

Field Sciences**Review of *Earth Science and Science -Core* Level 3 achievement and unit standards****Unit standards**

Subfield	Domain	ID
Science	Earth Science	6364, 6365, 8153, 21614
	Science - Core	6355, 21613

Achievement standards

Domain	ID	Subject reference
Science - Core	90727	Earth and Space Science 3.1
	90728	Earth and Space Science 3.2
	90729	Earth and Space Science 3.3
	90730	Earth and Space Science 3.4
	90731	Earth and Space Science 3.5
	90732	Earth and Space Science 3.6
	90733	Earth and Space Science 3.7

The Ministry of Education and NZQA National Qualifications Services have completed a review of the achievement and unit standards listed above.

New Registration date December 2012

Date new versions published December 2012

Planned review date December 2016

Summary of review and consultation process

In 2008 the Ministry of Education (MoE) and NZQA began to review achievement and unit standards in light of the revised New Zealand Curriculum (NZC). This Alignment of Standards (AoS) review also addressed duplication of outcomes, credit parity, fairness, consistency, and coherence. The AoS review was guided by the revised NZC itself and the Standards Review Guidelines. A copy of the NZC is available at:

<http://nzcurriculum.tki.org.nz/Curriculum-documents/The-New-Zealand-Curriculum>.

Teacher subject associations were involved in the review, and draft achievement standards were the focus of wide consultation, especially with secondary schools and teachers. Extensive resources, including student exemplars, were also developed to support these standards, and are available on the MoE and/or the NZQA websites.

The review of unit standards included consultation with tertiary providers to assess continued relevance and likely future use of the standards. Unit standards that duplicate achievement standard outcomes and those without the likelihood of future tertiary use were recommended for expiry.

National consultation was undertaken in 2011, with the results analysed by Research New Zealand. The responses were generally positive.

The review of these Level 3 unit and achievement standards was completed in time for implementation in schools in 2013.

Main changes resulting from the review

- All NZC Level 8 (NZQF Level 3) outcomes derived from the NZC are now assessed using achievement standards, and there are no longer any unit standards linked to the NZC.
- Existing achievement standards were reviewed and new achievement standards were developed to align with the NZC. See [table](#) below.
- Grading criteria for achievement standards were reviewed in accordance with the Standards Review Guidelines.
- Unit standards that recognised similar outcomes as achievement standards were recommended for expiry. See [table](#) below.

For a detailed description of the review of, and the changes to, the Earth and Space Science standards see the appendix at the end of this report.

Impact on existing organisations with consent to assess

Current consent for			Consent extended to		
Nature of consent	Classification or ID	Level	Nature of consent	Classification or ID	Level
Domain	Earth Science	Any	Domain	Earth and Space Science	Same
Domain	Science - Core	Any	Domain	Earth and Space Science	Same
Standard	21614	3	Standard	91412	3

Impact on Consent and Moderation Requirements (CMR)

All new achievement standards have been registered on CMR 0233.

Impact on registered qualifications

Key to type of impact	
Affected	The qualification lists a reviewed classification (domain or subfield) in an elective set The qualification lists a standard that has changes to level or credits The qualification lists a C or D category standard
Not materially affected	The qualification lists a standard that has a new title The qualification lists a standard that has a new classification

The following table identifies a qualification developed by another SSB that is impacted by the outcome of this review. The SSB has been advised that the qualification requires revision. The standard that generated the status *Affected* is listed in **bold**.

Ref	Qualification Title	Classification or ID	SSB Name
0453	National Diploma in Surveying (Level 6) with an optional strand in Mine Surveying	21614	InfraTrain New Zealand

Impact of changes on [Exclusions List](#)

For transition purposes, the following exclusions will apply for new achievement standards.

Achievement standard	Excluded against each of these standards
91410	90727
91411	90728
91412	21614, 90731
91415	90733

Review Categories and changes to classification, title, level, and credits

The following summary shows the changes made to the standards as a result of the review. All changes are in **bold**. Where a new or a new version of an externally assessed achievement standard is registered, the following designation appears after the title **[Externally Assessed]**.

Key to review category	
A	Dates changed, but no other changes are made - the new version of the standard carries the same ID and a new version number
B	Changes made, but the overall outcome remains the same - the new version of the standard carries the same ID and a new version number
C	Major changes that necessitate the registration of a replacement achievement standard with a new ID
D	Achievement standard will expire and not be replaced

Externally assessed achievement standards categorised as category C or D expire at the end of	December 2012
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Internally assessed achievement standards and unit standards categorised as category C or D expire at the end of	December 2013
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Sciences > Science > Earth Science

ID	Ref	Title	Level	Credit	Review Category
6364		Use plate tectonics to explain distribution of major NZ and Southwest Pacific geological features	3	4	D
6365		Demonstrate knowledge of geological hazards	3	3	D
8153		Explain factors affecting a water resource and its management, and plot and interpret hydrographs	3	4	D

Sciences > Science > Science - Core

ID	Ref	Title	Level	Credit	Review Category
6355		Research and report on a current environmental issue from a scientific perspective, with guidance	3	4	D
21613		Research and report on a scientific sustainability issue, with guidance	3	4	D

ID	Ref	Title	Level	Credit	Review Category
90729	3.3	Describe genetic processes	3	4	D
90730	3.4	Describe selected organic compounds and their uses	3	4	D
90732	3.6	Describe selected properties and applications of EMR, radioactive decay, sound and ultrasound	3	4	D

