

**SISFFIT004 Incorporate
anatomy and physiology
principles into fitness
programming**



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ASSESSMENT FOR SISFFIT004

Student name	Jack Low
Date of assessment submission	14/10/2018
Trainer/Assessor's name	Kymberley Sant
Date of assessment marking	31/10/2018
Outcome for units	☐ Competent ☒ Not Yet Competent

TASK INSTRUCTIONS

- The assessment for these units of competency consists of the following:
 - **Quiz:** You are required to complete a series of multiple choice questions to demonstrate your knowledge and skills.
 - **Short answer activities:** You are required to provide short written responses to a series of activities to demonstrate your knowledge and skills.
 - **Case studies:** You are required to provide written responses to a series of case study scenarios to demonstrate your knowledge and skills.
 - **Practical task:** You will be required to put your knowledge and skills into practice, through observed tasks and work experience.
- At times, you will be provided with a specific context to which you must respond, otherwise it is anticipated that you will use a scenario of your choosing to provide context to the task.

QUIZ

QUESTIONS	CORRECT
1. What are the planes of body motion? ☐ Sagittal, Frontal, Reverse ☒ Sagittarius, Frontal, Transverse ☐ Transverse, Sagittal, Frontal ☐ Back, Front, Side	☐
2. What is the term associated with moving towards the midline of the body? ☐ Superior ☐ Inferior ☐ Plantar ☒ Medial	☒
3. What is the focussed movement in the movement of a shrug? ☐ Superior and then Inferior ☐ Anterior and then Medial ☒ Elevation and Depression ☐ Protraction and Retraction	☒
4. Which of the following are examples of connective tissue? ☐ Muscle, Bone, Cartilage, and Skin ☒ Ligaments, Tendons, Fascia, and Cartilage ☐ Tendons, Bones, Ligaments, and Muscle ☐ Muscle, Fascia, Cartilage, and Tendons	☐
5. What are the major muscles required for the flexion and extension of the elbow? ☐ Quadriceps and Hamstring ☐ Pectoral and Latissimus Dorsi ☐ Biceps Femoris and Triceps ☒ Biceps and Triceps	☒
6. What two (2) sections can the skeleton be divided into? ☒ Axial and Appendicular ☐ Axial and Appendages ☐ Torso and Limbs ☐ Long bones and Short bones	☒

7. What three (3) sections can joints be classified into? ☐ Fibrous, Cartilage, Synovial ☐ Fibre, Cartilaginous, Synovial ☒ Fibrous, Cartilaginous, Synovial ☐ Fibro, Hyaline, Symphysis	☐
8. What are fast twitch fibres known as? ☐ Type I ☒ Type II ☐ Type IA and Type IB ☐ Type III	☒
9. What does the mechanics of breathing involve? ☐ Breathing in and breathing out ☐ Inspire and exhale ☒ Inspiration and expiration ☐ Respiration and expiration	☐
10. What does ATP stand for? ☐ Adenosine Two Phosphate ☒ Adenosine Tri Phosphate ☐ Adenosine Three Phosphates ☐ Adrenaline Tri Phosphate	☒
11. True or False: In multicellular organisms, including humans, all cells, tissues, organs, and organ systems of the body work together to maintain the life and health of the organism. ☒ True ☐ False	☒

12. What are the four (4) tissue types? ☐ Isokinetic, Isometric, Concentric, Eccentric ☒ Connective, Muscle, Nervous, Epithelial ☐ Superficial, Inferior, Deep, Anterior ☐ Muscle, Nervous, Connective, Organism	☒
13. Which of the following methods will keep you aware of emerging knowledge of anatomy and physiology relevant to the development of your own professional practice? Select all that apply. ☒ Reading journal articles ☒ Newsletters from health professional associations ☒ Networking within your industry	☒

14. Fill in the blanks for the statements below, selecting the correct option.

☐

Statement	Option 1	Option 2
The pectoralis major is _____ to the rhomboids.	☒ Anterior	☐ Posterior
The soleus is _____ to the gastrocnemius.	☒ Deep	☐ Superficial
The pectoralis major is _____ to the rhomboids.	☐ Deep	☒ Superficial
The rhomboids are _____ to the trapezius.	☐ Anterior	☒ Posterior
The biceps femoris is _____ to the semimembranosus.	☒ Lateral	☐ Medial
Anterior deltoid is _____ to rectus abdominus.	☒ Superior	☐ Inferior
Rectus abdominus is _____ to the obliques.	☐ Lateral	☒ Medial
The elbow joint is _____ to the shoulder joint.	☐ Superior	☒ Inferior
The wrist joint is _____ to the elbow joint.	☒ Distal	☐ Proximal
The knee joint is _____ to the ankle joint.	☐ Distal	☒ Proximal

15. Match the terms below with the appropriate movement, placing the corresponding movement letter label next to each term.



