AQA A Level PE

Free Topic

A Level PE Revision Booklet

Applied Anatomy & Physiology

Name: _____

Contents Page

Introduction

This revision work-booklet includes topic overview sheets and exam questions.

The topic overview sheets include a range of key information, images and diagrams in order to help you revise each topic. There are lots of gaps within these sheets which you will need to fill in. Lets look at an example.

As you can see, there are gaps in the description of gross and fine skills shown below.

Gross v Fine

- **Gross - uses _____ muscle groups which don't need to be _____**
- **Fine - uses _____ muscle groups which are more intricate & must be _____ _____**

You simply need to fill in the gaps in order to complete the definition.

Gross v Fine

- **Gross - uses large muscle groups which don't need to be precise**
- **Fine - uses smaller muscle groups which are more intricate & must be more precise**

The example below shows that you need to complete the bullet points covering dietary supplements.

Dietary supplements used by athletes may include:

After filling in the answers, the bullet points will look like this:

Dietary supplements used by athletes may include:

- **Creatine**
- **Sodium bicarbonate**
- **Caffeine**
- **Glycogen loading**

You will also be required to answer a number of exam questions throughout the booklet. Read each question carefully and pay close attention to the amount of marks available.

Health

A state of complete _____, _____ and _____ well-being, and not merely the absence of disease and infirmity.

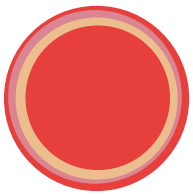
Fitness

The ability to meet the **demands** of the _____.

MAX HR = _____ - Age

_____ Volume - The volume of blood pumped out by the heart ventricles in each contraction

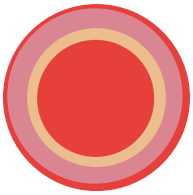
_____ Output - The volume of blood pumped out by the heart ventricles per minute
= HR x SV



_____ artery

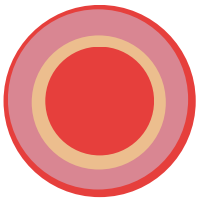
Increases in exercise

Venous Return - The flow of blood back to the heart, via the veins and specifically the vena cava

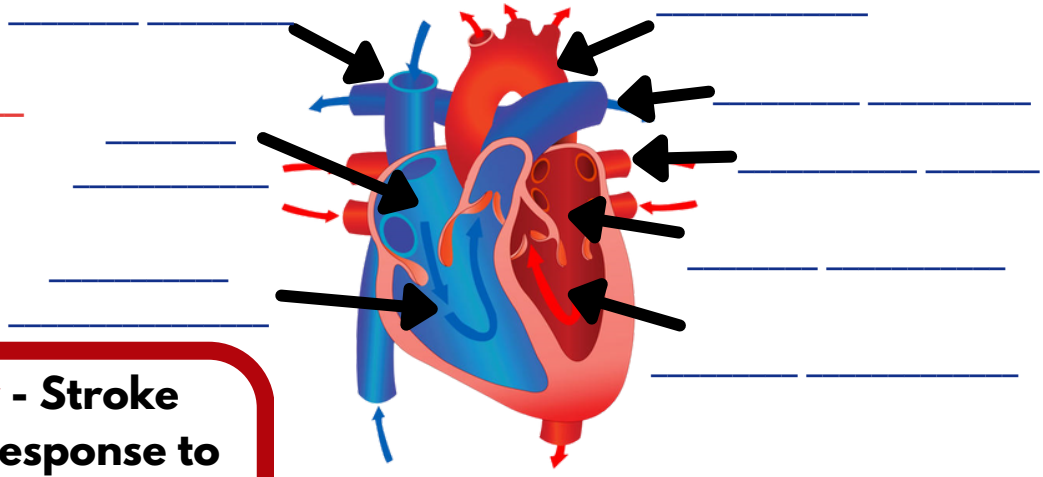


Normal artery

Applied Anatomy and Physiology - CV System



_____ artery



_____'s Law - Stroke volume increases in response to an increase in _____ _____.

Cardiac Conduction System

Sinoatrial Node (SAN)

↓

_____ Contraction

↓

Atrioventricular Node (AVN)

