Title	Describe and construct circuits to demonstrate the operation and properties of electronic devices		
Level	3	Credits	3

Purpose	This unit standard is intended for use in a senior secondary school environment, pre-employment electronics courses, or for electronics technicians. People credited with this unit standard are able to: – describe and construct circuits to demonstrate the operation and properties of electronic devices.

Classification	Electronic Engineering > Electronics Technology

Available grade	Achieved, Merit, and Excellence

Criteria for Merit	The candidate must demonstrate the functions of three discrete and three integrated electronic devices in no more than three circuits.

Criteria for Excellence	The candidate must demonstrate the functions of three discrete and three integrated devices in one circuit.

Guidance Information

1   This unit standard can be awarded with Achieved, Merit, or Excellence. For the Achieved grade to be awarded, the outcome must be achieved as specified in the outcome statement. For Merit or Excellence to be awarded, the candidate must meet the Merit or Excellence criteria specified above.

2   Definitions
     BJT – bipolar junction transistor.
     IR – infrared.
     LCD – liquid crystal display.
     LDR – light dependent resistor.
     LED – light emitting diode.
     Microcontroller – an integrated, programmable device.
     MOSFET – metal oxide semiconductor field effect transistor.
     n-type – negative type semiconductor.
     Op-amp – operational amplifier.
     p-type – positive type semiconductor.
     RF – radio frequency.

3   For this unit standard, basic electronic devices can be made of either discrete components and/or integrated components.
    a   Examples of discrete components – reed switch, LDR, Hall-effect device, BJT, motor (pulse-width modulation control), 7-segment display, IR diode, n-channel MOSFET.
    b   Examples of integrated components – 555 astable or 555 monostable, gates, op-amp (comparator), op-amp (inverting amplifier), op-amp (non-inverting amplifier), LCD, RF transmitter, RF receiver, IR receiver/decoder, microcontroller.

4   References
    Health and Safety at Work Act 2015;
    Safety in Technology Education – A Guidance Manual for New Zealand Schools, available from https://technology.tki.org.nz/Technology-in-the-NZC/Safety-in-Technology-Education;
    and all subsequent amendments and replacements.

5   It is recommended that a diary or log be kept for each stage of the process and may include – sketches, diagrams, schematics, photos, videos.

Outcomes and performance criteria

Outcome 1

Describe and construct circuits to demonstrate the operation and properties of electronic devices.

Performance criteria

1.1   Describe the properties and operation of semiconductor materials in electronic devices based on their structure and make-up.

      Range   structure – n-type semiconductor, p-type semiconductor, electron flow, hole flow;
                  make-up – silicon diode, LED, BJT, LDR, n-channel MOSFET;
                  evidence of three semiconductor devices is required.

1.2   Construct a circuit to demonstrate the individual properties of basic electronic devices.

      Range   evidence of three discrete and three integrated devices is required;
                  up to six circuits may be constructed.

1.3   Describe the design, schematic, and construction process of each circuit from performance criterion 1.2.

      Range   description may be based on the diary or log.

Replacement information	This unit standard replaced unit standard 19743.

Planned review date	31 December 2025

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	16 April 2010	31 December 2012
Review	2	15 April 2011	31 December 2024
Rollover and Revision	3	15 March 2012	31 December 2024
Revision	4	15 January 2014	31 December 2024
Rollover and Revision	5	27 January 2015	31 December 2024
Review	6	24 June 2021	N/A

Consent and Moderation Requirements (CMR) reference	0003

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Comments on this unit standard

Please contact The Skills Organisation reviewcomments@skills.org.nz if you wish to suggest changes to the content of this unit standard.