

**Fraser High School**

Digital Technologies Department

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| **Achievement Standard 91896 & 91897** |

**AS91896 - Use advanced programming techniques to develop a computer program**

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| **Achievement Criteria** | | |
| **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| Use advanced programming techniques to develop a computer program. | Use advanced programming techniques to develop an informed computer program | Use advanced programming techniques to develop a refined computer program. |

**AS91887 - Use advanced processes to develop a digital technologies outcome**

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| **Achievement Criteria** | | |
| **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| Use advanced processes to develop a digital technologies outcome | Use advanced processes to develop an informed digital technologies outcome. | Use advanced processes to develop a refined digital technologies outcome. |

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| Assessment Conditions | The program is to be completed in class under supervision to ensure authenticity of work. You can use the notes, previous work and the videos in eStudee as a resource. You can also use online resources *not directly related to the assessment task* e.g. basic python.  You cannot request help from other students, so there should be no talking or viewing of other student’s screens or printouts for the duration of the assessment.  You may ask for *clarification of instructions* and this will not affect your final grade. |

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| Requirements | For **AS91886**  For **Achieved**, you must use advanced programming techniques to develop a computer program:   * writing code for a program that performs a specified task * using advanced techniques in a suitable programming language * setting out the program code clearly and documenting the program with comments * testing and debugging the program to ensure that it works on a sample of expected cases.   For **Merit**, you must use advanced programming techniques to develop an informed computer program:   * documenting the program with appropriate names and comments that describe code function and behaviour * following common conventions for the chosen programming language * testing and debugging the program effectively to ensure that it works on a sample of both expected cases and relevant boundary cases.   For **Excellence**, you must use advanced programming techniques to develop a refined computer program:   * ensuring that the program is a well-structured, logical response to the specified task * making the program flexible and robust * comprehensively testing and debugging the program.   For **AS91887**  For **Achieved**, you must use advanced processes to develop a digital technologies outcome:   * using appropriate project management tools and techniques to plan the development of a digital technologies outcome * decomposing the outcome into smaller components * trialling the components of the digital technologies outcome * testing that the digital technologies outcome functions as intended * explaining relevant implications.   For **Merit**, you must use advanced processes to develop an informed digital technologies outcome:   * effectively using project management and version control tools and techniques to manage the development of a digital technologies outcome * trialling multiple components and/or techniques and selecting those which are most suitable * using information appropriately from testing and trialling to improve the functionality of the digital technologies outcome * addressing relevant implications.   For **Excellence**, you must use advanced processes to develop a refined digital technologies outcome:   * discussing how the information from planning, testing and trialling of components assisted in the development of a high-quality outcome. |

**Introduction**

This assessment activity requires you to plan, trial, test and develop a computer program using advanced programming techniques. You will use a development process to help you make informed decisions throughout the coding, testing and trialling of your program and show ongoing refinement to improve the functionality and quality of your program.

You will be assessed on how effectively you plan your development, decompose the outcome into smaller components, and test and refine your program so that it is a high-quality response to the task (e.g. well-structured, logical, flexible, robust and comprehensively tested).

When planning and developing your program, you must ensure your program:

* uses variables storing at least two types of data (e.g. numeric, text, Boolean)
* uses sequence, selection and iteration control structures
* takes input from a user, sensor(s), or other external source(s)
* produces output

AND includes two or more advanced programming techniques, such as writing code that:

* modifies data stored in collections (e.g. lists, arrays, dictionaries)
* defines and manipulates multidimensional data in collections
* creates methods, functions, or procedures that use parameters and/or return values
* responds to events generated by a graphical user interface (GUI)
* requires non-basic string manipulation
* uses functionality of additional non-core libraries.

**Task**

Create a program that works as a tool to allow users to solve a specific problem. Choose **ONE** project from the ideas below…

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| You have been provided with a resources folder which includes brief videos ‘unpacking’ each of the tasks below. Where appropriate, you have also been given access to a spreadsheet which inefficiently solves the given problem. Your job is to create a program that would completely automate a given process. |

* A price comparison tool where users can enter the amount of money they have on hand. They then enter information on a list of products and the program automatically tells them the unit price for each item. The program should also recommend the item which is the best value for money within the given budget.
* An area / perimeter tool that intermediate / secondary school students can use to check their Mathematics homework. The tool should allow students to choose a shape (eg: rectangle, circle, triangle, parallelogram) and then enter the known dimensions. It should then work out the area and perimeter (if possible). The program should store the student’s calculation history and it should show it to them at the end of the session.
* A ‘right angle triangle solver’ that allows users to enter the lengths / angles of a triangle and then outputs the remaining / unknown lengths and angles. The program should store the student’s calculation history and show it to them at the end of the session. *Caution: to create this program you would need to understand how to convert between degrees and radians in Python.* *When using sin, cos and tan, Python assumes you are working in radians. This is an opportunity to show trialling and testing. Here is helpful article on* [*degrees / radians*](https://www.geeksforgeeks.org/degrees-and-radians-in-python/)*.*
* A simple Caesar Cipher solver that could be run off-line. The solver should allow users to encrypt or decrypt a message with a given key.
* A recipe cost calculator. This program should ask users for a recipe name and serving size. It should then ask users to list each ingredient in the recipe, the amount of the ingredient needed and the cost of that ingredient. Then the program should then work out the cost per serving. *Caution: you will need to go online and look up prices and amounts for key ingredients to be able to properly test your program.*

