Title	**Demonstrate knowledge of basic science theory relating to water**		
Level	**3**	**Credits**	**6**

Purpose	People credited with this unit standard are able to: demonstrate knowledge of basic microbiology; and describe basic chemistry and physics; relating to water.

Classification	Water Industry > Water - Generic

Available grade	Achieved

Guidance Information

1 Evidence presented for assessment against this unit standard must be consistent with safe working practices and be in accordance with applicable legislative and industry requirements.

2 Legislation relevant to this unit standard includes the Health and Safety at Work Act 2015, Water Services Act 2021, Hazardous Substances and New Organisms Act 1996, Health and Safety at Work (Hazardous Substances) Regulations 2017 and subsequent amendments.

3 Definition
Industry requirements include manufacturers' specifications; and enterprise requirements which may include documented workplace policies, procedures, specifications, business, and quality management requirements relevant to the workplace in which assessment is carried out.

4 Learning and assessment activities for this unit standard must be informed by Te Mana o te Wai (refer to Taumata Arowai) and the *National Policy Statement for Freshwater Management 2020* available from https://environment.govt.nz/.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of basic microbiology relating to water.

Range viruses, bacteria, cyanobacteria, protozoa, helminths, algae and pathogens.

Performance criteria

1.1 Microbiological organisms are identified and their basic differences are described.

1.2 Environmental factors affecting microbes are described in terms of nutrition requirements, temperature, pH, sunlight, aerobic, anaerobic, and facultative.

1.3 Natural and artificial controls on microbes are described in terms of reproduction, die-off, disinfection, and marine salinity.

1.4 Enumeration methods for indicator organisms are described in relation to water quality monitoring.

Outcome 2

Describe basic chemistry relating to water.

Performance criteria

2.1 Chemicals and compounds are described with reference to water quality.

Range acids, bases, pH, alkalinity, nitrogen, phosphorus, gases, organics, inorganics.

2.2 Mixtures of solids and water are described in terms of their physical forms.

Range suspensions, solutions, colloids.

Outcome 3

Describe basic physics relating to water.

Performance criteria

3.1 The hydrological water cycle is described in terms of the way in which it impacts on an effluent receiving environment.

Range precipitation, surface flow, groundwater, oceans, evaporation, transpiration, percolation, infiltration, permeability.

3.2 Variations in natural water quality are described in terms of flow volumes, suspended solids, organics, pH, dissolved gases, and inorganics.

3.3 The states of energy relating to water are described in terms of the different types of energy and energy losses.

Range static, potential, pressure, kinetic, velocity head, friction losses, pumps, hydraulic fall, water hammer, surges.

3.4 Water velocities and volumes are calculated for constant flows and the volumes of simple shapes.

Range rectangular and circular volumes, time to fill/empty, flow rates and their units.

Planned review date	31 December 2026

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	1 February 2001	31 December 2018
Review	2	19 September 2008	31 December 2018
Review	3	16 March 2017	31 December 2024
Review	4	24 February 2022	N/A

Consent and Moderation Requirements (CMR) reference	0101

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

Comments on this unit standard

Please contact Waihanga Ara Rau Construction and Infrastructure Workforce Development Council at qualifications@waihanga.nz if you wish to suggest changes to the content of this unit standard.