↓

Bundle of His

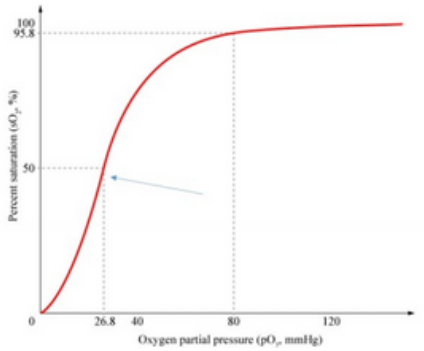
↓

_____ Fibres

↓

Ventricular Contraction

Oxyhaemoglobin Dissociation Curve



A-VO2 Diff - The _____ in the volume of oxygen between the arteries and veins.

1 Marker

1. Which of the following shows the correct order that is followed by the conduction system of the heart? (1 mark)

A) Purkinje Fibres, Bundle of HIS, SA Node, AV Node
B) AV Node, SA Node, Bundle of HIS, Purkinje Fibres
C) AV Node, SA Node, Purkinje Fibres, Bundle of HIS
D) SA Node, AV Node, Bundle of HIS, Purkinje Fibres

3 Marker

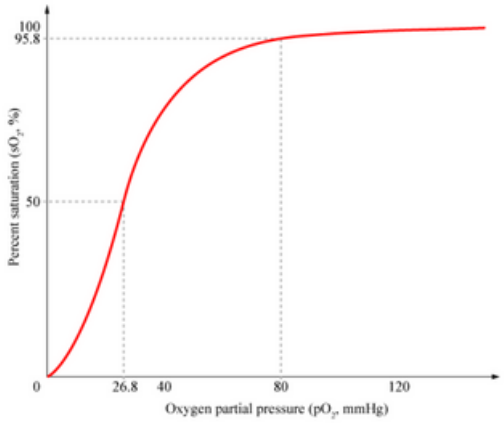
2. Starling's Law outlines that during exercise there will be an increase in stroke volume? Explain the factors leading to this increase in stroke volume? (3 marks)

4 Marker

3. If a performer exercises in warm conditions, cardiovascular drift can occur. Explain the process that leads to cardiovascular drift? (4 marks)

8 Marker

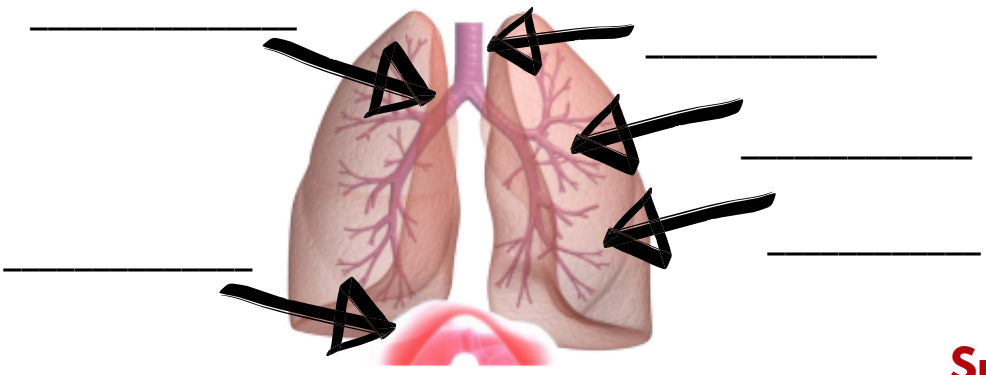
4. The graph shows the dissociation curve. Explain what the dissociation curve is and discuss the changes that occur to this curve during exercise. (8 marks)



15 Marker

5. An elite swimmer begins a 400m race. Explain the different receptor systems present in the swimmer's body and evaluate how they can have an effect on performance in swimming. (15 marks)

Lungs are the main organ involved in respiration.

