

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 Physics 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
Standard	6389	3	Standard	91526	3
Standard	6390	3	Standard	91526	3
Standard	6391	3	Standard	91523	3
Standard	6392	3	Standard	91522	3
Standard	6394	3	Standard	91522	3
Standard	6395	3	Standard	91521	3
Standard	6397	3	Standard	91524	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 classifications and/or standards that generated the status *Affected* are listed in **bold**.

Ref	Qualification Title	Classification or ID	SSB Name
0672	National Certificate in Engineering and Technology (for the Design and Construction Sector) (Level 4)	6388, 6391, 6394, 6397	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
91521	6395, 90774
91522	6392, 6394
91523	6391, 90520
91524	6397, 90521
91525	6396, 90522
91526	6389, 6390, 90523

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 expire at the end of	December 2012
---	----------------------

Internally assessed achievement standards and unit standards categorised as category C or D expire at the end of	December 2013
---	----------------------

Sciences > Science > Physics

ID	Ref	Title	Level	Credit	Review Category
6388		Apply formulae, graphical, vectorial and phasor methods to find unknowns for a physical system	3	3	D
6389		Describe and determine unknowns for direct current electrical systems	3	2	C
6390		Describe and determine unknowns for alternating current electrical systems	3	4	C
90523	3.6	Demonstrate understanding of electrical systems	3	6	C
91526	3.6	Demonstrate understanding of electrical systems [Externally Assessed]	3	6	

ID	Ref	Title	Level	Credit	Review Category
6391		Demonstrate knowledge of, and determine unknowns for, wave systems	3	4	C
90520	3.3	Demonstrate understanding of wave systems	3	4	C
91523	3.3	Demonstrate understanding of wave systems [Externally Assessed]	3	4	
6392		Analyse the development of a selected area of physics and a physics-based application	3	2	C
6394		Carry out a practical investigation of a physics-based application with guidance	3	3	C
91522	3.2	Demonstrate understanding of the application of physics to a selected context	3	3	
6395		Use graphical analysis to determine non-linear physical relationships	3	4	C
90774	3.1	Carry out a practical physics investigation with guidance, that leads to a mathematical relationship	3	5	C
91521	3.1	Carry out a practical investigation to test a physics theory relating two variables in a non-linear relationship	3	4	
6396		Describe and discuss models of atomic systems	3	3	C
90522	3.5	Demonstrate understanding of atoms, photons and nuclei	3	3	C
91525	3.5	Demonstrate understanding of Modern Physics	3	3	
6397		Demonstrate knowledge of circular, rotational, and simple harmonic motion	3	6	C
90521	3.4	Demonstrate understanding of mechanical systems	3	6	C
91524	3.4	Demonstrate understanding of mechanical systems [Externally Assessed]	3	6	
91527	3.7	Use physics knowledge to develop an informed response to a socio-scientific issue	3	3	New

Appendix

Development of Level 3 Physics Standards

Process of Aligning Standards with the New Zealand Curriculum

The Level 3 Physics achievement standards have been developed to align the outcomes with the Physical World strand and, where appropriate, the Nature of Science (NoS) strand of the Science learning area at Level 8 of the NZC.

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).

Addressing Duplication

The achievement standards and unit standards were compared in detail to identify duplication issues. Where duplication of outcomes was identified the unit standard was recommended for expiry.

Addressing Credit Parity

The credits allocated to each of the draft standards reflect the time required for the teaching and learning involved.

External and Internal Assessment

The method of assessment for each standard best reflects the teaching and learning involved in the content of the standard.

What Has Changed?

The matrix shows the reviewed titles and assessment modes. There are now three externally assessed standards and four internally assessed standards.

The Ministry was asked to develop a standard that assessed the learning gained in an extended open-ended investigation, deriving from the NoS Investigating in science achievement objective (AO). This would involve a broader investigation than is involved in Standard 3.1, which assesses the learning related to Physical inquiry and physics concepts AO, *Analyse and evaluate data to deduce complex trends and relationships in physical phenomena*. The Ministry will give further consideration to this matter in 2012.

Specific Changes

NB The replacement relationships below relate only to achievement standards – for a full outline of the replacement relationships, see the table above.

3.1 *Carry out a practical investigation to test a physics theory relating two variables in a non-linear relationship*

This standard has been developed from AS90774. The new title emphasises the manner in which this standard requires students to investigate scientific theories and models, in keeping with the NZC. The requirement to produce an empirical equation has been

removed and replaced by a requirement for students to test and critically evaluate a theoretical model. There is less focus on the handling of uncertainties with more scope for students to demonstrate holistic understanding of the physics ideas in their investigation.

The requirement for a linear graph has been removed to allow students to use other graphical analysis techniques in widely available computer applications and calculators.

3.2 *Demonstrate understanding of the application of physics to a selected context*

This new achievement standard has been introduced to allow students and teachers scope for studying a context of their own choice.

3.3 *Demonstrate understanding of wave systems*

This standard has been developed from AS90520. The Doppler effect is now restricted to mechanical waves because of the complexity required to accurately apply it to electromagnetic waves.

3.4 *Demonstrate understanding of mechanical systems*

The content of this standard remains largely unchanged from that in AS90521. The wording has been rationalised to reflect the emphasis on mechanical systems.

3.5 *Demonstrate understanding of Modern Physics*

This standard has been developed from AS90522. The new title provides a more holistic description of the physics content in this standard.

Other changes to the content have been made to emphasise key concepts in this standard where previously students may have become focussed on the application of a limited range of equations without developing understanding.

This standard is now internally assessed and is designed to allow choice of topics. Some guidance has been provided.

3.6 *Demonstrate understanding of electrical systems*

This standard has been developed from AS90523. Mutual inductance and its defining equation have been removed because the equation was only applicable in an unrealistic, contrived situation. The concepts around mutual inductance and its use in a transformer remain, these being appropriate at NZC Level 8.

3.7 *Use physics knowledge to develop an informed response to a socio-scientific issue*

A gap in the Physics matrix at Level 3 was identified and this was confirmed by feedback from consultation. Previously there was no standard that assessed the application of physics knowledge to a socio-scientific issue. There was significant feedback from consultation that the NoS strand was not clearly visible in the proposed draft standards. This has been addressed through the development of this new standard.