



National Certificate of Educational Achievement  
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

**2008**

## **Internal Assessment Resource**

Subject Reference: **Physical Education 1.2**

Internal assessment resource reference number:  
**PhysEd/1/2\_B6**

### **Getting the best out of your body in your boat**

Supports internal assessment for:

Achievement Standard AS90068 v2  
Demonstrates knowledge of body structure and function related to  
performance of physical activity

Credits: 5

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**Date version published:**

August 2008

**Ministry of Education  
quality assurance status**

For use in internal assessment  
from 2008

### **Teacher Guidelines:**

The following guidelines are supplied to enable teachers to carry out valid and consistent assessment using this internal assessment resource.

### **Context/setting:**

Students are required to participate in a sea-kayaking outdoor education activity. Within this activity students should be able to explore how the body functions in terms of a) applied anatomical features, b) applied biomechanical principles and c) physiological responses.

This exemplar provides a knowledge-based learning context. Through an application of this knowledge students may develop greater self-awareness in relation to sea kayaking.

### **Conditions:**

This assessment is based on a sea-kayaking programme that is expected to last for a period of several weeks including training, skill development, and a sea-kayaking trip. It is expected that students will participate in the practical programme (fitness training, skill development, and the trip) in order to develop the knowledge and skills assessed in this activity.

Students are required to provide evidence for standard 1.2 by completing a number of written tasks related to sea kayaking.

Parts 1, 2, 3 and 4 are to be completed under teacher supervision at the completion of the practical programme. Teachers should give out the worksheets for the tasks at appropriate times.

### **Resource requirements:**

Students need to have access to a sea kayak for the duration of this programme.

### **Possible local adaptation:**

Where local adaptations are made, teachers and schools should ensure that they have:

- checked that the adapted assessment validly assesses the achievement standard;
- checked the copyright status of any material imported into the assessment resource;
- complied with all internal and external quality assurance requirements.

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**Student Instructions Sheet**

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School/Institution	
Student Name	
Teacher or class	
Date	

Read through all the information given to you before starting work. Make sure that you understand what you are being asked to do. Ensure that you know what level of performance will be required to obtain an achievement, merit or excellence grade for this achievement standard.

You will complete the assessment tasks at specified times. Your teacher will give you clear instructions about the times and place for your assessment, and for the preparation work.

You will carry out a sea-kayaking programme. This will involve training to improve your physical fitness relative to sea kayaking, practice, and a 2 day 25 km sea-kayaking trip.

You will be applying biomechanical principles to improve your sea-kayaking technique. The biomechanical principles focus on the themes of propulsion and will consider the kayak's buoyancy and drag. Propulsion involves the application of force to move the kayak. Buoyancy includes understanding of displacement and density. Drag involves the reduction of resistance to the kayak movement through the water

It is expected that you will need to plan to do extra fitness training outside of school time.

When you have completed your practical programme you will complete Parts 1, 2, 3 and 4 of the assessment activity. This will involve answering questions that demonstrate the understanding of body structure and function that you have learnt about during your sea-kayaking programme.

**Part 1: Physiological Responses**

**Task 1**

Complete the table below:

- a. Identify 2 additional physiological changes in response to going sea kayaking.
- b. For each change, explain in detail how it helps the body to manage the demands of the exercise.

<b>a. Physiological response</b>	<b>b. Explanation in detail</b>
e.g. Sweating	Helps to remove extra heat generated by muscle action and cools the body.
1.	
2.	

**Task 2**

You have carried out a training programme for the last 8 weeks

- a) Identify 3 long-term responses/training effects

<b>a. Physiological response</b>	<b>b. Explanation in detail</b>
1.	
2.	
3.	

**Task 3**

Explain in detail the three energy systems that are used in the 25km kayak.

