

Assessor Marking Guide

Programme Name	Health and Fitness Coach (Personal Trainer) (Level 4)	
Assessment Number	Assessment 3 of 4	
Assessment Title	Muscle System Quiz	
Course number	Course 1	Version 2 Level 4 Credit 10
Course Title	Anatomy and Physiology	

Internal feedback related to design of assessment tools should be submitted via the online Continuous Improvement Form (eCIF).

This assessment leads to the following graduate profile and learning outcomes.

NZQA GPO	Learning Outcome	Task #
GPO 2: Apply knowledge of anatomy and physiology to adapt and deliver safe and effective exercise programmes to individuals	2.1: Identify and describe the structure and function of major systems of the human body and their physiological responses (acute and chronic) to exercise (7 Credits).	Tasks 1-3
	2.2: Differentiate clearly, the energy systems in use during different forms of exercise (3 Credits).	Task 3

NZQF Level 4 Descriptors	
Knowledge	<ul style="list-style-type: none"> Broad operational and theoretical knowledge in a field of work or study.
Skills	<ul style="list-style-type: none"> Select and apply solutions to familiar and sometimes unfamiliar problems. Select and apply a range of standard and nonstandard processes relevant to the field of work or study.
Application	<ul style="list-style-type: none"> Self-management of learning and performance under broad guidance. Some responsibility for performance of others.

ADMINISTRATION

Assessors are required to provide feedback to students:

- Constructive feedback to the student must be documented within assessment evidence. Including where resubmission is required.
- Notes on demonstrated performance and application of skills, knowledge, attributes; future improvement/development planning e.g. task management, study skills; relationship to other programme content and use in career.

Student evidence must be assessed against all specified criteria to meet learning outcomes.

- Any adaption in assessment methods must be documented and attached to the assessment by the assessor (where deemed necessary to be fair and transparent in relation to student's specified needs).
- Assessment Pack Cover should be dated and signed by assessor when the student has received the final result.
- Assessment opportunities must be indicated accurately.
Where any practical criteria are not achieved, an additional practical sheet must be used for reassessment for all practical outcomes and attached to this assessment pack. Refer to Assessment opportunities policy for additional detail.
- The student must sign the post-assessment agreement after receiving final result.

- It is the Assessors responsibility to ensure all relevant documentation is included in the assessment prior to reporting and filing.
- Samples of assessments will be forwarded to internal and/or external parties for moderation as required.

Where appropriate **sample answers and or exemplars** may be included: Sample answers are a guide only providing an example of the sufficiency of qualitative and quantitative evidence the assessor could expect to see.

ASSESSMENT SCHEDULE	
<i>Give feedback to student on successes, for N add a note to the student on here or on their assessment evidence (e.g. in Turnitin) about how to improve for resubmission.</i>	
Task Evidence	Achievement Criteria / Judgement
Task 1	a) Answers must be labelled in correct order b) Table must be filled out accurately with correct explanations c) Accurate explanation provided (25-75 words) Answer must contain that origin is fixed during movement and insertion is moving
Task 2	a) FOUR correct answers identified and circled b) Accurate explanations provided Answer must provide information on length change in muscle during each contraction. c) Accurate explanations provided for both types (50-100 words) Answer must contain fixator muscle works with stabilising joints and Synergist supports prime mover
Task 3	a) Accurate explanation provided, with TWO expectations. Answer could contain TWO of, increase muscle size, increase fibre size, increase in strength. b) Accurate explanation provided, with TWO expectations. Answer must link to fibre type targeted, Type 1 or slow twitch. Answers could contain TWO of, increased number of mitochondria, increased capillary density, increased fatigue resistance. c) Table filled out accurately Columns "Energy system" and "description" must be accurate. For column "exercise type" students can provide different exercises as long as they represent the respective energy system. Relevance – tutor discretion to apply.

Muscle Physiology Quiz

Task 1 – Structure of the Muscular system

a) Put the following muscle structures in order from smallest (1) to largest (5).

Myofibril - Actin - Fascicle - Myosin - Muscle Fibre

 3 1 5 2 4

b) Identify the 3 types of muscle fibres and list an activity which uses each muscle type.

