
| Declare total variable | 1 |
| For loop (iteration) with end | 1 |
| Do total = total + age[n] | 1 |
| Print value | 1 |
| **Total** | **5** |
| **Answer could include, but is not limited to:**  Begin  Int total = 0  For n in 0 to 39  Do total = total + age[n]  Endfor  Print total/40  End | |

1. Complete desk checking (trace table) below with the numbers 2, 3, 6, 5, 7, 1000 (6 marks)

|  |  |  |
| --- | --- | --- |
| **Description** | **Marks** | |
| One mark per correct line | 1–6 | |
| **Total** | **6** | |
| **Answer could include, but is not limited to:**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Largest** | **Number** | **Number**  **>**  **Largest** | **Largest**  **=**  **Number** | **Number** | **Number**  **>**  **999** | **Output** | | 0 | 2 |  |  |  |  |  | |  |  | T | 2 | 3 | F |  | |  |  | T | 3 | 6 | F |  | |  |  | T | 6 | 5 | F |  | |  |  | F |  | 7 | F |  | |  |  | T | 7 | 1000 | T | The largest number is 7 | | | |
| **Total** | | **/68** |

# Sample assessment task

Year 11 ATAR Computer science

## Task 7 – Part A

**Assessment type:** Practical test

**Conditions**

Time for the task: Single lesson for Part A and Part B

**Task weighting:** 5% of the school mark for this pair of units

**Normalise and create an ERD from unnormalised data (49 marks)**

**Scenario**

Perth Art Gallery buys and sells original artwork to Australian and international customers. Customers register their interest via their email address to keep in contact with the gallery, so they can receive updates about new artwork and then possibly buy artwork. The artwork the gallery deals in exclusive pieces of art that have a minimum price of $10,000 and a maximum of price of $10,000,000.

The data recorded is currently stored in a single spreadsheet. A snapshot of their data is provided.