Letter	Term
H	Flexion
D	Extension
A	Adduction
K	Abduction
G	Pronation
J	Supination
I	Dorsiflexion
B	Plantarflexion
C	Circumduction
F	Inversion
E	Eversion

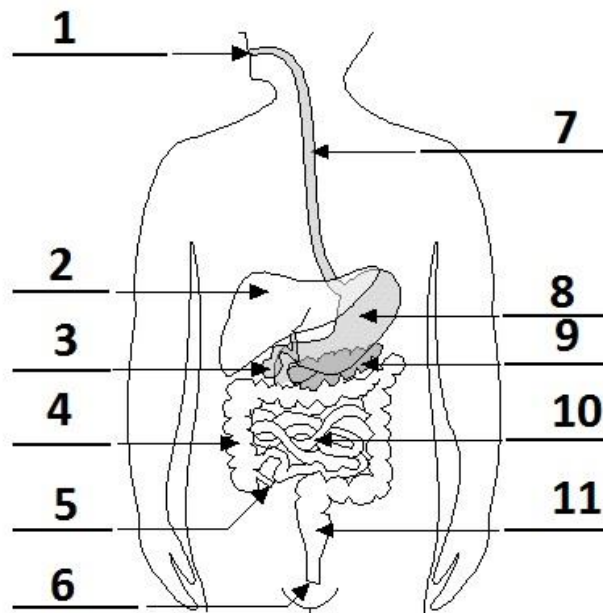
Movements
A. The movement of a limb sideways direction towards the midline of the body
B. Extension at the ankle
C. To allow a joint to perform movement through all possible axes
D. The straightening of a joint. It occurs when the angle at a joint increases and the two opposing surfaces move apart
E. To turn the sole of the foot laterally
F. To turn the sole of the foot medially
G. To turn the palm posterior
H. The bending of a joint. It occurs when the angle of the joint becomes smaller and the two opposing surfaces move together
I. Flexion at the ankle
J. To turn the palm anterior
K. The movement of a limb in a sideways direction away from the midline of the body

16. Identify the type of muscle tension for each listed exercise.



Exercise	Isokinetic	Isometric	Isotonic
Pushing against a wall	☐	☒	☐
Performing a bicep curl	☐	☐	☒
Holding a push up position at the bottom of the movement	☐	☐	☒
Swimming	☒	☐	☐
Holding a shopping bag	☐	☒	☐
Performing a squat	☐	☐	☒
Cycling on a stationary bike	☒	☐	☐

17. Match the terms below with the appropriate diagram label, placing the corresponding number label next to each term.



Number	Term
6	Anus
5	Appendix
7	Esophagus
3	Gall bladder
4	Large intestine
2	Liver
1	Mouth
9	Pancreas
11	Rectum
10	Small intestine
8	Stomach

18. What effect does regular cardiovascular exercise have on the following respiratory volumes? Select the correct option.



Respiratory volume	Increase in size	Decrease in size
Vital capacity	☒	☐
Residual volume	☐	☒
Total lung capacity	☒	☐

Outcome for Quiz

- ☐ Satisfactory
☒ Not satisfactory

Trainer/Assessor comments

Wow! Great attempt here Jack!

Just have a few questions to retry:
 Questions- 1 ,4, 7 , 9 and review your answers for-

Question 14

The rhomboids are _____ to the trapezius.

Question 16

Holding a push up position at the bottom of the movement

SHORT ANSWER ACTIVITIES

ACTIVITY 1

Consider the relevance of the anatomical position.

- Provide a definition of the anatomical position.
- Explain the reason for this body position in relation to health screening.

Definition

Anatomical position is the description of any region or part of the body in a specific stance. In the anatomical position, the body is upright, directly facing the observer, feet flat and directed forward. The upper limbs are at the bodies sides with the palms facing forward.

Relation of health screening

This is used to eliminate any medical errors and can allow a medical practitioner to know where on the body certain injuries and problems are. The patient can distinguish rights from lefts and the practitioner can identify correctly.

