Achievement Standard

Subject Reference	Digital Technologies and Hangarau Matihiko 2.7
Title	Use advanced programming techniques to develop a computer program

Level   2   **Credits**   6   **Assessment**   Internal

Subfield   Technology

Domain   Digital Technologies

Status   Registered   **Status date**   29 November 2018

Planned review date   31 December 2020   **Date version published**   29 November 2018

This achievement standard involves using advanced programming techniques to develop a computer program.

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.

Explanatory Notes

1   This achievement standard is derived from the Technology learning area in *The New Zealand Curriculum*, Learning Media, Ministry of Education, 2007; and is related to the material in the *Teaching and Learning Guide for Technology*, Ministry of Education at http://seniorsecondary.tki.org.nz.

Further information can be found at http://www.technology.tki.org.nz/.

Appropriate reference information is available in *Safety and Technology Education: A Guidance Manual for New Zealand Schools,* Ministry of Education at http://technology.tki.org.nz/Technology-in-the-NZC/Safety-in-Technology-Education-revised-2017, and the Health and Safety at Work Act 2015.

This standard is also derived from *Te Marautanga o Aotearoa*. For details of *Te Marautanga o Aotearoa* outcomes to which this standard relates, see the Papa Whakaako for the relevant learning area.

2   *Use advanced programming techniques to develop a computer program* involves:
- 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.

Use advanced programming techniques to develop an informed computer program involves:
- 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.

Use advanced programming techniques to develop a refined computer program involves:
- 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.

3   The programming language chosen must support the required data types, control structures, advanced programming techniques and have good commenting facilities.

4   An *advanced computer 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, sensors, or other external source
- produces output
- uses two or more advanced programming techniques.

5   Examples of *advanced programming techniques* include:
- modifying data stored in collections (e.g. lists, arrays, dictionaries)
- storing multidimensional data in collections
- creating methods, functions, or procedures that use parameters and/or return values
- responding to events generated by a graphical user interface (GUI)
- using non-trivial string manipulation
- using additional non-core libraries.

6   Examples of ways of making a *program flexible and robust* include:
- using actions, conditions, control structures and methods, functions, or procedures effectively
- checking input data for validity
- correctly handling expected, boundary and invalid cases
- using constants, variables and derived values in place of literals.

7   Conditions of Assessment related to this achievement standard can be found at http://ncea.tki.org.nz/Resources-for-Internally-Assessed-Achievement-Standards.

Replacement
This Achievement Standard replaced AS91372 and AS91373.

Quality Assurance

1   Providers and Industry Training Organisations must have been granted consent to assess by NZQA before they can register credits from assessment against achievement standards.

2   Organisations with consent to assess and Industry Training Organisations assessing against achievement standards must engage with the moderation system that applies to those achievement standards.

Consent and Moderation Requirements (CMR) reference   0233