Title	Apply mathematics in a plumbing, gasfitting, or drainlaying situation		
Level	2	Credits	3

Purpose	This unit standard has been developed for learning and assessment off-job. People credited with this unit standard are able to, in a plumbing, gasfitting, or drainlaying situation: use mathematics; estimate, measure and calculate using metric measurement systems; solve formulae-based problems; convert metric units; and interpret plumbing, gasfitting, or drainlaying information from graphs and tables.

Classification	Plumbing, Gasfitting and Drainlaying > Core Plumbing, Gasfitting, and Drainlaying

Available grade	Achieved

Explanatory notes

1   This unit standard is aligned with the Workbase literacy profile of a plumber/gasfitter.

2   Definition
     Plumbing, gasfitting, or drainlaying situations are situations contextualised or relevant to plumbing, gasfitting, or drainlaying. For assessment purposes, either plumbing, gasfitting, or drainlaying situations are applicable.

3   Technology may be used for all calculations and formulae will be provided by the assessor.

Outcomes and evidence requirements

Outcome 1

Use mathematics in a plumbing, gasfitting, or drainlaying situation.

Evidence requirements

1.1   Scale factors are used to determine dimensions.

      Range   determine full size from scale drawing dimensions;
                  determine suitable scale for drawing a full size component.

1.2   Ratio proportions are calculated correctly in accordance with a specification.

         Range   dilution of concentrate, percentage of additive, geometric proportion ratio.

1.3   Angles are measured accurately using a protractor. Angles are added and subtracted using the 360 degree compass.

         Range   includes – addition forwards and backwards through 360 degrees.

1.4   Fractions are calculated to find plumbing, gasfitting, or drainlaying information.

         Range   may include – determination of number of pipes of a given length required to make up a specified distance.

1.5   Fractions are converted to decimals and percentages, and vice versa.

1.6   Decimals up to six places are rounded appropriately for a range of practical situations.

         Range   practical situations include – dimensioning, recording measured information, ordering material that has contingency and needs to be cut to length, differences in magnitude between rounding mm and m.

Outcome 2

Estimate, measure, and calculate using metric measurement systems in a plumbing, gasfitting, or drainlaying situation.

Evidence requirements

2.1   Distance is estimated and measured accurately (a deviation < 0 1% is required) in units of millimetres (mm) and metres (m).

2.2   Area calculated accurately (a deviation < 0 1% is required) in units of square millimetres (mm^2) and square metres (m^2).

2.3   Volume is calculated in units of cubic metres (m^3) and litres (l).

2.4   Mass is calculated from volume in units of grams (g) and kilograms (kg).

2.5   Pressure is calculated in units of kilopascals (kPa).

2.6   Energy usage is calculated for appliances with known energy consumption.

         Range   megajoule (MJ), kilowatt (kW).

Outcome 3

Solve formulae-based problems in a plumbing, gasfitting, or drainlaying situation.

Evidence requirements

3.1   Formulae are used to solve problems in a plumbing, gasfitting, or drainlaying context. The formulae used are consistent with the problem.

        Range   pressure, flow rates, time to heat water in a storage tank.

3.2   Formulae are transposed to determine unknown quantities.

        Range   volumetric (diameter of container given capacity) and lineal (diameter when given circumference) equations.

Outcome 4

Convert metric units in a plumbing, gasfitting, or drainlaying situation.

Range   m are converted to mm and vice versa; m^2 are converted to mm^2 and vice versa; m^3 are converted to litres and vice versa; g are converted to kg and vice versa; Pascals (Pa) are converted to kPa and vice versa; Watts (W) are converted to kW and MJ and vice versa; joules (J) are converted to MJ and vice versa.

Evidence requirements

4.1   Metric units in a plumbing, gasfitting, or drainlaying situation are converted.

Outcome 5

Interpret plumbing, gasfitting, or drainlaying information from graphs and tables.

Evidence requirements

5.1   Numerical information is interpreted from graphs and is consistent with the data recorded in them.

        Range   may include – bar graph, line graph, monograph;
                        evidence of two is required.

5.2   Textual information is interpreted from tables and is consistent with the text recorded in them.

Planned review date	31 December 2017

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	23 January 2009	N/A
Revision	2	18 February 2011	N/A
Review	3	15 March 2012	N/A

Consent and Moderation Requirements (CMR) reference	0008

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

Please note

Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMR). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

Comments on this unit standard

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