**Perth Art Gallery Customers and Sales**

| **Customer name** | **Address** | **Phone number** | **Email** | **ArtID** | **Art Title** | **Type** | **ArtistID** | **Artist** | **Nationality** | **DoB** | **Date Deceased** | **Date Art Acquired** | **Acquisition Cost** | **Date Sold To Customer** | **Asking Price** | **Sales Price** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | 11 | Blue Ranges | Painting | 8 | Albert Namatjira | Australian | 1902-07-28 | 1595-08-08 | 2022-07-07 | $22,000.00 |  | $30,000.00 |  |
| James Brown | 34 Handy Avenue, Perth, WA 6000, Australia | 0895959595 | james@brown.com | 1 | Luxembourg Gardens | Painting | 1 | Henri Matisse | French | 1869-12-31 | 1954-11-03 | 2019-05-15 | $120,000.00 | 2021-12-12 | $150,000.00 | $145,000.00 |
| Andrew Watson | 36 Dwyer Avenue, Murdoch, WA 6000, Australia | 0895959494 | andrew@watson.com | 4 | Coquelicots, La promenade - Poppies | Painting | 4 | Claude Monet | French | 1840-11-14 | 1926-12-05 | 2020-02-25 | $130,000.00 | 2021-06-02 | $160,000.00 | $155,000.00 |
| Carine King | 1 Altern Road, Gosnells, WA 6110, Australia | 0895959292 | carine.king@gmail.com | 2 | For the Love of God | Sculpture | 6 | Damien Hirst | English | 1965-06-07 |  | 2017-02-15 | $1,120,000.00 | 2021-08-12 | $1,150,000.00 | $1,145,000.00 |
| Jean Ferguson | 55 Wembley Way, Wembley, WA 6014, Australia | 0895959191 | 234543@optus.net.au | 5 | Self-Portrait in a Striped T-shirt | Painting | 1 | Henri Matisse | French | 1869-12-31 | 1954-11-03 | 2020-07-06 | $250,000.00 | 2022-02-06 | $280,000.00 | $280,000.00 |
| Lee Kwai | 88 Forsyth Street, Adelaide, SA 5000, Australia | 0411105566 | kwai.lee@telstra.net.au |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mary Saveley | 1 Winston Street, Murdoch, WA 6150, Australia | 0410564879 | saveley@gmail.com |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eric Young | 65 Verti Avenue, Sydney, NSW 2000, Australia | 0432656989 | eric.young@wa.com |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Keith Franco | 32 Albert Road, Willetton, WA 6155, Australia | 0456895649 | 4ilkj234@yahoo.com |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Wendy Victorino | The Cottage, Innaloo, WA 6018, Australia | 0895644598 | thecottage@gmail.com | 6 | Woman with Mustard Pot | Painting | 2 | Pablo Picasso | Spanish | 1881-10-25 | 1973-04-08 | 2019-09-14 | $150,000.00 | 2020-08-25 | $180,000.00 | $185,000.00 |
| Julie Bertrand | 106 Lidora Drive, Wellington WA 5012, New Zealand | 65499879 | bertrandj@gmail.com | 7 | The Persistence of Memory | Painting | 3 | Salvador Dali | Spanish | 1904-05-11 | 1989-01-23 | 2020-11-12 | $650,000.00 | 2020-12-05 | $780,000.00 | $775,000.00 |
| Michael Frick | 4565 Long Avenue, Subiaco, WA 6008 Australia | 0895959090 | mike@frick.com | 3 | Impression, Sunrise | Painting | 4 | Claude Monet | French | 1840-11-14 | 1926-12-05 | 2018-06-25 | $2,145,000.00 | 2020-10-14 | $3,145,000.00 | $3,145,000.00 |
| Mory Kentary | 43 Baden Avenue, Perth, WA 6000, Australia | 0894566548 | mory@gmail.com |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Anne Roulet | 43 Olive Road, London, E5 6JP, England | 0209654874 | anne.roulet@gmail.com | 8 | The Hay Wain | Painting | 5 | John Constable | English | 1776-06-11 | 1837-03-31 | 2015-05-23 | $4,120,000.00 | 2018-12-02 | $4,150,000.00 | $4,145,000.00 |
| James Brown | 34 Handy Avenue, Perth, WA 6000, Australia | 0895959595 | james@brown.com | 3 | Impression, Sunrise | Painting | 4 | Claude Monet | French | 1840-11-14 | 1926-12-05 | 2021-01-22 | $400,000.00 | 2021-01-22 | $550,000.00 | $555,000.00 |
|  |  |  |  | 9 | The Starry Night | Painting | 7 | Vincent van Gogh | Dutch | 1853-03-30 | 1890-07-29 | 2022-05-09 | $1,650,000.00 |  | $1,780,000.00 |  |
|  |  |  |  | 10 | Van Gogh self‑portrait | Painting | 7 | Vincent van Gogh | Dutch | 1853-03-30 | 1890-07-29 | 2021-12-12 | $1,850,000.00 |  | $2,780,000.00 |  |

1. Normalise the data to 3NF and represent all entities, attributes and keys using relational notation. (11 marks)

1. Explain the steps you took to take the unnormalised data to 1NF. (3 marks)

1. Explain the steps you took to take the 1NF data to 2NF. (3 marks)

1. Explain the steps you took to take the 2NF data to 3NF. (3 marks)

1. Create an entity relationship diagram (ERD) using crow’s foot notation showing all entities, relationships, cardinalities and keys. Note: do not include non-key attributes. (7 marks)
2. Complete a data dictionary for the table containing the sales of the artwork including at least **four (4)** unique constraints. Note: the gallery wants to allow customers in future to use their email address to login. (11 marks)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Datatype** | **Size** | **Description** | **Constraint** |
|  |  |  |  |  |

1. Create your database (11 marks)

Use SQL to create a database based on your ERD. Ensure the relationships are established and all your attributes are correct with appropriate datatypes and sizes. You do not need to include any non-key attributes.

