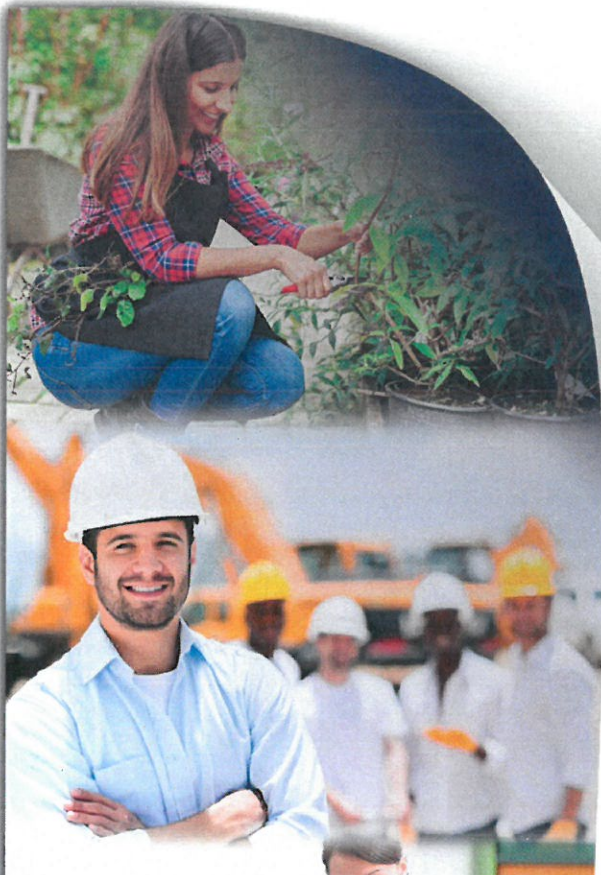


**SISFFIT004 Incorporate
anatomy and physiology
principles into fitness
programming**



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ASSESSMENT FOR SISFFIT004

Student name	Benjamin Neilson
Date of assessment submission	30/05/2017
Trainer/Assessor's name	Kymberley Sant
Date of assessment marking	8/06/2017
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 X ☐ Muscle, Fascia, Cartilage, and Tendons	☐
5. What are the major muscles required for the flexion and extension of the <u>elbow</u> ? ☒ Quadriceps and Hamstring ☐ Pectoral and Latissimus Dorsi X ☐ 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 bicep 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.

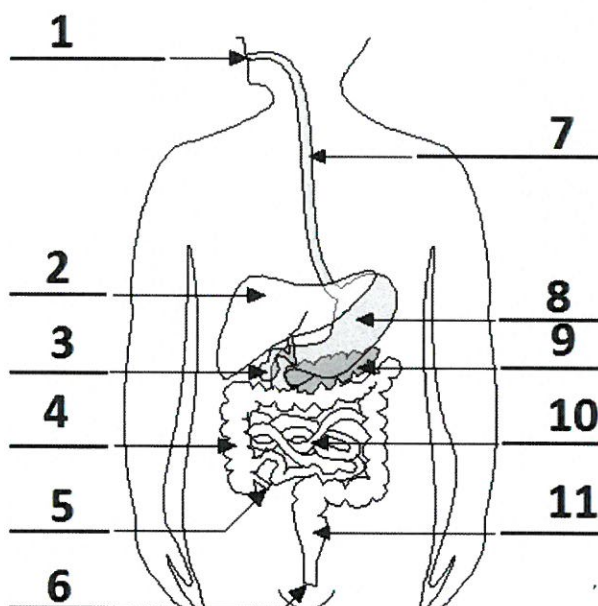
Letter	Term
I	Flexion
B	Extension
A	Adduction
K	Abduction
J	Pronation
G	Supination
F	Dorsiflexion
E	Plantarflexion
C	Circumduction
B	Inversion
D	Eversion

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.