Outcome for Activity 1

- ☒ Satisfactory
☐ Not satisfactory

Trainer/Assessor comments

ACTIVITY 2

Explain the path of an oxygen molecule from the initial phase of inspiration, starting at the nasal cavity.

Path of oxygen molecule

Outcome for Activity 2

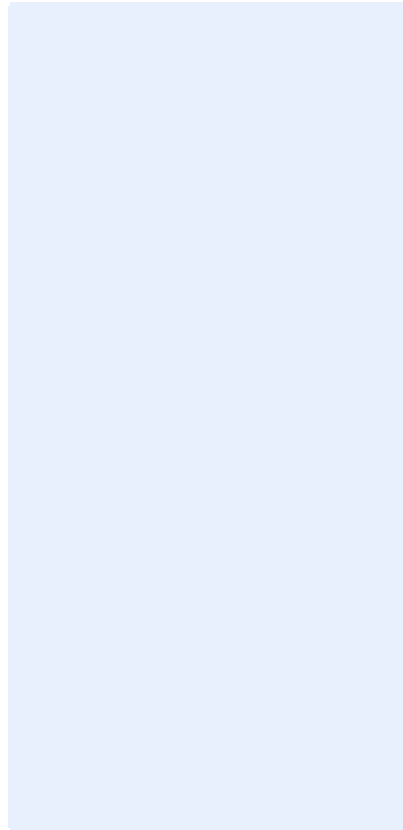
- ☒ Satisfactory
☐ Not satisfactory

Trainer/Assessor comments

ACTIVITY 3

Draw and label a sketch of a long bone.

Labelled sketch



Outcome for Activity 3

- ☐ Satisfactory
☐ Not satisfactory

Trainer/Assessor comments

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ACTIVITY 4

Identify three (3) types of muscle. Describe these muscles and explain where they are found in the body.

Muscle 1

Name of muscle	Rectus Femoris
Description and location	Part of the quadriceps the rectus femoris muscle is attached to the hip and helps to extend or raise the knee. This muscle is also used to flex the thigh.

Muscle 2

Name of muscle	Sternal head (pectoralis head)
Description and location	thick, fan-shaped muscle contributing to the thoracobrachial motion. It consists of a clavicular part and a sternal part, both converging to a flat tendon that inserts on the humerus. It's innervated by both medial and lateral pectoral nerves.

Muscle 3

Name of muscle	Gluteus Maximus
Description and location	The main extensor muscle of the hip. It is the largest and most superficial of the three gluteal muscles and makes up a large portion of the shape and appearance of each side of the hips. Its thick fleshy mass, in a quadrilateral shape, forms the prominence of the buttocks.

Outcome for Activity 4

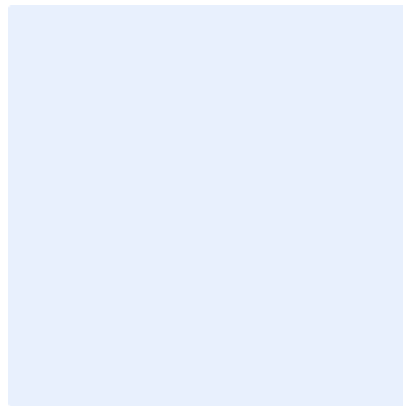
- ☒ Satisfactory
☐ Not satisfactory

Trainer/Assessor comments

ACTIVITY 5

Draw and label a sketch of the cardiovascular system.

Labelled sketch



Outcome for Activity 5

- ☐ Satisfactory
☐ Not satisfactory

Trainer/Assessor comments

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ACTIVITY 6

Consider the movements in a push up.

- Describe the agonists and antagonists responsible for movement.
- Describe the role synergists play in this movement.
- Describe the role connective tissue plays in this movement.
- Describe the role of a Fixator or Stabilizer during an exercise movement, such as a push up.
- Describe the role of a Prime Mover in muscle movement.

Agonists and antagonists

Agonists are Prime Mover muscles directly responsible for the movement of a joint the chest muscles, anterior deltoids and triceps are used to do a push up. Antagonists are muscles that is relaxing and has the opposite reaction to the Agonists.

The Antagonists muscles used in a push up are the trapezius, posterior deltoids, and the rhomboids.

Synergists

Synergists muscles assist the Agonist muscles assisting with elbow extension and shoulder flexion.

Connective tissue

Connective tissue aids strength output when pulled tight and helps the muscles used in a push up work synergistically. Giving the shape these muscles connective tissue allow them to slide together so they can work in the best possible way.