## Task 7 Part A Marking key

1a – Normalise the data to 3NF and represent all entities, attributes and keys using relational notation. (11 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| **Relational Notation** | |
| Appropriately named entities | 1–4 |
| All entities have an appropriately named Primary Key | 1–4 |
| Correctly identifies foreign keys | 1–3 |
| **Total** | **11** |
| **Example answer:**  ARTIST (ArtistID PK, LastName, FirstName, Nationality, DateOfBirth, DateDeceased)  ARTWORK (ArtworkID PK, ArtistID FK, Title, ArtType, Description)  CUSTOMER (CustomerID PK, LastName, FirstName, Street, City, State, PostCode, Country, PhoneNumber, Email)  SALE (SaleID PK, CustomerID FK, ArtworkID FK, DateAcquired, AcquisitionCost, DateSold, AskingPrice, SalePrice)  Accept any other relevant answers | |

1b – Explain the steps you took to take the unnormalised data to 1NF. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| **1NF** | |
| Explains the process of 1NF | 2 |
| Makes a statement about 1NF | 1 |
| **Subtotal** | **2** |
| Provides an example from supplied data. | 1 |
| **Subtotal** | **1** |
| **Total** | **3** |
| **Example answer:**  First normal form rules require attributes to be single values (atomic), attributes must have unique names, values of a given attribute must be the same data type, no records can be identical (unique).  The customer name is not atomic, this has been separated into two attributes, firstname and lastname.  Accept any other relevant answers. | |

1c – Explain the steps you took to take the 1NF data to 2NF. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| **2NF** | |
| Explains the process from 1NF to 2NF | 2 |
| Makes a statement about 2NF | 1 |
| **Subtotal** | **2** |
| Provides an example from sample data. | 1 |
| **Subtotal** | **1** |
| **Total** | **3** |
| **Example answer:**  Data is in 1NF and there should be no partial dependencies of any column on the primary key.  Accept any other relevant answers | |

1d – Explain the steps you took to take the 2NF data to 3NF. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| **3NF** | |
| Explains the process from 2NF to 3NF. | 2 |
| Makes a statement about 3NF. | 1 |
| **Subtotal** | **2** |
| Provides an example from sample data. | 1 |
| **Subtotal** | 1 |
| **Total** | **3** |
| **Example answer:**  Data is in 2NF and all non-primary attributes are dependent on the primary key (no transitive dependencies).  Accept any other relevant answers. | |

2 – Create an entity relationship diagram (ERD) using crow’s feet notation showing all entities, relationships, cardinalities and keys. Note: do not include non-key attributes. (7 marks)

|  |  |
| --- | --- |
| **Description** | **Mark** |
| **ERD** | |
| Correctly identifies cardinalities (1 mark per cardinality). | 1–3 |
| Identifies all primary keys identified. | 1 |
| Identifies All foreign keys identified. | 1 |
| Identifies all correct attributes. | 1 |
| Uses correct notation for crow’s foot. | 1 |
| **Total** | **7** |
| Note: follow through marks given as per normalised relational notation in Part 1a.  Graphical user interface, application, Teams  Description automatically generated  Table with all attributes provided to answer any student questions.  Graphical user interface  Description automatically generated with medium confidence  Accept any other relevant answers | |

Question 3 – Complete a data dictionary for the table containing the sales data including at least **four (4)** unique constraints. (11 marks)

Note: the gallery wants to allow customers in future to use their email address to login.

|  |  |
| --- | --- |
| **Data dictionary** | **Mark** |
| All correct attributes identified | 1 |
| ArtworkID Foreign key is an integer datatype | 1 |
| All other datatypes appropriate | 1 |
| Size of prices 7 or 7,2 | 1 |
| Size of dates 10 | 1 |
| Descriptions meaningful | 1 |
| Constraint: SalesID set as Primary Key or Unique | 1 |
| Constraint: CustomerID not required and foreign key | 1 |
| Constraint: ArtworkID required and foreign key | 1 |
| Constraint: All date attributes include format (in description or constraint) | 1 |
| Constraint: All price attributes > 10000 and < 10000000 | 1 |
| **Total** | **11** |
| **Example answer:**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Name** | **Datatype** | **Size** | **Description** | **Constraint** | | SalesID | Integer or Text | 10 | Unique identifier of sale. | Primary key or  Unique  Auto incremented or Required | | CustomerID | Integer or Text | 10 | Unique identifier for customer | Not required Foreign key | | ArtworkID | Integer | 10 | Unique identifier for artwork. | Required Foreign key | | DateAcquired | Date | 10 | Date artwork was purchased by gallery | Required  Format: YYYY-MM-DD | | AcquisitionPrice | Float | 7,2 | Cost of artwork to the gallery | Required  > 100000 and  < 10000000 | | DateSold | Date | 10 | Date artwork sold to customer | Not required  Format: YYYY-MM-DD | | AskingPrice | Float | 7,2 | Advertised price of artwork | Required  > 100000 and  < 10000000 | | SalePrice | Float | 7,2 | Price artwork sold for | Not required  > 100000 and  < 1000000 |   Accept any other relevant answers | |