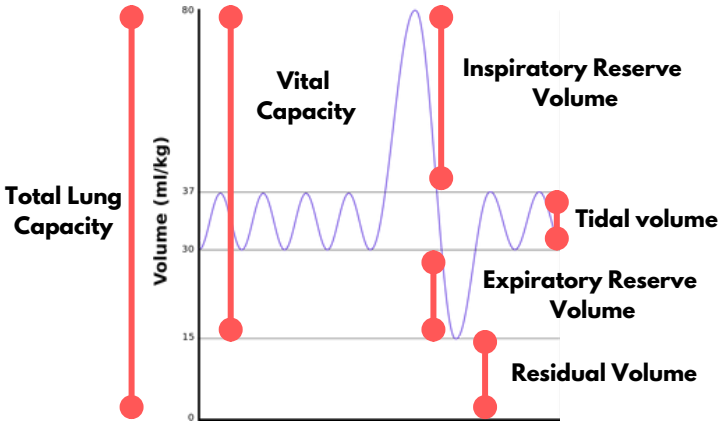


The **diaphragm** changes shape during ventilation -

_____- Contracts and flattens

_____- Relaxes and becomes dome shaped

Spirometer Trace -

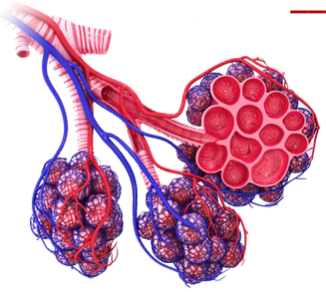


Spirometer Trace Changes in Exercise -

Tidal volume and minute ventilation _____

Inspiratory reserve volume and expiratory volume _____

Residual volume _____ _____ _____



Applied Anatomy and Physiology - Respiratory System

Gas Exchange -
Where the waste product **carbon dioxide** diffuses out of the blood and _____ diffuses into the blood. This takes place in the _____.

This is possible because of the concepts of **diffusion, partial pressure** and **concentration gradients**

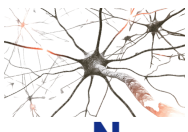
Each gas will diffuse down their own concentration gradient

_____

Baroreceptors

Chemical

Regulation of Pulmonary Ventilation



Neural

_____

_____ is the lifestyle choice with the greatest number of direct negative effects on the respiratory system

- Irritation of the _____ and _____
- Damaged cilia
- _____ constricts the bronchioles
- Carbon monoxide exposure
- Damaged alveoli

1 Markers

1.Identify which one of the following statements defines expiratory reserve volume. (1 mark)

A) The amount of air breathed in or out per breath
B) The amount of air left in the lungs after maximal expiration has occurred
C) The amount of air that can be forcibly expelled after a normal breath
D) The amount of air that can be forcibly inspired at the end of a breath

2.Identify two functions of the fast component of Excess Post-Exercise Oxygen Consumption (EPOC). (1 mark)

A) Break down lactic acid and normalise body temperature
B) Resaturate myoglobin with oxygen and normalise body temperature
C) Restore phosphocreatine (PC) and break down lactic acid
D) Restore phosphocreatine (PC) and resaturate myoglobin with oxygen

3.Which one of the following describes residual volume? (1 mark)

A) The volume of air that can be forcibly expired following a normal breath
B) The volume of air that can be forcibly inspired following a normal breath
C) The volume of air that remains in the lungs after maximum expiration
D) The volume of air breathed in or out per breath

4.Tidal volume x respiratory frequency' is an equation.

Which one of these physiological measures does the equation allow you to calculate? (1 mark)

A) Expiratory reserve volume
B) Inspiratory reserve volume
C) Minute ventilation
D) Residual volume

3 Markers

5. Explain how and why a period of continuous exercise would impact the following lung volumes.

Location	Partial Pressure of Oxygen (P02)	Partial Pressure of Carb Dioxide (PC02)
Alveoli	100 mm Hg	40 mm Hg
Blood Capillary	40 mm Hg	46 mm hg

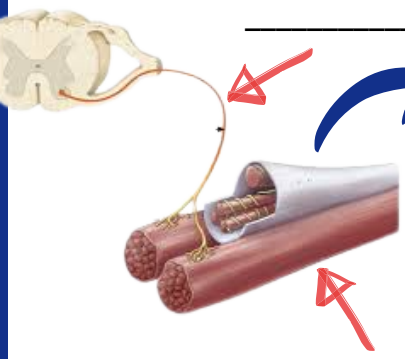
6. The table above shows the partial pressure of oxygen at the site of the lungs. Using the data from the table, explain how diffusion occurs at the site of the lungs. (3 marks)

