

<b>Title</b>	<b>Demonstrate knowledge of the principles of electronic logic gates in computing</b>		
<b>Level</b>	<b>4</b>	<b>Credits</b>	<b>9</b>

<b>Purpose</b>	People credited with this unit standard are able to: perform Boolean logic algebra operations; demonstrate knowledge of logic gates, numerical representations, the general principles of logic devices, and how electronic logic and logic devices are used in integrated circuits.
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<b>Classification</b>	Computing > Generic Computing
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<b>Available grade</b>	Achieved
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### Guidance Information

- 1 Definitions  
*Central Processing Unit (CPU)* for the purposes of this unit standard is a simple integrated circuit that is capable of performing basic mathematical operations.  
*Industry conventions* refer to conventions used and recommended by an organisation involved in the computer industry.
- 2 Legislation relevant to this unit standard includes but is not limited to the:  
 Copyright Act 1994;  
 Copyright (New Technologies) Amendment Act 2008;  
 Health and Safety at Work Act 2015;  
 and their subsequent amendments.  
 Current legislation and regulations can be accessed at <http://legislation.govt.nz>.
- 3 An assessment resource to support computing unit standards (levels 1 to 4) can be found on the NZQA website at <http://www.nzqa.govt.nz/for-providers/resources/index.html>.

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### Outcomes and performance criteria

#### Outcome 1

Perform Boolean logic algebra operations.

#### Performance criteria

- 1.1 Algebraic laws are demonstrated using Boolean algebra.  
 Range commutative, associative, distributive, tautology.

- 1.2 Boolean expressions are translated to logic gate diagrams and vice versa.
- 1.3 Truth tables are translated using Boolean expression.
- 1.4 The outputs of a truth table and logic gate diagrams are described for a given series of inputs.
- 1.5 A logic gate diagram is described for a given simple truth table and simple written statement.

## Outcome 2

Demonstrate knowledge of logic gates.

### Performance criteria

- 2.1 The symbol, truth table, and equivalent Boolean expression are stated for logic gates.  
  
Range AND, OR, NOT, NAND, NOR, XOR.
- 2.2 Logic gates are combined to perform the functions of the XOR gate.

## Outcome 3

Demonstrate knowledge of numerical representation.

### Performance criteria

- 3.1 Numbers are converted between combinations of decimal, binary, and hexadecimal.  
  
Range positive integers.
- 3.2 Representation of integers using two's complement is described in terms of the calculation used and the binary value of the integer.  
  
Range a minimum of ten representations of eight bits.
- 3.3 Floating point numbers are described in terms of errors, accuracy, overflows and underflows.

## Outcome 4

Demonstrate knowledge of the general principles of logic devices.

Range devices – multivibrators, bistables, shift registers, counters.

### Performance criteria

- 4.1 Symbols for logic devices are drawn according to industry conventions.

4.2 Logic devices are described in terms of their operations.

### Outcome 5

Demonstrate knowledge of how electronic logic and logic devices are used in integrated circuits.

### Performance criteria

- 5.1 Integrated circuits (ICs) that implement gates are named for computer system in use.
- 5.2 Memory chips are explained in terms of the electronic logic used.
- 5.3 Central processing unit (CPU) is explained in terms of electronic logic.

<b>Replacement information</b>	This unit standard replaced unit standard 219
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**This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.**

### Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 September 1994	31 December 2015
Revision	2	18 November 1996	31 December 2015
Review	3	24 September 1997	31 December 2015
Revision	4	28 July 1998	31 December 2015
Review	5	30 July 2002	31 December 2015
Revision	6	16 January 2003	31 December 2015
Revision	7	16 July 2004	31 December 2015
Review	8	19 November 2010	31 December 2017
Rollover and Revision	9	16 April 2015	31 December 2019
Review	10	19 January 2017	31 December 2024
Review	11	26 May 2022	31 December 2024

<b>Consent and Moderation Requirements (CMR) reference</b>	0226
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.