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| If you have an alternate project that you would like to complete, please consult with your teacher. The program you write for this standard should allow you to use advanced programming techniques to develop a refined outcome (see program requirements below). |

**What you need to think about before you begin this assessment:**

You need to think about…….

* Who might use your program
* What user inputs you will need
* How you can ensure that users enter valid input
* How the data will be manipulated, stored and retrieved to solve the problem
* How you will give feedback to the user
* How you can explain and address the relevant implications.

What you need to do (follow these steps):

1. Decide on an appropriate planning methodology, and what project management and version control tools you will use to manage your program development.
2. Set up any necessary planning/project management tools.
3. Decide how you will collect input from your users and how you will structure your output.
4. Decompose your program into the different components you need to incorporate into the final program
5. Throughout your development, you must trial multiple components. You should also think about the advanced programming techniques that will best make your program flexible and robust. Select the best components and/or advanced programming techniques to include in your final program, based on the results of your testing and trialling.
6. Use your selected version control tools/techniques to save successive versions of your code and keep evidence of how you created the program in an ongoing manner.
7. Ensure your testing and trialling includes both expected cases and relevant boundary cases. You may want to get other students or your family/whānau to test your program at each stage and provide feedback to help you improve your final program. Using others to test the program will help to ensure it is comprehensively tested for many different cases (including expected and relevant boundary cases). Note the improvements that could be made based on the testing and implement your changes.
8. Throughout the development of your program code, ensure that you document your program with appropriate variable/module names and comments that describe code function and behaviour. Follow the common conventions of your programming language (e.g. naming conventions or rules for program layout).
9. Comprehensively test your final program to ensure that it functions correctly and is of high-quality (e.g. bug free, has a well-presented and easy-to-understand instructions, contains all the required information).
10. Testing can be recorded either through a series of annotated screenshots or by making a brief screencast showing the outcome being comprehensively tested.
11. Discuss how the information from planning, testing and trialling of the components of your program assisted you to develop a high-quality outcome. This can be in the form of a screen-cast, document with annotated screenshots, online presentation or oral presentation to your teacher/class.
12. Show how your program has addressed the relevant implications.

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| **91896: Use advanced programming techniques to develop a computer program (Level 2, 6 credits)** | | |
| **Criteria & Judgements** | **Comments** | **🗹** |
| **Achieved...** | | |
| Written code for a program that performs a specified task |  | ⬜ |
| Used advanced techniques in a suitable programming language |  | ⬜ |
| Set out the program code clearly and documents the program with comments |  | ⬜ |
| Tested and debugged the program to ensure that it works on a sample of expected cases |  | ⬜ |
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| Documented the program with appropriate variable/module names and comments that describe code function and behaviour |  | ⬜ |
| Followed common conventions for the chosen programming language |  | ⬜ |
| Tested and debugged the program effectively to ensure that it works on a sample of both expected and relevant boundary cases |  | ⬜ |
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| Ensured that the program is a well-structured, logical response to the task |  | ⬜ |
| Made the program flexible and robust |  | ⬜ |
| Comprehensively tested and debugged the program. |  | ⬜ |

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| **91897: Use advanced processes to develop a digital technologies outcome (Level 2, 6 credits)** | | |
| **Criteria & Judgements** | **Comments** | **🗹** |
| **Achieved...** | | |
| Used an appropriate planning methodology to plan the development of a digital technologies outcome |  | ⬜ |
| Decomposed the outcome into smaller components |  | ⬜ |
| Has trialled the components |  | ⬜ |
| Tested that the digital outcome functions as intended |  | ⬜ |
| Has explained the relevant implications |  | ⬜ |
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| Trialled multiple components and/or techniques and selected those which are most suitable |  | ⬜ |
| Used information appropriately from testing and trialling to improve the functionality of the digital technologies outcome |  | ⬜ |
| Used project management and version control tools and techniques to effectively manage the development of a digital technologies outcome |  | ⬜ |
| Has addressed the relevant implications |  | ⬜ |
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| Discusses how the information from planning, testing and trialling of components assisted in the development of a high-quality outcome. |  | ⬜ |