

<b>Title</b>	<b>Apply biomechanical principles to improve skill performance</b>		
<b>Level</b>	<b>5</b>	<b>Credits</b>	<b>6</b>

<b>Purpose</b>	People credited with this unit standard are able to: apply the principles of motion to human movement; explain mechanisms that control human movement; explain the implications of basic mechanical principles for human movement; design a pre-analysis strategy for analysing a skill; complete a qualitative analysis of the skill; and provide a strategy for improvement and re-evaluate the skill following implementation of the strategy.
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<b>Classification</b>	Recreation and Sport > Recreation and Sport - Coaching and Instruction
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<b>Available grade</b>	Achieved
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<b>Entry information</b>	
<b>Recommended skills and knowledge</b>	Unit 5368, <i>Demonstrate knowledge of basic functional anatomy and physiology as they relate to movement</i> , or demonstrate equivalent knowledge and skills.

**Explanatory notes**

None.

**Outcomes and evidence requirements**

**Outcome 1**

Apply the principles of motion to human movement.

**Evidence requirements**

1.1 Basic kinematics concepts are described in relation to human movement.

Range displacement, distance, speed, velocity, acceleration, deceleration, projectile motion, vectors, scalars, linear kinematics, angular kinematics.

1.2 Major axes of rotation and planes of movement are described in relation to human movement.

Range axes of rotation – transverse, anteroposterior, longitudinal;  
planes of movement – sagittal, frontal, transverse.

1.3 Newton's laws are described in relation to human movement.

1.4 The relationship between impulse and momentum is described in relation to human movement.

Range impulse and momentum – mass, distribution of mass, moment of inertia;  
human movement – collisions, impact.

## Outcome 2

Explain mechanisms that control human movement.

### Evidence requirements

2.1 Mechanics of the musculoskeletal system are explained.

Range concentric contractions, eccentric contractions, length-tension relationship within a muscle, force-velocity relationship in tension development, pulley and lever systems.

2.2 Force generation is explained in the context of human movement.

Range internal force, external force, motive force, resistive force, torques.

2.3 Kinetics are explained in the context of human movement.

Range conservation of energy, transfer of energy, kinetic energy, potential energy, work, power.

2.4 The relationship between stability and balance is explained in relation to human movement.

Range centre of gravity, centre of mass, stability, base of support.

2.5 The significance of concepts of projectile motion is explained in relation to human movement.

Range parabolic path, range as a function of speed, height and angle of release, hanging in motion.

**Outcome 3**

Explain the implications of basic mechanical principles for human movement.

**Evidence requirements**

- 3.1 The pushing-throwing continuum is explained in relation to its implications for human movement.
- Range accuracy-distance trade off, effect of size and weight of implement on push-throw decision.
- 3.2 The kinetic link theory is explained in relation to its implications for human movement.
- Range methods used to generate velocity at the end of a chain of segments with and without implements, implication of summation of forces for human movement, distinction between open and closed kinetic chains.

**Outcome 4**

Design a pre-analysis strategy for analysing a skill.

**Evidence requirements**

- 4.1 The objective of the movement and factors contributing to the objective are determined.
- 4.2 Critical features of the skill are determined.
- 4.3 Scoring or rating is developed for critical features of the skill.
- 4.4 Potential constraints affecting the observation are identified and their effects explained.
- Range internal distractions – motivation;  
external distractions – other individuals, noise;  
environmental distractions – wind, light, temperature, rain, heat, humidity, surface conditions.
- 4.5 An observation plan is developed.
- Range plan – number of observations, position to observe from, scanning strategies, range of acceptable responses.
- 4.6 Type of analysis is determined.
- Range at least one of – observation, video, time.

4.7 Planning is conducted for a qualitative skill analysis.

Range facility and equipment identified and confirmed as available; performer knows time, location, and pre-test preparation requirements.

### Outcome 5

Complete a qualitative analysis of the skill.

#### Evidence requirements

5.1 Records include factors that may affect performance of the skill, and these factors are controlled where it is within the ability of the learner coach to do so.

Range time of day, time of year, phase of training, experience of performer, injury concerns, internal distractions, external distractions, environmental distractions.

5.2 Documentation includes critical features as observed and/or timed.

5.3 Analysis compares critical features as documented, with acceptable response ranges and existing data on the same performer and/or different performers.

5.4 List identifies critical features needing modification.

### Outcome 6

Provide a strategy for improvement and re-evaluate skill following implementation of the strategy.

#### Evidence requirements

6.1 A strategy for improving the critical features needing modification is identified.

6.2 The strategy to be implemented is selected in consultation with the performer and/or coach.

6.3 Re-evaluation of the skill is planned.

Range person performing the re-evaluation, equipment, environment, external and internal distractions, time of day, time of year, phase of training, performer experience, injury concerns, performer preparation for re-evaluation.

6.4 Re-evaluation session establishes that strategy is achieving desired skill level, or that strategy needs to be modified to meet requirements of skill and performer's ability.

<b>Planned review date</b>	31 December 2012
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#### Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	17 May 1996	31 December 2012
Revision	2	19 February 1998	31 December 2012
Review	3	30 August 1999	31 December 2012
Review	4	12 February 2001	31 December 2012
Rollover and Revision	5	20 November 2006	31 December 2012
Rollover and Revision	6	20 May 2011	N/A

<b>Consent and Moderation Requirements (CMR) reference</b>	0099
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

#### Please note

Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMRs). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

#### Comments on this unit standard

Please contact Skills Active Aotearoa Limited [info@skillsactive.org.nz](mailto:info@skillsactive.org.nz) if you wish to suggest changes to the content of this unit standard.