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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

Good Try! 😊

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

A standard position of the body: standing erect, facing directly forward, feet pointed forward and slightly apart, and arms hanging down at the sides with palms facing forward. ✓

Relation of health screening

This position is used as a reference to describe sites or motions of various parts of the body. This position makes it easy for scanning of all parts. ✓

posture

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

Please see attached document with details of the oxygen molecule

Outcome for Activity 2

- ☐ Satisfactory
☒ Not satisfactory

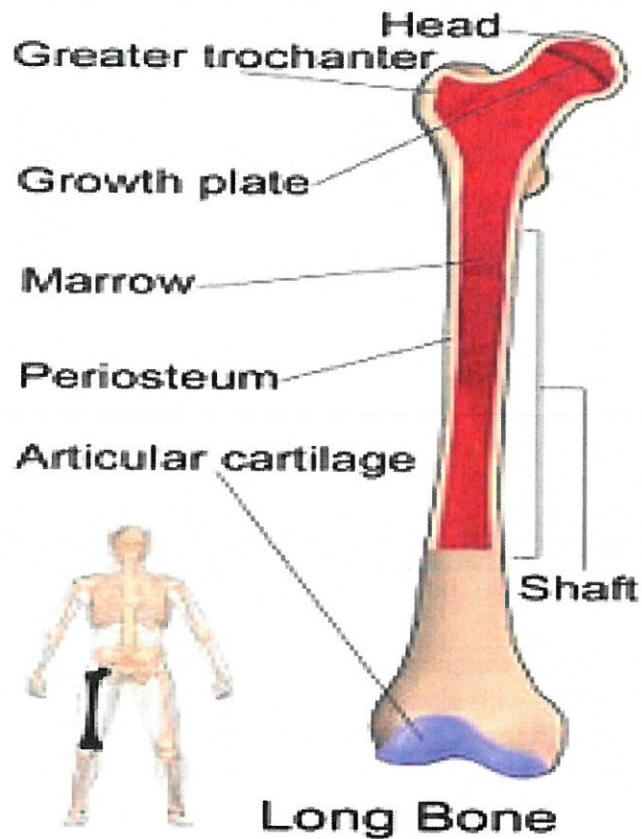
Trainer/Assessor comments

See Notes in your attached document.

ACTIVITY 3

Draw and label a sketch of a long bone.

Labelled sketch



Outcome for Activity 3

- ☐ Satisfactory
☒ Not satisfactory

Trainer/Assessor comments

Please label bone structure rather than bone structure.
 ie: Tibia (shin bone).