Question 4– Create your database (11 marks)

Use SQL to create a database based on your ERD. Ensure the relationships are established and all your attributes are correct with appropriate datatypes and sizes. You do not need to include any non-key attributes.

|  |  |
| --- | --- |
| **Description** | **Mark** |
| **Database** | |
| Creates tables, | 1–4 |
| Creates primary keys with datatypes. | 1–4 |
| Creates relationships using foreign keys. | 1–3 |
| **Total** | **11** |
| **Sample Answer:**  CREATE TABLE Artist (  ArtistID INTEGER PRIMARY KEY AUTOINCREMENT  );  CREATE TABLE Artwork (  ArtworkID INTEGER PRIMARY KEY AUTOINCREMENT,  ArtistID INTEGER NOT NULL,  FOREIGN KEY(ArtistID) REFERENCES Artist(ArtistID)  );  CREATE TABLE Customer (  CustomerID INTEGER PRIMARY KEY AUTOINCREMENT  );  CREATE TABLE Sale (  SaleID INTEGER PRIMARY KEY AUTOINCREMENT,  CustomerID INTEGER NULL,  ArtworkID INTEGER NOT NULL,  FOREIGN KEY(ArtworkID) references Artwork(ArtworkID),  FOREIGN KEY(CustomerID) references Customer(CustomerID)  );  Accept any other relevant answers. | |

# Sample assessment task

Year 11 ATAR Computer Science

## Task 7 – Part B

**Assessment type:** Practical test

Time for the task:Single lesson for Part A and Part B

**Task weighting:** 5% of the school mark for this pair of units

**Write SQL queries (46 marks)**

**Scenario**

Perth Art Gallery buys and sells original artwork to Australian and international customers. Customers register their interest via their email address to keep in contact with the gallery, so they can receive updates about new artwork and then possibly buy artwork. The artwork the gallery deals in exclusive pieces of art that have a minimum price of $10,000 and a maximum of price of $10,000,000.

You can open the provided SQLite database file using <https://sqliteonline.com/>

The schema (database structure) provides indications about how you should write your SQL.

Normalisation:

**Customer** (CustomerID, LastName, FirstName, Street, City, State, PostCode, Country, PhoneNumber, Email)

**Sale** (SaleID, DateAcquired, AcquisitionPrice, DateSold, AskingPrice, SalesPrice, CustomerID FK, ArtworkID FK)

**Artwork** (ArtworkID, Title, ArtType, Description, ArtistID FK)

**Artist** (ArtistID, LastName, FirstName, Nationality, DateOfBirth, DateDeceased)

You must create queries to run against the data to find answers to the questions below**.**

**Question 1 (3 marks)**

Show all the customer details for people who live in Western Australia.

**Question 2 (2 marks)**

Identify how many artists are in the database.

**Question 3 (3 marks)**

Identify how many sales have been made.

**Question 4 (2 marks)**

Based on the schema of the Artist table, describe why an American artist cannot to be inserted.

Complete SQL queries to extract or modify the following information.

**Question 5 (5 marks)**

Display the full name of the customer and title of the artwork for SaleID 1.

**Question 6 (3 marks)**

Display the name of the artist who is still alive (do not use the ArtistID primary key identifier).

**Question 7 (5 marks)**

Display the full name of the artist and the titles of Claude Monet’s artwork in alphabetical order of artwork titles.

**Question 8 (4 marks)**

Display the price and title of the most expensive sale.