Sciences > Science

ID	Ref	Domain	Title	Level	Credit	Review Category
21614		Earth Science	Describe the geological history of an area in the Southwest Pacific	3	3	C
90731	3.5	Science – Core	Describe geological processes affecting New Zealand	3	2	C
91412	3.3	Earth and Space Science	Investigate the evidence related to dating geological event(s)	3	4	
90727	3.1	Science – Core	Carry out a practical scientific investigation with guidance	3	4	C
91410	3.1	Earth and Space Science	Carry out an independent practical Earth and Space Science investigation	3	4	
90728	3.2	Science – Core	Research a current scientific controversy	3	4	C
91411	3.2	Earth and Space Science	Investigate a socio-scientific issue in an Earth and Space Science context	3	4	
90733	3.7	Science – Core	Report on a recent astronomical event or discovery	3	2	C
91415	3.6	Earth and Space Science	Investigate an aspect of astronomy	3	4	

Sciences > Science > Earth and Space Science

ID	Ref	Title	Level	Credit	Review Category
91413	3.4	Demonstrate understanding of processes in the ocean system [Externally Assessed]	3	4	New
91414	3.5	Demonstrate understanding of processes in the atmosphere system [Externally Assessed]	3	4	New

Appendix

Development of Level 3 Earth and Space Science Standards

Process of Aligning Standards with the New Zealand Curriculum

The focus of the standards has been on the content (the concepts, skills and knowledge) given in the curriculum rather than on contexts. The standard titles reflect either component Achievement Objectives or Nature of Science statements at Level 8 of the NZC.

Aspects of the Nature of Science (NoS) objectives are addressed in each of the achievement standards. The weighting given the Nature of Science (NoS) skills is dependent on the outcome being assessed.

The overarching themes for Earth and Space Science are expressed in the Science Essence Statement in the NZ Curriculum (2007) – “students will learn about the interconnecting systems and processes of the Earth, the other parts of the solar system, and the universe beyond. They come to appreciate that humans can affect this interdependence in both positive and negative ways”. It is therefore acknowledged that an Earth Systems approach has been adopted in the appropriate standards.

The standards align with Level 8 of the curriculum. Skills assessed at Level 2 are developed from Level 1 and continue on into Level 3.

Some aspects of the L3 unit standards for Earth Science have been incorporated into the new standards. All the unit standards were designated expiring.

No overlap or duplication has occurred with other science standards.

Supporting documents have been developed to assist in the interpretation of achievement standards and to assist in the development of teaching and learning programmes.

- [Conditions of Assessment](#) provide guidelines on the assessment of the internal standards.
- Assessment Specifications provide guidelines on the assessment of external standards (accessible via relevant [subject](#) on NZQA website).
- The Teaching and Learning Guide for Earth and Space Science provides guidance on how to prepare students as 21st century learners through the development of their [key competencies](#).

Addressing Credit Parity

Standards will have the number of credits relevant to the learning and assessment time for the outcome being assessed. The NZQF guideline for allocating credits has been used ie 1 credit represents 10 notional hours of learning, which includes time in class, individual study, and assessment.

External and Internal Assessment

Internal Standards

The internally assessed standards allow wide contexts, accommodation of rapid, technological changes and advances, investigative approaches, and contexts relevant to students or locality. The internal standards allow for responsiveness to rapidly changing

and expanding topics and context.

The practical and research nature of Earth and Space Science is recognised in the internally assessed achievement standards.

The main focus of 3.1 and 3.2 is on either practical or research skills.

Standard 3.3 is internally assessed to give maximum flexibility around the event/s chosen for assessment and to allow teachers to use a range of contexts.

External Standards

The two externally assessed standards (3.4 & 3.5) were chosen because of the nature of outcomes being assessed; the remaining four standards are internally assessed.

The externally assessed standards lend themselves to resource-based questions as well as to questions designed to assess the depth of conceptual understanding. The external standards still allow teachers to make choices about the topics they teach.

A suite of standards has been developed to reflect the Achievement Aims (AA) and Achievement Objectives (AO) of the Planet Earth and Beyond (PEB) Strand at Level 8.

General

The Planet Earth and Beyond (PEB) Strand has equal weighting with the other contextual strands and this is expressed in the standards offered.

The requirement for there to be no duplication between standards, remains at Levels 1, 2, and 3. The standards have been written to allow for progression of the concepts and skills.

Many of the old Level 3 Science standards duplicated standards in Biology, Chemistry, or Physics and will expire.

The new Earth and Space Science (ESS) standards at Level 3 will replace the current Science - Core standards. It is proposed that these standards form the basis for assessment of a new subject called Earth and Space Science.

ESS standards have been written so that they could also be chosen to assess aspects of courses such as Environmental Science, Sustainability Science, (General) Science, or to broaden Chemistry, Biology, Physics, or other courses.

Level 3 Science courses can be designed by using the standards from all the Level 3 matrices in the Science strands.

AS 3.4 & 3.5

In the process of developing AS 3.4, it was initially proposed that a single standard encompass processes in the atmosphere and ocean systems. However, in response to feedback, the standard was split into two. The new standards – *AS 3.4 Demonstrate understanding of processes in the ocean system* and *AS 3.5 Demonstrate understanding of processes in the atmosphere system* are externally assessed.

AS 3.3

In the course of developing AS 3.3, it was initially proposed that the standard be externally assessed. However, concerns were raised about the feasibility of setting an examination for the broad scope encompassed by the standard. The standard is therefore internally assessed. This allows valid step ups to level 8 and within the grades. It also aligns with the NZC.

Numbering on the matrix has been updated to provide clear progression from the Level 2 standards.

Other draft ESS standards had minor changes made in response to feedback from evaluation, consultation, and resource writer feedback.