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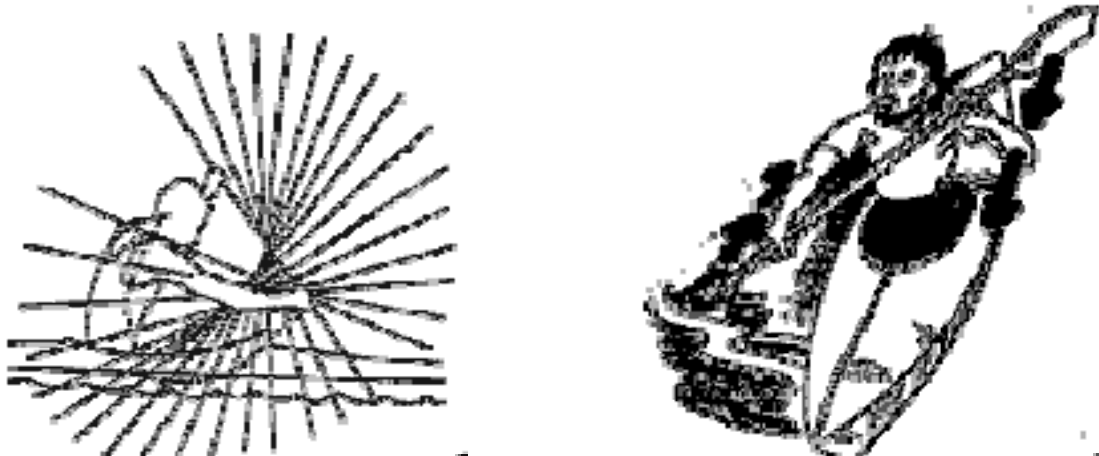


**Part 2: Anatomical Principles**

**Task 1**

Consider the following diagrams of the forward paddle stroke for kayaking.

Start Position



Consider the kayaker moving from this start position until the paddle is pulled out of the water. Complete the table by placing the following anatomical terms in the correct spaces.

Terms: Flexion, Biceps, Pectorals, Posterior Deltoid, Extension, Anterior Deltoid, Triceps, Lattisimus Dorsi.

Joint being moved	Joint Movement	Name of Muscle contracting	Name of Muscle relaxing
Right Elbow			
Left Elbow			
Right Shoulder			
Left Shoulder			

**Task 2**

Describe/explain in detail the forward paddling stroke using anatomical terms. Check that you include the following terms: joint flexion, joint extension, muscle contraction, muscle relaxation. Ensure that you have included the main muscles (or muscle groups) that are being used and the main bones that are being moved during the forward paddle stroke.

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**Task 3**

Consider each of the following three body types. State an advantage that a person with a dominance of that body type may have when sea kayaking, giving an anatomical reason for each answer.

Ectomorph \_\_\_\_\_

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Endomorph \_\_\_\_\_

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Mesomorph \_\_\_\_\_

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**Part 3: Biomechanical Principles**

**Task 1 Summation of forces**

In sea kayaking force must be transferred from your body, through the paddle to the water. To create this force efficiently the paddler will want to use as many muscle groups as possible and use them in the correct order. S/he will also want to use the larger muscles first and the smaller muscles last. **Discuss how a paddler uses his/her body to generate the most efficient force.**

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**Newton's Laws**

**Task 2**

The direction of force applied by the paddle in the water should be opposite to the direction you wish to travel. (By pulling backwards the boat travels forward.) Explain how you would use this knowledge to improve the efficiency of your paddling.

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**Task 3**

Some paddlers choose paddles that have larger or smaller blades. In biomechanical terms describe an advantage and a disadvantage in having a larger blade, giving reasons for your answer. Discuss the overall effect of having a larger blade.

Advantage \_\_\_\_\_

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Disadvantage \_\_\_\_\_

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**Task 4**

Sea kayaks are designed to remain quite stable and kayaker can do things to make the boat more stable. Sea Kayaks are also designed to overcome the drag caused by the water. Describe how the paddler can make the kayak more stable and give a design features that makes the boat stable and other design features that overcome drag.