Fixator or Stabilizer

The fixator in a push up are the muscles that stabilize the origin of the Agonist and the joint that the origin spans in order to help the agonist function most effectively.

Prime Mover

Prime Movers are muscles directly responsible for the movement of a joint

Outcome for Activity 6	☒ Satisfactory ☐ Not satisfactory
Trainer/Assessor comments	

ACTIVITY 7

Write a description of cross bridging. Include references to the following:

- All or none theory
- Motor units
- CNS
- Structure of a muscle

Description

A Cross Bridge involves the globular head of myosin molecule that projects from a myosin filament in muscle and in the sliding filament hypothesis of muscle contraction is held to attach temporarily to an adjacent actin filaments and draw it into the A band of a sarcomere between the myosin filaments.

The all or none theory is the principle that the strength by which a nerve or muscle fibre responds to a stimulus is independent of the strength of the stimulus.

The Motor Units consists of a motor nureon and the muscle fibres that it innervates.

Central Nervous System is the first part of using each muscle or molecule, this allows the brain to send a message allowing cross bridging to occur. A whole skeletal muscle is considered an organ of the muscular system. Each organ or muscle consists of skeletal muscle tissue, connective tissue, nerve tissue, and blood or vascular tissue.

Outcome for Activity 7

- ☒ Satisfactory
☐ Not satisfactory

Trainer/Assessor comments

ACTIVITY 8

Muscle fibres can be classified as either fast twitch or slow twitch.

- a) Describe each twitch type.
- b) Provide an example of a specific sport where they are most used.

Description

Fast twitch muscles are good for rapid movements like jumping to catch a ball or sprinting for the bus. They contract quickly, but get tired fast, as they consume lots of energy. Slow Twitch muscles help enable long-endurance and contract slowly.

Sports where most used

Fast twitch muscle fibres are used in sports such as sprinting and hurdling. Slow twitch muscle fibres are used in long distance running and cycling.