ACTIVITY 4

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

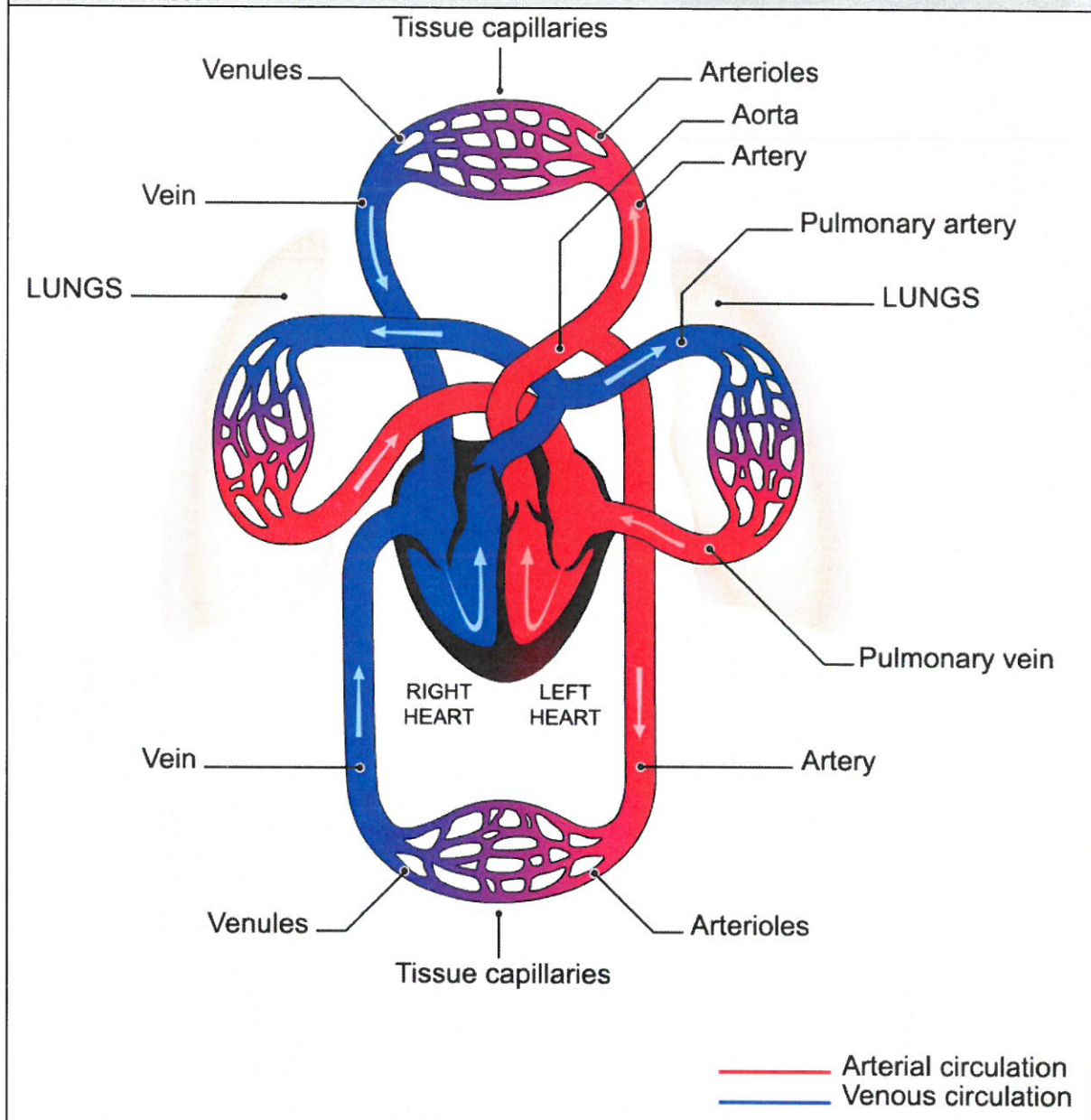
Muscle 1	
Name of muscle	Skeletal Muscle
Description and location	Skeletal Muscles are those which attach to bones and have the main function of contracting to facilitate movement of our skeletons. They are also sometimes known as striated muscles due to their appearance. The cause of this stripy appearance is the bands of Actin and Myosin which form the Sarcomere, found within the Myofibrils.
Muscle 2	
Name of muscle	Smooth Muscle
Description and location	Smooth muscle is also sometimes known as Involuntary muscle due to our inability to control its movements, or Unstriated as it does not have the stripy appearance of Skeletal muscle. Smooth muscle is found in the walls of hollow organs such as the Stomach, Oesophagus, Bronchi and in the walls of blood vessels. This muscle type is stimulated by involuntary neurogenic impulses and has slow, rhythmical contractions used in controlling internal organs, for example, moving food along the Oesophagus or constricting blood vessels during Vasoconstriction
Muscle 3	
Name of muscle	Cardiac Muscle (heart muscle)
Description and location	This type of muscle is found solely in the walls of the heart. It has similarities with skeletal muscles in that it is striated and with smooth muscles in that its contractions are not under conscious control. However this type of muscle is highly specialised. It is under the control of the autonomic nervous system, however, even without a nervous input contractions can occur due to cells called pacemaker cells. Cardiac muscle is highly resistant to fatigue due to the presence of a large number of mitochondria, myoglobin and a good blood supply allowing continuous aerobic metabolism.

Outcome for Activity 4	☐ Satisfactory ☒ Not satisfactory
Trainer/Assessor comments	Refer to attached feedback.

ACTIVITY 5

Draw and label a sketch of the cardiovascular system.