Fibres	Role in activity	Example Sport/Exercise
Slow twitch/Type 1	Long distance or slow activities or exercises	Marathons, distance running, swimming, cycling, power walking, endurance training
Intermediate/Fast Twitch/Type 2a	Rather than used for specific tasks, these fibres can be trained to take on more of the characteristics of one of the other fibre types.	There are no specific exercises that target type 2a fibres. They simply adapt to help other fibres dependent on the predominant type of training done.
Fast Twitch/Type 2b	For specialised use in 'quick energy' activities or power- based exercises	Powerlifting, sprinting, jumping, strength and agility training

c) Explain what the terms origin and insertion mean in relation to muscles. (25-75 words)

Origin relates to where the muscle starts from. The origin is a fixed spot when movement occurs.

Insertion relates to the end point or where the muscle attaches to the bone that it moves. This point moves during exercises that use the muscle.

Task 2 – Function of the Muscular System

a) Which of the following are functions of muscle? Select the FOUR correct answers from the choices below.

- a) Detoxification of metals
- b) Protection
- c) Waste removal
- d) Posture
- e) Movement
- f) Heat production
- g) Mineral storage

b) Explain the meaning of the following contractions

Contraction	Explanation	Example
Isometric	When a muscle creates force but does not change length	A plank or attempting to lift something that is too heavy and will not move
Concentric	When a muscle creates force while shortening in length	The bicep muscle during the upwards phase of a bicep curl.
Eccentric	When a muscle creates force while lengthening	The lower or downward phase of a machine hamstring curl.

c) Explain the role and function of the **fixator** muscles and the **synergist** muscles in relation to movement. Please provide an example for each muscle type. (50-100 words)

Fixator – These muscles fix the joints where the origin of the muscles is, these need to be stable while performing a movement. E.g., when a bicep curl is completed the rotator cuff muscles act as the fixators, stabilising the shoulder joint.

Synergist – These muscles support the main muscle or agonist in the movement. E.g., when a bicep curl is completed, the brachialis supports this movement as it crosses the elbow joint as well.

Task 3 – Response to training of the Muscular System

a) Your client has just completed a block of hypertrophy training. What adaptations are you expecting to see in the muscles that have been targeted. Link your answer to muscle fibre types. Please provide a minimum of TWO answers.

This type of training targets mainly the Type 2 fibres as these are the biggest and produce the most force. We are expecting to see an increase in size in the fibres due to an increase in thickness of the sarcolemma. We will also expect to see an increase in muscle strength due to a greater number of cross bridges caused by an increase in sarcomeres in series.

b) You have built a program to increase your client's muscular and cardiovascular endurance in preparation for a triathlon. What adaptations would you expect to see within her skeletal muscle fibres after training for a triathlon for 3 or more months? Link your answer to the muscle fibre types. Please provide a minimum of TWO adaptations that will occur.

Cardiovascular training will target our clients type 1 or slow twitch fibres. Two adaptations would be an increase in mitochondria and capillary density around the muscle. This will help her process lactic acid and perform for longer.

c)

- i. Name the three energy systems of the human body and identify two types of exercise for each energy system type.
- ii. Provide a clear description below of each energy system.
- iii. Outline the relevance of each energy system to personal training contexts.

Energy System	
i. ATP-PC System	Exercise Type: Sprinting, power lifting
ii. Description of system	The ATP-PC system or Phosphagen system utilises the ATP (the molecule for energy) in exercise lasting very short periods of time.
iii. Relevance to personal training context	Using this system would be to develop top-end strength, speed and/or power.
i. Lactic Acid System (Anaerobic / Glycolytic) Anaerobic glycolysis	Exercise Type: 800m running, team sports e.g. rugby, football, netball, hypertrophy training, HIIT
ii. Description of system	This energy system uses carbohydrate to produce ATP and normally lasts between 30 secs-3mins in duration.
iii. Relevance to personal training context	Increasing lactate threshold, increasing overall high intensity exercise capacity, increased ability to perform high intensity interval training
i. Aerobic System	Exercise Type: Long distance or high volume such as distance swimming
ii. Description of system	This system is the only system to use oxygen to help with energy production. The oxidative system (aerobic system) utilises the breakdown of other macronutrients (fat and protein) using oxygen to produce energy. This system is best suited for exercise lasting longer than 3mins in duration.
iii. Relevance to personal training context	Increased ability to work at moderate intensities for longer, increased VO ₂ max, increased aerobic capacity