Outcome for Activity 8

- ☒ Satisfactory
☐ Not satisfactory

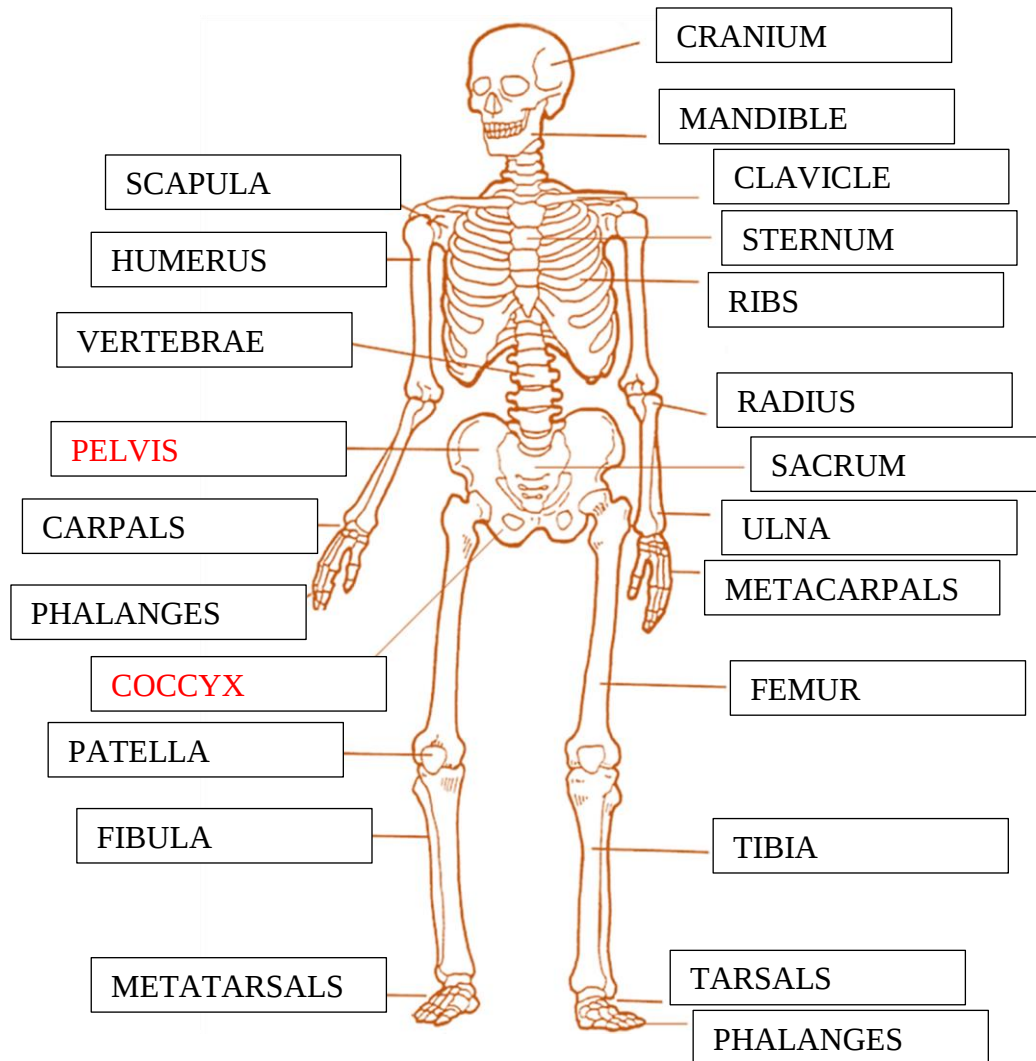
Trainer/Assessor comments

ACTIVITY 9

It is important to have a detailed knowledge of the human skeleton as part of fitness programming.

- Name the labelled parts of the skeleton shown below.
- Give three (3) examples of bony landmarks from the diagram.