Labelled sketch



Outcome for Activity 5	☒ Satisfactory ☐ Not satisfactory
Trainer/Assessor comments	

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 and antagonists. Agonist muscles and antagonist muscles refer to muscles that cause or inhibit a movement. Agonist muscles cause a movement to occur through their own contraction

Name the muscles ↑

Synergists

The synergists muscle when performed correctly will generate with another muscle to perform the movement. The role for this particular body part would be to help the chest in a way to perform the movement properly and correctly meaning, when performing a push up the synergists will concert with the chest and arms. ✓

Connective tissue

The connective tissue is what is holding the chest muscle. When performing a push up people would need to get a good stretch all the way to the ground and backup to tear the tissue so that the person can re fill the muscle with the right amount of protein and foods to grow and get stronger ✓

Fixator or Stablizer

A fixator is a stabilizer that acts to eliminate the unwanted movement of an agonist's, or prime movers, origin. Many muscles are attached to more than one bone. The fixator muscle helps keep out all the other muscles so that the performer can really keep muscle mind to the chest and a little triceps to isolate.

Prime Mover

The prime mover is a muscle that acts directly to bring about a desired movement and for that to help for performer focus more and what they are working and to cut out and other muscle for joining when they are unwanted ✓

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 * NOT answered.

Description

In full (actin-)myosin cross-bridge in muscle, strictly refers to the molecular structure consisting of a myosin head-group bound to an actin molecule. Widely, though loosely, also used for the head-group alone, particularly when seen as an ultra-structural component in a striated muscle fibre. Cross-bridge cycle of force-generating attachment/detachment interactions between myosin head-groups and actin, powered by the hydrolysis of ATP. See also length-tension relationship, muscle contraction, myosin ?

Outcome for Activity 7

- ☐ Satisfactory
☒ Not satisfactory

Trainer/Assessor comments

Please re-write using your words!

ACTIVITY 8

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

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

Description

Fast twitch is contracting rapidly, thus providing strength rather than endurance

Slow twitch is contracting slowly, providing endurance rather than strength

X

Sports where most used

Slow twitch muscle fibres would be best for long distance running or cycling to help with endurance. The fast twitch fibres would be good for rapid movements like jumping to catch a ball so nfl, rugby or afl and also sprinting short distances so 100m sprints

