

## Achievement Standard

<b>Subject Reference</b>	Construction and Mechanical Technologies 2.25		
<b>Title</b>	Demonstrate understanding of advanced concepts related to machines		
<b>Level</b>	2	<b>Credits</b>	3
		<b>Assessment</b>	Internal
<b>Subfield</b>	Technology		
<b>Domain</b>	Construction and Mechanical Technologies		
<b>Status</b>	Registered	<b>Status date</b>	17 November 2011
<b>Planned review date</b>	31 December 2019	<b>Date version published</b>	17 November 2016

This achievement standard involves demonstrating understanding of advanced concepts related to machines.

### Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> <li>Demonstrate understanding of advanced concepts related to machines.</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrate in-depth understanding of advanced concepts related to machines.</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrate comprehensive understanding of advanced concepts related to machines.</li> </ul>

### Explanatory Notes

- This achievement standard is derived from Level 7 of the Technology learning area in *The New Zealand Curriculum*, Learning Media, Ministry of Education, 2007; and is related to the material in the *Teaching and Learning Guide for Technology*, Ministry of Education at <http://seniorsecondary.tki.org.nz>.

Further information can be found at <http://www.technology.tki.org.nz/>.

Appropriate reference information is available in *Safety and Technology Education: A Guidance Manual for New Zealand Schools*, Ministry of Education at <http://technology.tki.org.nz/Curriculum-support/Safety-and-Technology-Education>, and the Health and Safety at Work Act 2015.

This standard is also derived from *Te Marautanga o Aotearoa*. For details of *Te Marautanga o Aotearoa* achievement objectives to which this standard relates, see the [Papa Whakaako](#) for the relevant learning area.

- 2 *Demonstrate understanding of advanced concepts related to machines* involves:
- explaining how mechanical components are combined to form machines
  - describing the efficiencies of machines in relation to their safe application
  - explaining how mechanical components are combined to transfer work and motion in machines.

*Demonstrate in-depth understanding of advanced concepts related to machines* involves:

- explaining how mechanical components combine to provide the desired mechanical advantage, and relative motion between input and output in a machine.

*Demonstrate comprehensive understanding of advanced concepts related to machines* involves:

- discussing why mechanical components were combined to provide the mechanical advantage, relative motion between input and output, and efficiency desired in a machine.

- 3 For this achievement standard a machine will include two or more mechanical components. Examples of machines may include but are not limited to: block and tackle, chain block, pneumatic or hydraulic jack, and turntable.

- 4 Mechanical components include:

- cams and followers; may include but are not limited to – cams such as plate and eccentric; followers such as needle, roller, flat, and offset
- pivots and linkages; may include but are not limited to – pivots such as fixed and moving; linkages such as: parallel, reverse and sliding crank motion
- gears may include but are not limited to – spur, bevel, helical, rack and pinion, worm, and idler
- belt or chains and sprockets may include but are not limited to – flat belt, v-belt, duplex chain or double belt, and tooth belt
- shafts and bearings may include but are not limited to – solid shafts, hollow shafts, ball bearing, roller bearing, and conical bearing.

- 5 A machine's *efficiency* is determined by the ratio of the energy delivered (or work done) by a machine to the energy needed (or work required) to operate it (ie output energy/input energy).

- 6 Conditions of Assessment related to this achievement standard can be found at <http://ncea.tki.org.nz/Resources-for-Internally-Assessed-Achievement-Standards>.

**Quality Assurance**

- 1 Providers and Industry Training Organisations must have been granted consent to assess by NZQA before they can register credits from assessment against achievement standards.
- 2 Organisations with consent to assess and Industry Training Organisations assessing against achievement standards must engage with the moderation system that applies to those achievement standards.

Consent and Moderation Requirements (CMR) reference

0233