**Stability** - A boat is made stable by \_\_\_\_\_

\_\_\_\_\_

**Drag** is overcome by \_\_\_\_\_

\_\_\_\_\_

Give reasons why stability and drag are important factors in sea kayaks. Your answer must relate to the biomechanical principles involved for the person paddling the sea kayak.

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\_\_\_\_\_




\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Task 5**

Consider the following design ideas and state the advantages and disadvantages of each. Use biomechanical principles in your explanation.

Design variation	Advantages	Disadvantages
<p><b>Width of boat</b>            Paddling a skinny boat</p> 		
<p><b>Length of boat</b>            Paddling a short boat (3 m)</p> 		
<p><b>Rudder</b>            Having a stern rudder</p> 		

### Assessment Schedule – PhysEd/1/2\_B6 - Getting the best out of your body

Task	Evidence	Judgement		
		Achievement	Merit	Excellence
Part 1 Task 1	Table is completed short-term/acute physiological changes - ↑HR, ↑SV, ↑Q, ↑Ventilation, ↑Systolic BP.	Student describes 2 valid changes Eg Heart rate increases to pump blood faster.	An explanation is given for each response. Eg Heart rate increases to ensure that more oxygen is delivered to the working muscles.	A detailed explanation is given for each response. Eg The heart rate increases to ensure that more oxygen is delivered to the working muscles that require additional oxygen so that the body can work at this rate.
Task 2	Table is completed long-term/chronic physiological changes or system - ↑heart size, ↓Resting Hr, ↑SV, ↑Q.  Muscular Changes - ↑muscle size - ↑glycogen stores	Student describes 3 valid changes	An explanation is given for each response.	A detailed explanation is given for each response.
Task 3	The 3 energy systems are describes/explained/explained in detail as they relate to the 25km kayak.	Student describes the 3 energy systems  Eg ATP-CP – this anaerobic system is used in the first 10 seconds of the kayak.	Student explains the 3 energy systems  Eg ATP-CP – this anaerobic system is used in the first 10 seconds of the kayak and is limited to what is stored in the body.	Student explains in detail the 3 energy systems Eg ATP-CP – this anaerobic system is used in the first 10 seconds of the kayak and is limited to what is stored in the body. It is the source of energy for instant, high intensity movements and there are no by-products.

Part 2 Task 1	Joint being moved	Joint Movement	Name of Muscle contracting	Name of Muscle relaxing	Student correctly describes 8 /12 required answers					
	Right Elbow	Flexion	biceps	Triceps						
	Left Elbow	Extension	triceps	Biceps						
	Right Shoulder	Extension	Latissimus Dorsi or Posterior Deltoid	Pectorals or Anterior Deltoid						
	Left Shoulder	Flexion	Pectorals or Anterior Deltoid	Latissimus Dorsi or Posterior Deltoid						
Task 2	During the forward paddle the right arm stretches forward. The right elbow bends (Flexes) with the biceps muscle contracting and the triceps muscle relaxing. The humerus and the ulna/radius are moving closer together. The right arm is pulled backwards with the Lattisimus Dorsi and Posterior Deltoid muscle contracting and the Pectorals and Anterior Deltoid relaxing. The humerus is moving toward the back as is the shoulder joint. During this time the left arm (Humerus, ulna & radius) is moving forward caused by the triceps contracting and the biceps relaxing, and the Pectorals & Anterior Deltoid contracting and the Lattisimus Dorsi and Posterior Deltoid relaxing.				The student describes the forward paddle stroke.	Student explains how the forward paddle stroke is completed, using the correct terms.	Student explains in detail how the forward paddle stroke is completed, using the correct terms. (see eg)			
Task 3	Ectomorph: An ectomorph often has long limbs and so can reach further and have a longer stroke. This means that don't need to make so many strokes. They also usually have good aerobic fitness.  Endomorph: An endomorph floats better if they fall out of the /kayak and isn't likely to feel the cold so well due to natural insulation.  Mesomorph: A Mesomorph has more strength so can move the paddle through the water more easily and faster.				Student describes a valid advantage for at least 2 body type	Student explains a valid advantage for at least 2 body types	Student explains in detail a valid advantage for at least 2 body types			