✓

Outcome for Activity 8

☐ Satisfactory

☒ Not satisfactory

Trainer/Assessor comments

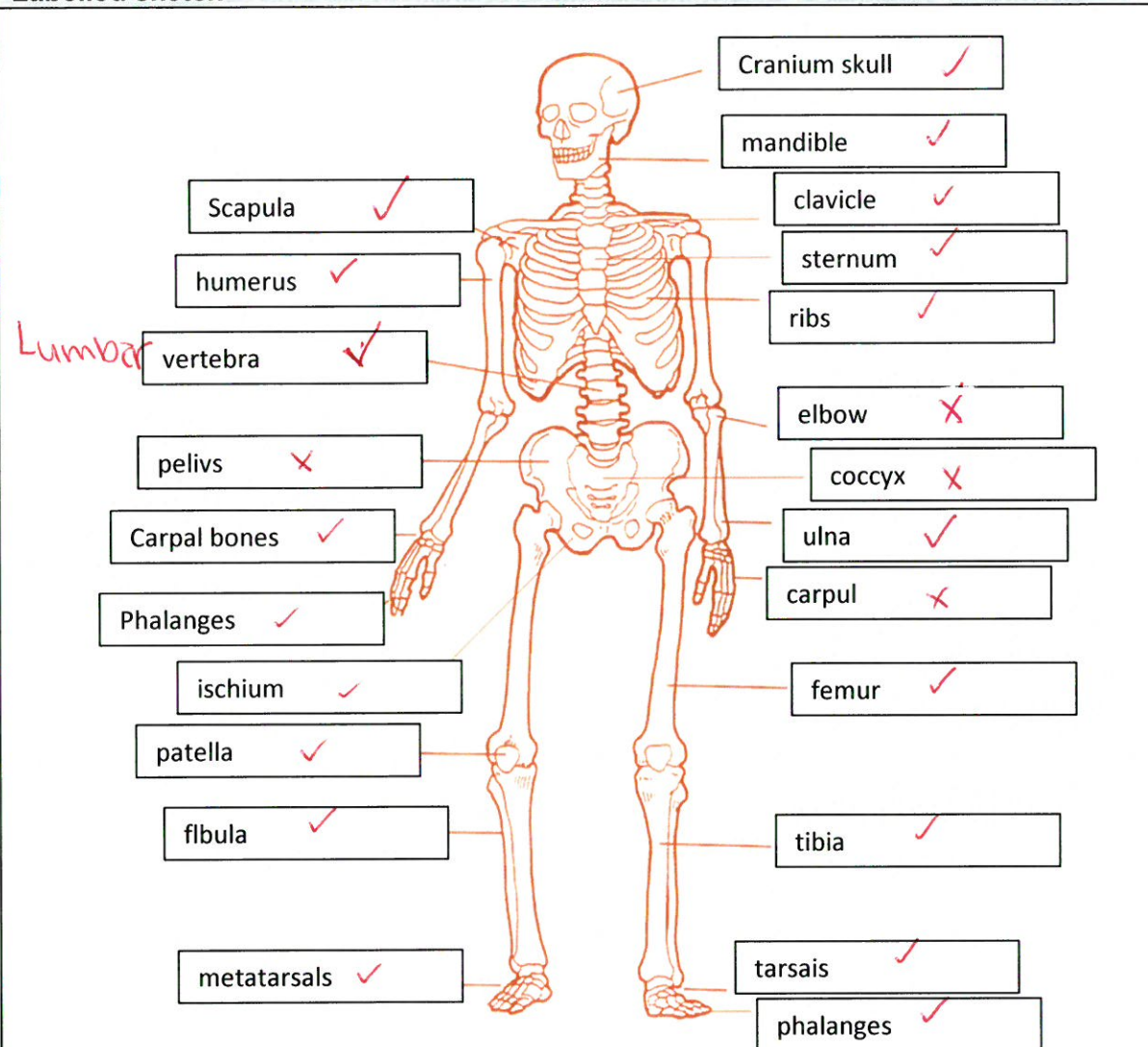
Please use your own words for description.