Labelled sketch



Bony landmarks

Three bony landmarks included in this diagram are

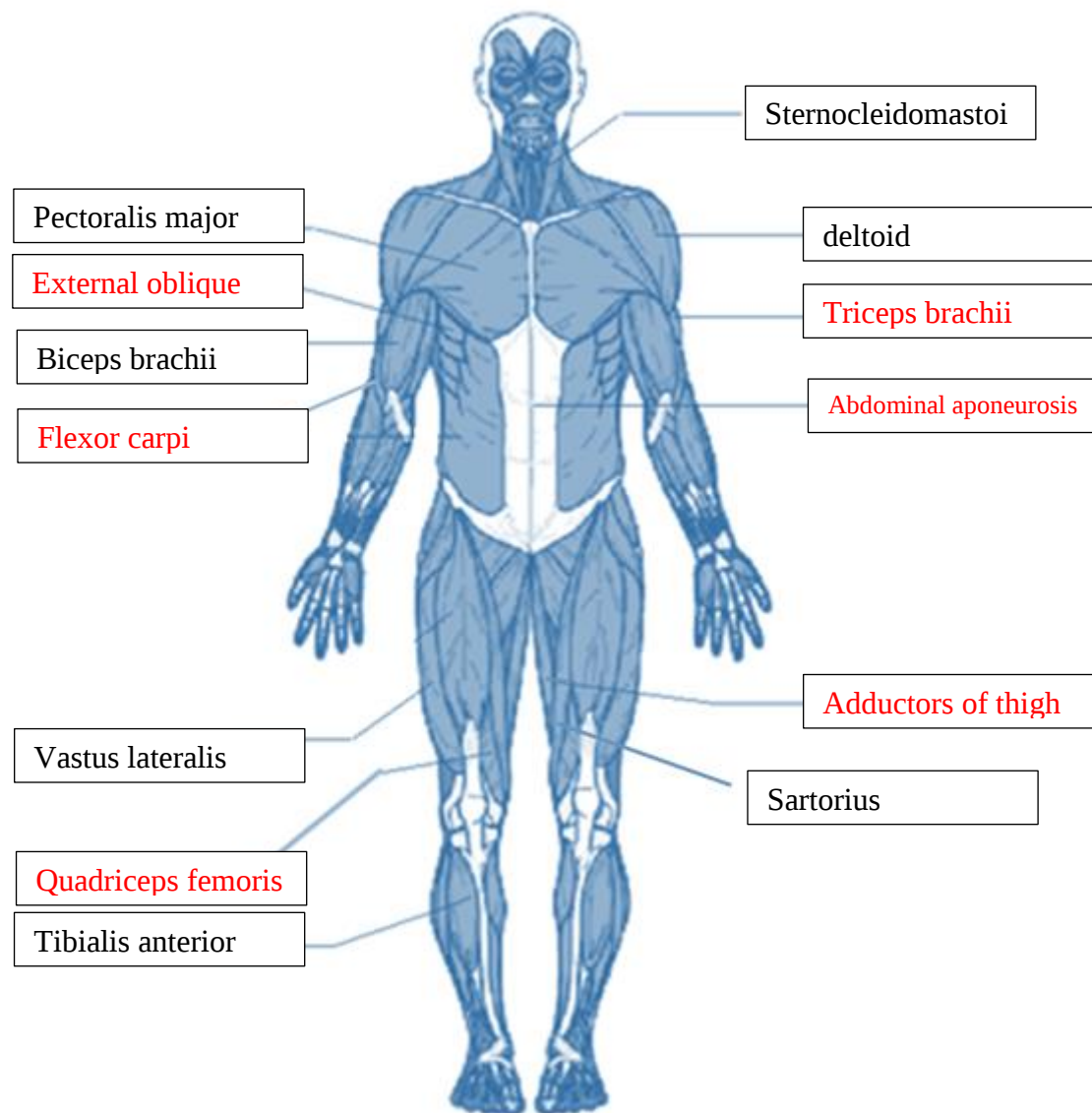
1. Clavical
2. Ribs
3. Sternum

Outcome for Activity 9	☐ Satisfactory ☒ Not satisfactory
Trainer/Assessor comments	Great try! Please review your answer where indicated in red.

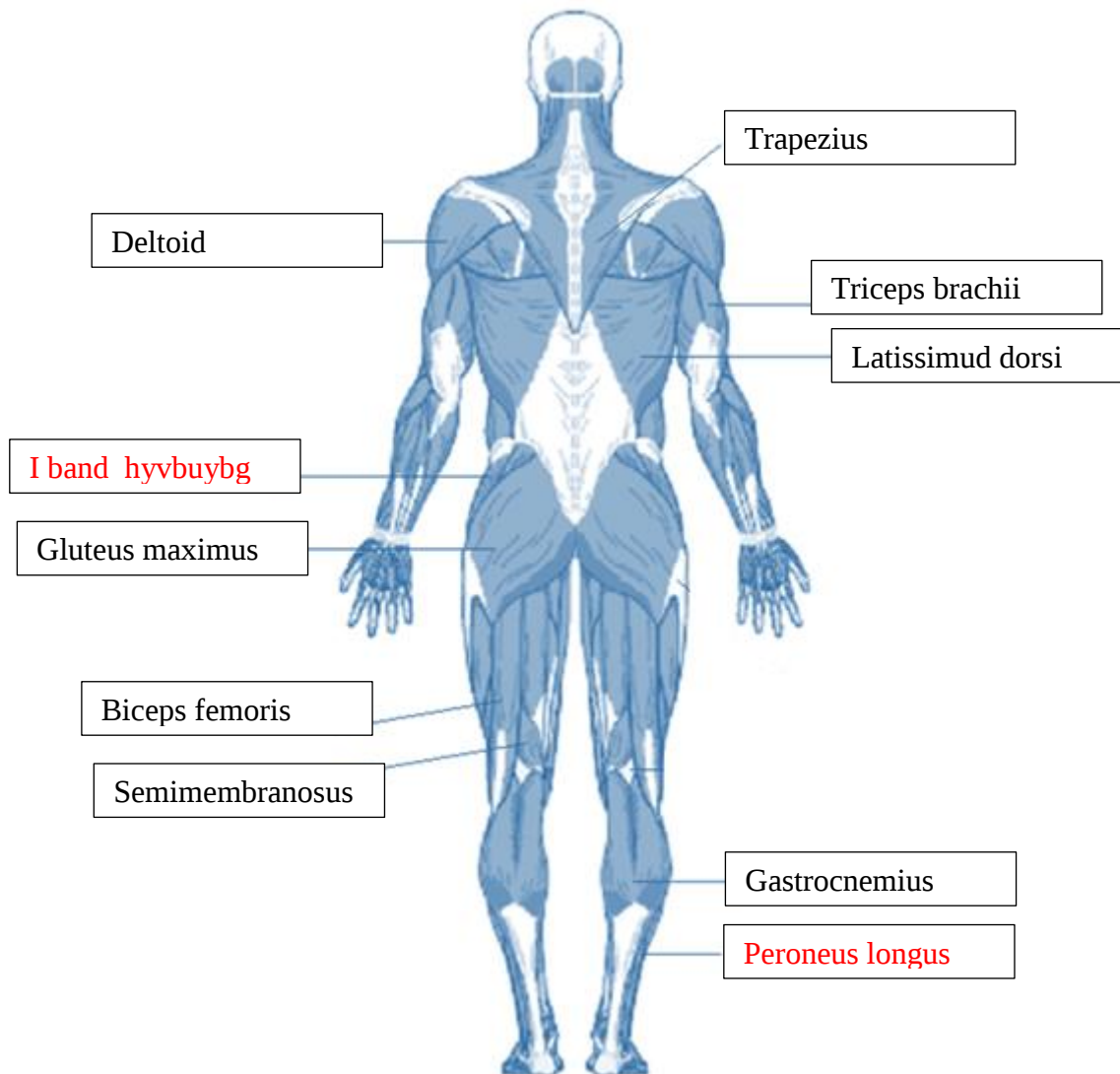
ACTIVITY 10

Name the labelled muscles shown in the sketches below.