<p><b>Part 3</b> Task 1</p>	<p>Summation of forces - Because of the way a paddler sits in the boat S/He is not able to use their lower leg well. They can use their thigh if their knee is tight fitting into their kayak. In this way they can use their thigh first then their trunk (abdomen and back muscles) followed by their chest muscles, then their shoulder muscles and finally their upper arm muscles. These muscles work one after each other with each muscle group contributing energy (force) to the final movement.</p>	<p>Student gives a basic and valid description that includes some of the principles applied to sea kayaking</p>	<p>Student gives a valid explanation that includes how most of the principles are applied to sea kayaking</p>	<p>Student gives a full, accurate and detailed explanation as to how these principles are applied to sea kayaking</p>
<p>Task 2</p>	<p>An efficient stroke will reach forward and pull back in a straight line resulting in a reaction of the boat moving in a straight line through the water. It also requires a balanced and even stroke on both sides of the boat.</p> <p>When paddling I would try to bring the paddle back in a straight line so that there is no wasted effort taking the paddle and the boat sideways.</p>	<p>Student gives a basic and valid description that includes some of the principles applied to sea kayaking</p>	<p>Student gives a valid explanation that includes how most of the principles are applied to sea kayaking</p>	<p>Student gives a full, accurate and detailed description as to how these principles are applied to sea kayaking</p>
<p>Task 3</p>	<p><b>Advantage:</b> The advantage is that the paddler can push more water backward so that the boat can go forwards much more quickly. Moving a greater mass of water or greater inertia that is transferred to the speed of the boat.  <b>Disadvantage:</b> The disadvantage is that it requires more effort to push the blade backwards and so the paddler might get tired more quickly and unable to finish the trip. It also might get too heavy to move so the paddler will do slower.</p>	<p>Student gives a basic and valid description that includes some of the principles applied to sea kayaking</p>	<p>Student gives a valid explanation that includes how most of the principles are applied to sea kayaking</p>	<p>Student gives a full, accurate and detailed description as to how these principles are applied to sea kayaking</p>

Task 4	<p><b>Stability</b>                  By having a <u>flat or wide bottom</u> so it requires <u>more force</u> to tip over. By sitting low in the boat so that the Centre of gravity is low. Will also aid stability. The gear or the heaviest gear should be stored low and evenly in the boat <u>lowering it's centre of gravity</u>.</p> <p><b>Overcoming drag</b>                  By the boat being <u>long with pointy ends</u> the water easily slides past the bow and the boat cuts through the water with <u>less resistance</u>. The surface of the boat is pretty <u>smooth</u> so that water slides easily over it. In this way there is less drag.</p>			Student gives a basic and valid description that includes some of the principles applied to sea kayaking	Student gives a valid explanation that includes how most of the principles applied to sea kayaking	Student gives a full, accurate and detailed description as to how these principles are applied to sea kayaking
Task 5	Design variation	Advantages	Disadvantages	Student describes a valid advantage or disadvantage for each design variation (3 in total)	Student explains a valid advantage or disadvantage for each design variation (5 in total)	Student explains in detail a valid advantage or disadvantage for each design variation (6 in total)
	Skinny boat	Fast, least resistance, cuts through water easily	Unstable, easy to tip out, suited to advanced kayakers			
	Short boat	Easy to turn, less resistance, mobile, avoid danger quickly	Harder to paddle in a straight line. Little room for carrying gear. Suited to playing in white water			
Rudder	Control steering or direction. Added safety in rough conditions	Rudder causes drag and slows the boat down				

**OVERALL GRADE**

To gain ACHIEVED students must answer 7 of 11 at achievement level or better correctly,

To gain MERIT students must attain merit in 7 out of 10 questions and achievement in the other 4 questions.

To gain EXCELLENCE students must attain excellence in 6 out of 10 excellence and merit in the other 5 questions.