**Question 9 (3 marks)**

Display the total profit from all art that has been sold.

**Question 10 (5 marks)**

Display the titles of all artwork sold in 2020.

**Question 11 (2 marks)**

Add the following customer:

Sally Jenkins,153 Westerly Avenue, Perth, WA, 6000, Australia, sally@jenkins.com, 08 9595 6491.

**Question 12 (5 marks)**

Today, Sally Jenkins buys the Blue Ranges painting for $30,000.00. Update the data accordingly.

**Question 13 (2 marks)**

Eric Young has requested his data be removed from the gallery’s database. Delete this record.

## Task 7 Part B Marking key

**Question 1 (3 marks)**

Show all the customer details for people who live in Western Australia.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Description** | | | | | | | | | **Marks** |
| SELECT \* | | | | | | | | | 1 |
| FROM Customer | | | | | | | | | 1 |
| WHEREState = ‘WA’; | | | | | | | | | 1 |
| **Total** | | | | | | | | | **3** |
| **Sample output:** | | | | | | | | | |
| **CustomerID** | **LastName** | **FirstName** | **Street** | **City** | **State** | **Postcode** | **Country** | **PhoneNumber** | **Email** |
| 1 | Brown | James | 34 Handy Avenue | Perth | WA | 6000 | Australia | 089595959 | James@brown.com |
| 2 | Watson | Andrew | 36 Dwyer Avenue | Murdoch | WA | 6150 | Australia | 0895959494 | andrew@watson.com |
| 3 | King | Carine | 1 Altern Road | Gosnells | WA | 6110 | Australia | 0895959292 | carine.king@gmail.com |
| 4 | Ferguson | Jean | 55 Wembley Way | Wembley | WA | 6014 | Australia | 0895959191 | 234543@optus.net.au |
| 6 | Saveley | Mary | 1 Winston Street | Murdoch | WA | 6150 | Australia | 0410564879 | saveley@gmail.com |
| 8 | Franco | Keith | 32 Albert Road | Willetton | WA | 6155 | Australia | 0456895649 | 4ilkj234@yahoo.com |
| 9 | Victorino | Wendy | The Cottage | Innaloo | WA | 6018 | Australia | 0895644598 | thecottage@gmail.com |
| 11 | Frick | Michael | 4565 Long Avenue | Subiaco | WA | 6008 | Australia | 0895959090 | frick@frick.com |
| 12 | Kentary | Mory | 43 Baden Avenue | Perth | WA | 6000 | Australia | 0894566548 | mory@gmail.com |

**Question 2 (2 marks)**

Identify how many artists are in the database.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| SELECT COUNT(ArtistID) | 1 |
| FROM Artist | 1 |
| **Total** | **2** |
| **Sample output:**  COUNT(ArtistID)  7 | |

**Question 3 (3 marks)**

Identify how many sales have been made.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| SELECT COUNT(SaleID) | 1 |
| FROM Sale | 1 |
| WHERE DateSold IS NOT NULL; | 1 |
| **Total** | **3** |
| **Sample output:**  COUNT(Sale.SaleID)  9 | |

**Question 4 (2 marks)**

Based on the schema of the artist table, describe why an American artist cannot to be inserted.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Describes why a constraint limits what data can be added. | 1 |
| Identifies the Artist constraint does not have American in line 10 as a nationality value option. | 1 |
| **Total** | **2** |
| **Example answer:**  A constraint ensures the data follows rules for inserting attributes. The schema contains a Nationality constraint which does not include ‘American’. | |
| Accept any other relevant answer. | |

**Question 5 (5 marks)**

Display the full name of the customer and title of the artwork for SaleID 1.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| SELECT Customer.FirstName, Customer.LastName, Artwork.Title | 1 |
| FROM Customer, Sale, Artwork | 1 |
| WHERE Customer.CustomerID = Sale.CustomerID AND Sale.ArtID = Artwork.ArtworkID AND Sale.SaleID = 1;  (1 mark for each join and 1 mark for SaleID | 3 |
| **Total** | **5** |
| **Output:**  Customer Name Title  Carine King Coquelicots, La promenade - Poppies | |

