

<b>Title</b>	<b>Demonstrate knowledge of mathematics and mechanics for electrical trades</b>		
<b>Level</b>	<b>2</b>	<b>Credits</b>	<b>4</b>

<b>Purpose</b>	<p>This unit standard covers basic mathematics and mechanics for electricians and related trades.</p> <p>People credited with this unit standard are able to demonstrate knowledge of:</p> <ul style="list-style-type: none"> <li>– mathematics for electrical trades</li> <li>– mechanical terms and their units</li> <li>– lever systems and mechanical drives.</li> </ul>
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<b>Classification</b>	Electrical Engineering > Core Electrical
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<b>Available grade</b>	Achieved
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### Guidance Information

- 1 This unit standard has been developed for learning and assessment off-job.
- 2 For assessment purposes
  - a Candidates shall be supplied with formulae involving more than three quantities.
  - b Use of a calculator during assessment is permitted.
  - c Candidates are expected to express calculated values in the relevant Système International (SI) units, including multiples and sub-multiples (pico, nano, micro, milli, kilo, mega, etc) and be able to convert between them.

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### Outcomes and performance criteria

#### Outcome 1

Demonstrate knowledge of mathematics for electrical trades.

#### Performance criteria

- 1.1 Arithmetical calculations are completed.
 

Range        add, subtract, multiply, divide.
- 1.2 Fractions are converted to decimals and percentages, and vice versa.
- 1.3 Multiples are expressed to the power of 10 and vice versa.
 

Range        terra, giga, mega, kilo, unit, milli, micro, pico, nano.

- 1.4 Calculator functions are used to solve problems from given data.  
Range square, square root.
- 1.5 Area and volume calculations are carried out for simple two and three dimensional shapes using given data.  
Range area – square, oblong rectangle, triangle, circle;  
volume – box, cylinder.
- 1.6 Right angle triangle trigonometric calculations are carried out using given data.  
Range  $\sin$ ,  $\cos$ ,  $\tan$ ,  $\sin^{-1}$  (arcsin),  $\cos^{-1}$  (arccos),  $\tan^{-1}$  (arctan).
- 1.7 Given formulae are transposed to solve for an unknown quantity.  
Range formulae – Ohm's law, electrical power, resistivity, energy.

## Outcome 2

Demonstrate knowledge of mechanical terms and their units.

Range speed, velocity, force, torque, energy, work, power, efficiency.

### Performance criteria

- 2.1 Mechanical terms are defined in terms of elementary physical quantities.
- 2.2 Symbols for mechanical terms are stated according to international usage.
- 2.3 Units of measurement are stated according to the Système International.

## Outcome 3

Demonstrate knowledge of lever systems and mechanical drives.

Range may include - lever systems – three orders of simple lever, compound lever  
mechanical drives – belt and pulley drive, gear drive.

### Performance criteria

- 3.1 Lever systems, and mechanical drives are identified and described according to mechanical engineering practice.
- 3.2 Mechanical quantities are calculated for lever systems and simple mechanical drives from given data.  
Range quantities – torque, work, energy, power, efficiency.

<b>Replacement information</b>	This unit standard replaced unit standard 1176 and unit standard 5912.
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<b>Planned review date</b>	31 December 2028
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#### Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	10 February 1999	31 December 2013
Revision	2	3 April 2001	31 December 2013
Review	3	26 May 2005	31 December 2025
Rollover and Revision	4	15 March 2012	31 December 2025
Revision	5	15 January 2014	31 December 2025
Rollover and Revision	6	28 January 2021	31 December 2025
Review	7	28 March 2024	N/A

<b>Consent and Moderation Requirements (CMR) reference</b>	0003
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

#### Comments on this unit standard

Please contact Waihangara Ara Rau Construction and Infrastructure Workforce Development Council [qualifications@WaihangaraAraRau.nz](mailto:qualifications@WaihangaraAraRau.nz) if you wish to suggest changes to the content of this unit standard.