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

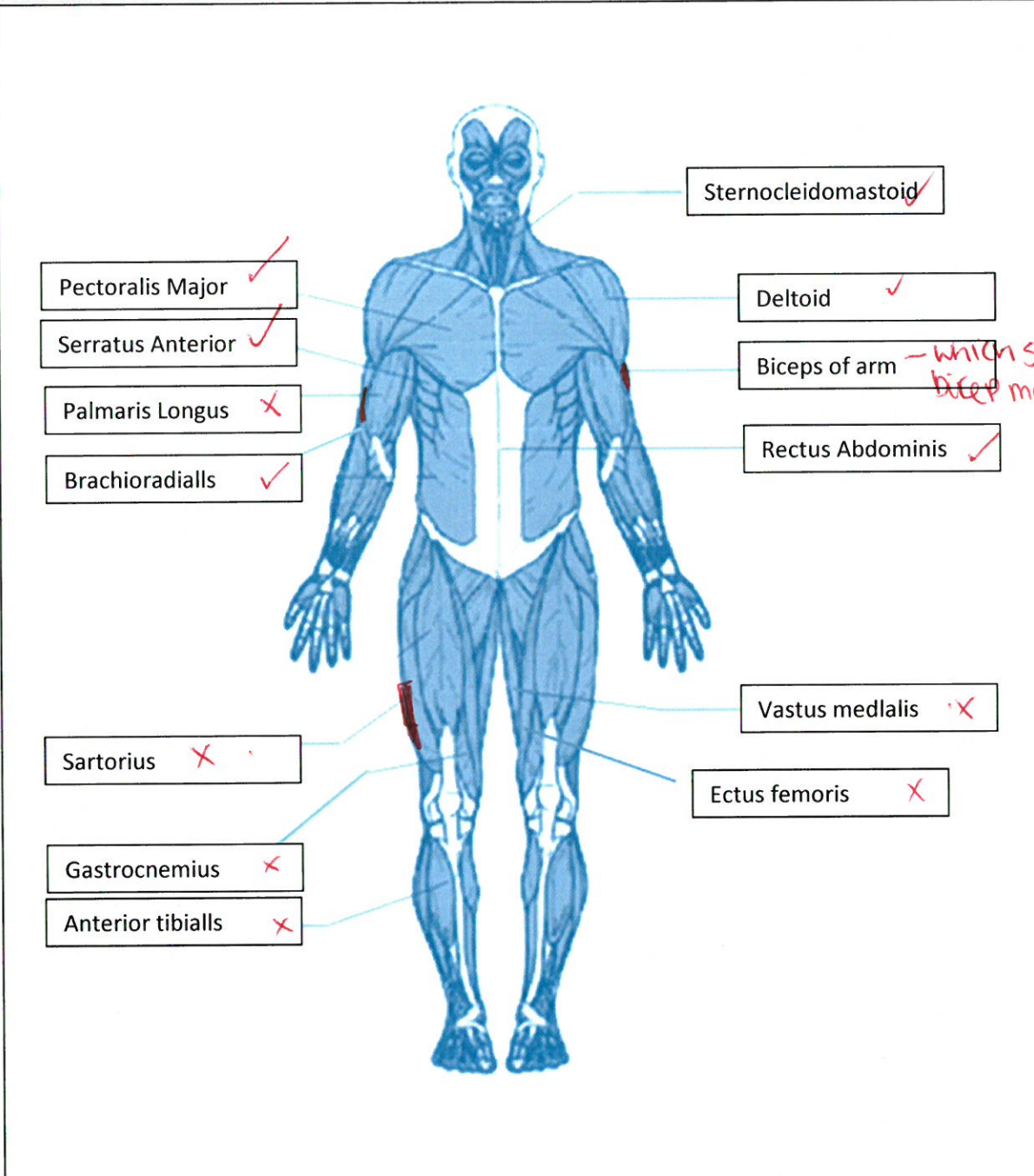
Clavicle, mandible and sternum ✓

Outcome for Activity 9	☐ Satisfactory ☒ Not satisfactory
Trainer/Assessor comments	Very close!