Labelled sketch 1



Labelled sketch 2



Outcome for Activity 10

- ☐ Satisfactory
☒ Not satisfactory

Trainer/Assessor comments

Great try, please review your responses as highlighted in red.

ACTIVITY 11

Consider the role of thermoregulation.

- a) Provide a description of this term.
- b) Outline the role it plays in exercise.
- c) Describe what a person can do to ensure their body is prepared to undertake the stresses of exercise in relation to body temperature, as well as accounting for environmental conditions.

Description

Thermoregulation is a process which allows your body to maintain its core internal temperature.

Role in exercise

As a result of the inefficiency of metabolic transfer, more than 75% of the energy that is generated by skeletal muscle substrate oxidation is liberated as heat. During exercise, several powerful physiological mechanisms of heat loss are activated to prevent an excessive rise in body core temperature. However, a hot and humid environment can significantly add to the challenge that physical exercise imposes on the human thermoregulatory system, as heat exchange between body and environment is substantially impaired under these conditions.

Preparing the body for exercise

heat acclimatisation and nutritional intervention seem to be most effective. During heat acclimatisation, the temperature thresholds for both cutaneous vasodilation and the onset of sweating are lowered, which, in combination with plasma volume expansion, improve cardiovascular stability. Effective nutritional interventions include the optimisation of hydration status by the use of fluid replacement beverages.

Outcome for Activity 11

- ☒ Satisfactory
☐ Not satisfactory

Trainer/Assessor comments

Please watch your answers and don't plagiarise word for word from the internet.

ACTIVITY 12

Explain the difference between motor and sensory neurons. Be sure to refer to afferent and efferent nerves.

Motor and sensory neurons

Sensory neurons carry signals from the outer parts of your body into the central nervous system. Afferent neurons are sensory neurons that carry nerve impulses from sensory stimuli towards the central nervous system and brain.

Motor neurons carry signals from the central nervous system to the outer parts of your body. Efferent neurons are motor neurons that carry neural impulses away from the central nervous system and towards muscles to cause movement.

Outcome for Activity 12

- ☒ Satisfactory
☐ Not satisfactory

Trainer/Assessor comments

ACTIVITY 13

Why does oxygen demand increase when you are physically active?

Oxygen demand

During exercise, your muscles move more vigorously than when you are at rest. Their metabolic rate increases, therefore they need more energy. more of the chemical energy molecule ATP is produced. You need oxygen to produce ATP, so the more ATP you produce, the more oxygen your body requires.

Outcome for Activity 13

- ☒ Satisfactory
☐ Not satisfactory

Trainer/Assessor comments

CASE STUDIES

CASE STUDY 1

A 39 year old female client, Janice, has shown indications of scoliosis during her exercise pre-screening. The postural problem is causing problems with her work and has been slowly getting worse since she started playing social tennis three (3) nights a week.

Janice has come to you looking for advice on how to relieve these symptoms and improve her overall strength. She has concerns that lifting weights will make her bulky and put her at risk of further injury.

Respond to the following points:

- a) Write a 200 word response to Janice allaying her concerns and giving suitable advice. Be sure to consider the following:
 - What anatomical positioning would indicate these symptoms
 - Why the factors indicated would make her muscles imbalanced
 - Where to access further information to help you prior to writing Janice's program
 - Any Allied Health Professionals (AHPs) you would recommend Janice visit prior to commencing her training program with you
- b) Using the template below, write a program from Janice to commence her training with you. Be mindful of the following points:
 - Janice has never been to the gym before and intends to come to you three (3) times a week initially
 - Janice's doctor has recommended that she improve her lower back and abdominal strength, as well as improve the balance of strength in her upper back
 - Currently, Janice's right side is much stronger than her left
 - Ensure you provide exercises to prevent the development of pathological postures and provide correction of joint alignment
- c) Explain how both the *Golgi tendon reflex* and the *Stretch reflex* will potentially assist Janice. Include a description of how the reflex arc works and the response it will have.

