Achievement Standard

Subject Reference	Physics 1.4				
Title	Demonstrate understanding of mechanics in one dimension				
Level	1	**Credits**	5	**Assessment**	External
Subfield	Science				
Domain	Physics				
Status	Registered	**Status date**	5 November 2007		
Planned review date	28 February 2009	**Date version published**	5 November 2007		

This achievement standard involves demonstrating knowledge and understanding of mechanics in one dimension and the use of appropriate methods to solve related problems.

Note: A student cannot use credit for both this achievement standard and AS90191, Science 1.6, towards a national qualification including a National Certificate of Educational Achievement.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
• Identify or describe aspects of phenomena, concepts or principles.	• Give descriptions or explanations in terms of phenomena, concepts, principles and/or relationships.	• Give explanations that show clear understanding in terms of phenomena, concepts, principles and/or relationships.
• Solve straightforward problems.	• Solve problems.	• Solve complex problems.

Explanatory Notes

1 This achievement standard is derived from *Physics in the New Zealand Curriculum,* Learning Media, Ministry of Education, 1994, Level 6 achievement objectives, p. 16.

2 Assessment will be limited to a selection from the following:

Phenomena, Concepts and Principles:

Motion and Force
Addition and subtraction of vectors in one dimension.

Distance, speed (instantaneous, average and constant), displacement, velocity (average and constant), positive and negative acceleration (constant), motion/time graphs and the interpretation of their gradients and areas.

Mass, weight and the acceleration due to gravity, balanced and unbalanced forces, free body force diagrams, pressure.

Work, Energy and Power
Work and power, gravitational potential energy, kinetic energy, and the conservation of mechanical energy in free fall situations.

Relationships:

$v = \frac{\Delta d}{\Delta t}$ $a = \frac{\Delta v}{\Delta t}$ $F_{net} = ma$ $P = \frac{F}{A}$

$\Delta E_P = mg\Delta h$ $E_K = \frac{1}{2} mv^2$ $W = Fd$ $P = \frac{W}{t}$

3 Real life contexts will be used whenever possible. Requisite information about the context used will be supplied.

4 The following descriptions provide guidance on the typical performance for achievement, achievement with merit and achievement with excellence. Both the complexity of the situation and the problem-solving process will determine the grade.

a Statements, descriptions and explanations can be written, diagrammatic or graphical.
- Achievement will typically involve single aspects related to phenomena, concepts or principles.
- Achievement with merit will typically involve reasons.
- Achievement with excellence will typically have minimal irrelevancies.

b A physics problem involves a process(es) to find a physical quantity. A process involves recognising the relevant concept or principle, selecting the method (eg formula, graph, diagram, logical deduction), and selecting the relevant information.
- A *straightforward problem* is one involving a single process. The relevant concept or principle will be transparent, the method will be straightforward (a formula will need no more than a simple rearrangement), and the information will be directly usable.

- For achievement with merit, a *problem* is typically one in which the relevant concept or principle may not be immediately obvious, the method may involve the use of a complex formula or rearrangement, or the information may not be directly usable or immediately obvious.
- A *complex problem* will typically involve more than one process. The recognition of two different concepts must be involved.

5 Formulae listed in this achievement standard will be supplied.

6 Minor computational or transcription errors will not be penalised if the process used to determine the solution is clearly indicated and valid.

7 Students must be aware of the appropriate use of units. Both negative index (eg $m\ s^{-2}$) and slash notation (eg m/s^2) will be acceptable when writing units. Negative index notation will be used when supplying data.

Quality Assurance

1 Providers and Industry Training Organisations must be accredited by NZQA before they can register credits from assessment against achievement standards.

2 Accredited providers and Industry Training Organisations assessing against achievement standards must engage with the moderation system that applies to those achievement standards.

Accreditation and Moderation Action Plan (AMAP) reference 0226