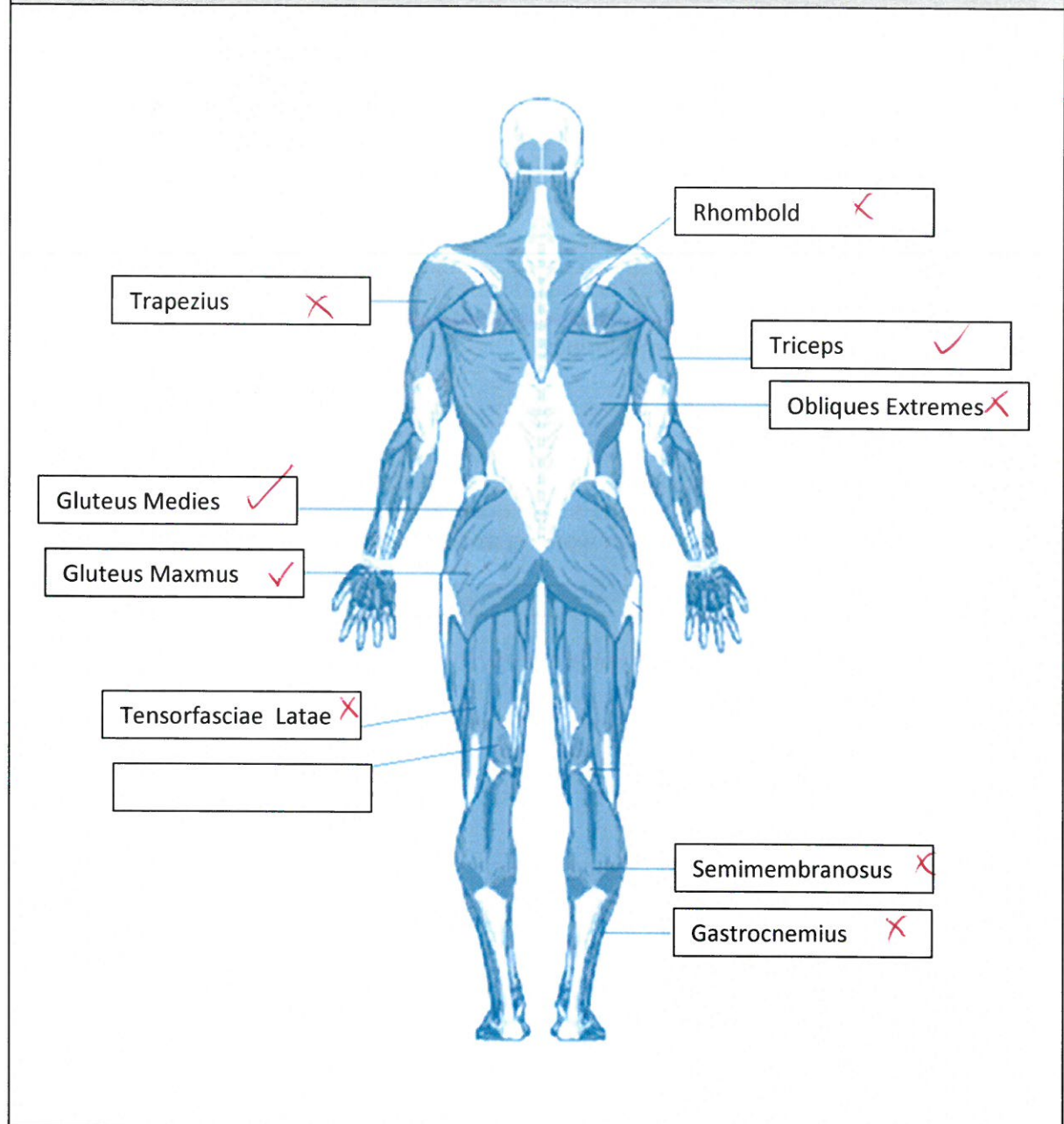
ACTIVITY 10

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

Good try!

ACTIVITY 11

Consider the role of thermoregulation.

- Provide a description of this term.
- Outline the role it plays in exercise.
- 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 that allows your body to maintain its core internal temperature. All thermoregulation mechanisms are designed to return your body to homeostasis. This is a state of equilibrium,

x

Not your own words.

Role in exercise

Maintaining ample hydration can be challenging for participants in outdoor and indoor aquatic exercise classes. During all types of exercise the body's ability to thermoregulation is challenged. Heat is produced as a bi product of metabolism. During exercise heat is produced mainly from working muscle contractions and core temperature can go above 40c

Preparing the body for exercise

Pre-exercise screening
 Visit your doctor before starting physical activity
 Setting goals for physical activity
 Start gently
 Stretching warming up and cooling down
 Comfortable clothes and shoes

Outcome for Activity 11

- ☐ Satisfactory
☒ Not satisfactory

Trainer/Assessor comments

ACTIVITY 12

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

Motor and sensory neurons

The cell body of a neuron holds a nucleus and organelles that carry out basic cell functions, such as protein synthesis, transporting materials and producing energy. A neuron also has special parts that allow information to move. Dendrites are branch-like structures that receive signals. The axon, which often resembles a long tail, takes messages away from the cell. The axon ends in a terminal containing a chemical called a neurotransmitter, which allows the signal to move across the space between the cell that sends information and the cell that receives it. When axons and dendrites of different cells are bunched together, they create nerves. Ganglia are groupings of many neurons' cell bodies. The processes conducted by nerve cells happen incredibly fast, in thousandths of a second. That is why the human body reacts so quickly to stimuli in the environment. A hand touching a hot stove is removed almost immediately so that serious injury does not occur.

Outcome for Activity 12

- ☐ Satisfactory
☒ Not satisfactory

Trainer/Assessor comments

Please re-answer using your own words.

ACTIVITY 13

Why does oxygen demand increase when you are physically active?

Oxygen demand

Your muscles are working harder during exercise and that means their demand for oxygen increases. This happens because oxygen is needed to burn calories more efficiently. Since the blood picks up oxygen in the lungs, and the demand for oxygen increases during exercise, the lungs must work harder. With a faster breathing rate, more oxygen is picked up at the lungs for delivery to the working muscles.

