Achievement Standard

Subject Reference	Digital Technologies and Hangarau Matihiko 3.5				
Title	Use complex techniques to develop an electronics outcome				
Level	3	**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 complex techniques to develop an electronics outcome.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
• Use complex techniques to develop an electronics outcome.	• Use complex techniques to develop an informed electronics outcome.	• Use complex techniques to develop a refined electronics outcome.

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 complex techniques to develop an electronics outcome* involves:
- using appropriate resources and techniques to develop a functional electronics outcome
- constructing, testing, and analysing functional circuits to ensure that the electronics outcome performs to specifications
- testing, modifying, debugging the outcome
- explaining the behaviour and function of the electronics outcome
- explaining relevant communication protocols
- addressing relevant implications.

Use complex techniques to develop an informed electronics outcome involves:
- using information from testing and analysis to ensure the circuit(s) functions reliably.

Use complex techniques to develop a refined electronics outcome involves:
- undertaking iterative improvement throughout the design, development and testing process
- justifying the choice of communication protocols
- justifying the choice of components and subsystems

3 Examples of *complex techniques* include:
- implementing communication protocols e.g. i2C, serial communications
- wireless transfer of information
- feedback control
- implementing software flags and interrupts
- CAD design, 3D printing, CNC, PCB making
- filtering, noise and EMI suppression.

4 Examples of *relevant implications* include:
- social
- cultural
- legal
- ethical
- intellectual property
- sustainability
- privacy
- accessibility
- usability
- functionality
- aesthetics
- sustainability and future proofing
- end-user requirements
- health and safety.

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

Replacement Information
This Achievement Standard replaced AS91638, AS91639, and AS91640.

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