**Question 6 (3 marks)**

Display the name of the artist who is still alive (do not use the ArtistID primary key identifier).

|  |  |
| --- | --- |
| **Description** | **Marks** |
| SELECT FirstName, LastName | 1 |
| FROM Artist | 1 |
| WHERE DateDeceased IS NULL; | 1 |
| **Total** | **3** |
| **Output:**  FirstName LastName  Damien Hirst | |

**Question 7 (5 marks)**

Display the full name of the artist and the titles of Claude Monet’s artwork in alphabetical order of artwork titles.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| SELECT Artist.FirstName, Artist.LastName, Artwork.Title | 1 |
| FROM Artist, Artwork | 1 |
| WHERE Artwork.ArtistID = Artist.ArtistID And Artist.LastName = 'Monet' | 2 |
| ORDER BY Artwork.Title ASC; | 1 |
| **Total** | **5** |
| **Output:**  FirstName LastName Title  Claude Monet Coquelicots, La promenade - Poppies  Claude Monet Impression, Sunrise | |

**Question 8 (4 marks)**

Display the price and title of the most expensive sale.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| SELECT MAX(Sale.SalesPrice), Artwork.Title (1 mark for MAX() and one mark for Artwork.Title) | 2 |
| FROM Sale, Artwork | 1 |
| WHERE Sale.ArtworkID = Artwork.ArtworkID; | 1 |
| **Total** | **4** |
| **Output:**  MAX(Sale.SalesPrice) Title  4145000 Coquelicots, La promenade - Poppies | |

**Question 9 (3 marks)**

Display the total profit from all art that has been sold.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| SELECT SUM(Sale.SalesPrice - AcquisitionPrice) | 1 |
| FROM Sale | 1 |
| WHERE Sale.DateSold IS NOT NULL; | 1 |
| **Total** | **3** |
| **Output:**  Total Profit  1325000 | |

**Question 10 (5 marks)**

Display the titles of all artwork sold in 2020.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| SELECT Artwork.Title | 1 |
| FROM Artwork, Sale | 1 |
| WHERE Artwork.ArtworkID = Sale.ArtworkID AND DateSold >= 20200101 AND DateSold < 20210101;  (1 mark for join and 2 marks for greater than and less than dates) | 3 |
| **Total** | **5** |
| **Output:**  Title  Impression, Sunrise  Luxembourg Gardens | |

**Question 11 (2 marks)**

Add the following customer:

Sally Jenkins,153 Westerly Avenue, Perth, WA, 6000, Australia, sally@jenkins.com, 08 9595 6491.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Insert syntax correct and contains all necessary attributes | 1 |
| Values syntax correct and contains all correct data | 1 |
| **Total** | **2** |
| **Output:**  INSERT INTO Customer (LastName, FirstName, Street, City, State, PostCode, Country, PhoneNumber, Email)  VALUES ('Jenkins', 'Sally', '153 Westerly Avenue', 'Perth', 'WA', '6000', 'Australia', '0895956491', 'sally@jenkins.com'); | |

**Question 12 (5 marks)**

Today, Sally Jenkins buys the Blue Ranges painting for $30,000.00. Update the data accordingly.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Update statement identifies Sale table | 1 |
| Set statement sets today’s date, updates customer id to 14 and updates sold price to 30000.00 (1 mark for each correct element) | 1–3 |
| Where statement identifies the record either using SaleID or ArtworkID | 1 |
| **Total** | **5** |
| **Output:**  UPDATE Sale  SET DateSold = date('now'), CustomerId = 14, SalePrice = 30000.00  WHERE SaleId = 1; | |

**Question 13 (2 marks)**

Eric Young has requested his data be removed from the gallery’s database. Delete this record.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Delete identifies customer table and has correct syntax | 1 |
| Where statement correctly identifies CustomerId 7 | 1 |
| **Total** | **2** |
| **Output:**  DELETE FROM Customer WHERE CustomerId = 7; | |

# Acknowledgements

Cisco Systems, Inc. Network topology icons. Retrieved September, 2022, from <https://www.cisco.com/c/en/us/about/brand-center/network-topology-icons.html>

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