Outcome for Activity 13

- ☐ Satisfactory
☒ Not satisfactory

Trainer/Assessor comments

Please use your own words.

- A protruding shoulder blade
- Tilted waist

Muscles Imbalanced

Study continues on muscle imbalances and scoliosis to see if a predictable pattern of muscle imbalances occurs within certain predictable patterns of change associated with scoliosis.

Access Information

www.informationvine.com/ScoliosisExercises

www.healthline.com/health/scoliosis

www.youtube.com.au

www.spine-deformity.org/home.

Allied Health Professionals

- See your doctor ✓
- Referral to a Specialist ✓
- Exercise Sport Science Australia ✗
- Rehabilitation Counseling association of Australasia ✗
- Read the National Health Services Directory Introduction ✗

More detail needed 200 words answering all points.

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

Name: Janice
Age: 39 years old
Exercise: Tennis Three nights a week

Information for Janice

Even though Janice may have seen a doctor for the condition of Scoliosis, it is important to have another conversation with her from a Personal Trainers point of view.

Scoliosis is a word used to describe the most common type of spinal curvature. When a scoliosis develops the spine bends sideways and rotates long its vertical axis. These changes have cosmetic and physiological effects with long-term consequences which may result in significant health problems with severe curves.

The personal trainer needs to determine what if any pain is involved in this condition for Janice, before looking at planning a workout programme.

The personal trainer also needs to do research the condition the symptoms and signs of Scoliosis.

Symptoms

- One shoulder tilted down towards a raised hip
- Prominent ribs

FIT TO LEARN PROGRAM CARD				
Name	Janice			
Trainer	Benjamin Neilson			
Date	26.5.2017			
Goals/Aims	Strength in the lower back. Work on particular areas in the lower back			
Contraindications	Few, if any, absolute contraindications exist regarding scoliosis care, just as few, if any, absolute indications for intervention exist. Accepted contraindications for bracing include skeletal maturity and excessive curve magnitude			
Session length	30 mins			
Exercise	Sets	Reps	%1RM/Weight	Rest
Squat	3	8-10	70%	60 sec
Wall Straightening	3	8-10		60 sec
Side Stretch	3	8-10		60 sec
Straight leg deadlift <i>Single side deadlift would be better to strengthen weaker</i>	4	8-10		60 sec
hyperextensions ?	3	8-10		60 sec
Rack pulls	4	8-10		60 sec
superman	3	8-10		60 sec
Hug a ball	3	15		60 sec
Russian twist	3	15 each side		60 sec
Cardiovascular training method	Time/Distance		Level/Resistance/Intensity	
Rowing	5km		6 level	
Treadmill	10-20 minutes		3 incline	
Cool down	On the treadmill will perform 5 minutes cool down, with the speed on 4 with a level 5 incline and each minute lower the speed and incline until the performer has reached speed 0 and incline 0			
Stretches	Dancers stretch, cobra stretch, lying knee twist.			

Outcome for Case Study 1	☐ Satisfactory ☒ Not satisfactory
Trainer/Assessor comments	

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)	Understanding how each muscle type works and is beneficial to other muscle types will improve the knowledge on how to be better and grow stronger will the correct knowledge, with the correct timing and intensity to be performed for improving intensity will help Steven to be better with intensity and duration. Adding circuit and bodybuilding training methods will improve the body and if Steven is looking to get tone and lean he will then soon add cross fit training to improve the view of the body
b)	As a personal trainer i would recommend to train more endurance cardio before a workout and also endurance cardio at the end of the workout or cool down. Performing workouts needs to be beneficial for the sport that he will be playing
c)	The endurance side to nervous system will part take as knowing when to stop and start or how long Steven should be sprinting and then jogging or knowing when to run or not. The nervous system sending off neurons to the brain will then help and expand the brain to help Steven remember moves and improve his play set

Outcome for Case Study 2	☐ Satisfactory ☒ Not satisfactory
Trainer/Assessor comments	more detail please.

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	