Advice to Janice

An anatomical positioning exam would confirm if Janice has scoliosis. It would show that she could not stand upright therefore concluding this theory. An imbalance of muscles would be evident in this exam due to abnormal lateral curvature of the spine therefore obstructing certain areas of the body. To access further information on writing Janices program I would contact both osteopaths and chiropractors to agree on suitable exercises. Additionally a GP should be contacted during the process.

FIT TO LEARN PROGRAM CARD				
Name	Janice			
Trainer	Jack			
Date	2018			
Goals/Aims	To relieve scoliosis symptoms and improve overall strength.			
Contraindications	Scoliosis			
Session length	1 hr			
Exercise	Sets	Reps	%1RM/Weight	Rest
<i>Squat</i>	3	8-10	70%	60 sec
Deadlift	3	8	30%	80
Lat pull down	3	8	30%	60
Hanging straight from bar	5	Time 45sec	-	45
Plank	5	30 sec		60
Yoga	-	-	-	-
Overhead press		6	30%	30
Cardiovascular training method	Time/Distance		Level/Resistance/Intensity	
Cycling	3km		50% full intensity	
Cool down	hydrotherapy			
Stretches	Bending in direction of curve, static chest stretch.			

Outcome for Case Study 1	☐ Satisfactory ☒ Not satisfactory
Trainer/Assessor comments	Please go into more detail for your response for a) the question asks for 200 words. Please answer c) Please review your program card, deadlifts and certain yoga moves for example is a training contradiction for a client with Scoliosis.

CASE STUDY 2

Steven is a 22 year old athlete who is trying to transition from a junior career as a 100m sprinter into playing state league Australian Rules football. While he is very lean and muscular, he says that he is feeling very tired after the first 10 minutes of each quarter. Also, as a result of moving from a short distance sport to an endurance sport, he is finding the DOMS he is experiencing seem to be lasting longer than the other members of his team.

Steven has always played sport but is wants to better understand how different energy systems and training styles can impact on his health, performance and recovery.

Respond to the following points:

- Using Steven's sports and symptoms, describe how understanding muscle types, energy systems and training methods can help to improve sport performance. Include definitions of key terms.
- What training advice would you give Steven to help make his transition to a new sport easier in the coming months?
- Explain the role the nervous system plays in Steven's training.

	Response
a)	Steven has transitioned from a sport which required fast twitch muscles and short bursts of high intensity to an endurance sport requiring stamina and slow twitch muscle fibres. This means that his body will need to adjust and correct training methods. Switching from hill sprints and explosive box jumps to long jobs and cycling as training. As Steven is able to comprehend the differences between the sports and has an understanding of the different muscle fibres required, Steven will be able to use his athletic background to improve his performance in AFL.
b)	I would advise that Steven make the following training adjustments, Switching from hill sprints and explosive box jumps to long jobs and cycling.
c)	Aerobic exercise actually decreases activity in your sympathetic nervous system. Involuntary processes in your body such as heart rate and blood pressure are controlled by a segment of your nervous system called the autonomic nervous system.

Outcome for Case Study 2	☐ Satisfactory ☐ Not satisfactory
Trainer/Assessor comments	a) Great start for question a), please just elaborate on energy systems in your answer also. Please go into more detail for b) with recommendations on training advice for transitioning over a couple of months. Great work for c) please relate your answer back specifically to Steven's training.)

PRACTICAL TASK

You are required to have a suitable observer verify your ability to complete the following tasks. These tasks may be simulated or real.

TASKS	VERIFIED
A. You are to plan for and provide five (5) clients with instruction on the following body systems – cardiovascular, respiratory, musculoskeletal (with attention to bone strength, muscle endurance, muscle strength), nervous and digestive. Your clients will include beginners, intermediate and advanced participants, and will require instruction for low and high impact. During each client session, you are to complete the following: • Explain and demonstrate: ○ The major movements of the body, while identifying major muscles ○ Actions of major joints during exercise ○ Relevant information regarding structure and function of skeletal muscle, and process of muscle contraction during exercise ○ Muscle actions and functions during different types of contractions • Complete an evaluation of your work (including associated documentation) identifying improvements for your professional practice	☐

Outcome for Practical Task	☐ Satisfactory ☐ Not satisfactory
Trainer/Assessor comments	