All muscles are made up of individual fibres.
Muscle fibres can either be -
Slow _____(type I - slow twitch)
Fast oxidative _____(type IIa - fast twitch)
_____ glycolytic (type IIX - fast twitch)

Slow _____(type I)	Fast Oxidative _____(type IIa)	_____Glycolytic (Type IIX)
_____ Twitch	_____Twitch	_____Twitch
_____ Contractions	_____ Contractions	_____ Contractions
_____ Activity	Fatigue _____ quickly	Fatigue _____quickly
e.g. _____	e.g. _____m	e.g. _____m

The proportion of muscle fibres in each muscle is largely _____- however training can affect the muscle fibre composition

Motor neuron
_____



Motor
_____

Motor units consist of a group of one type of **muscle fibre** and a **motor neurone** which transmits signals from the brain to the muscle fibres in the motor unit.

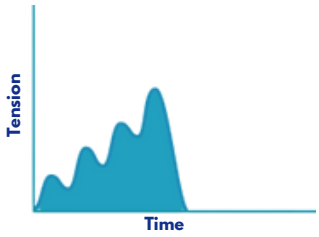
THE ALL OR NONE LAW

For a stimulus to result in a muscle contraction, the _____ must be high enough to reach the **threshold** for _____ muscle fibres within a motor units

Applied Anatomy and Physiology - Neuromuscular System

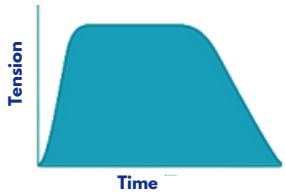
Wave Summation -

_____
_____
_____
_____
_____



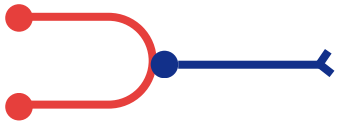
Tetanic Contraction -

_____
_____
_____
_____
_____



Spatial Summation -

_____
_____
_____
_____
_____



PNF

P_____
N_____ F_____

An advanced stretching technique used to increase flexibility

Muscle spindles and **golgi tendon organ** are the type of proprioceptors involved in PNF.

Muscle spindles send a signal to the _____ _____if a muscle is overstretching

Golgi-tendon organs detect _____ levels within a muscle to see if the muscle contracts isometrically

2 Markers

1. The neuromuscular system is responsible for creating muscular contractions. Explain the 'All or None Law'. (2 marks)

2. Fast twitch glycolytic muscle fibres (type IIx) are used to produce powerful contractions.

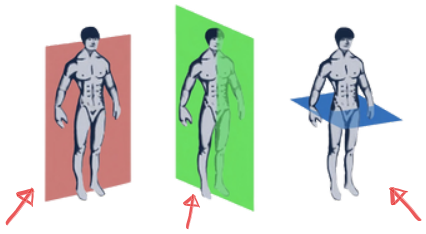
Identify two characteristics of fast twitch glycolytic muscle fibres (type IIx). (2 marks)

3 Marker

3. Explain how wave summation allows a gymnast to gain the required height in a floor routine. (3 marks)

Applied Anatomy and Physiology - Musculoskeletal System

Planes of Movement



_____ _____ _____

Axes of Rotation

_____ _____ _____

_____ **joints** allow only backward and forward motion.
There are 3 hinge joints

- Knee
- Elbow
- Ankle

_____ **joints** are when a long bone fit into a cup shaped hole allowing **circumduction**.

This includes shoulder and hip joints

If its moving - it's a synovial joint

A _____ **joint** is a place where two or more bones meet.


(Elbow Joint)


(Knee Joint)

_____

Flexion

Plantarflexion

Joint actions

_____

_____

_____

Abduction

Muscles CANNOT push - so they work in _____ **pairs.**
Whilst one muscle **pulls** (the **agonist**).
Its pair muscle will **relax** (the **antagonist**).

_____ **muscle contraction** - when a muscle contracts but its length does not change.

Isotonic muscle contraction - a muscle contracts and movement is present

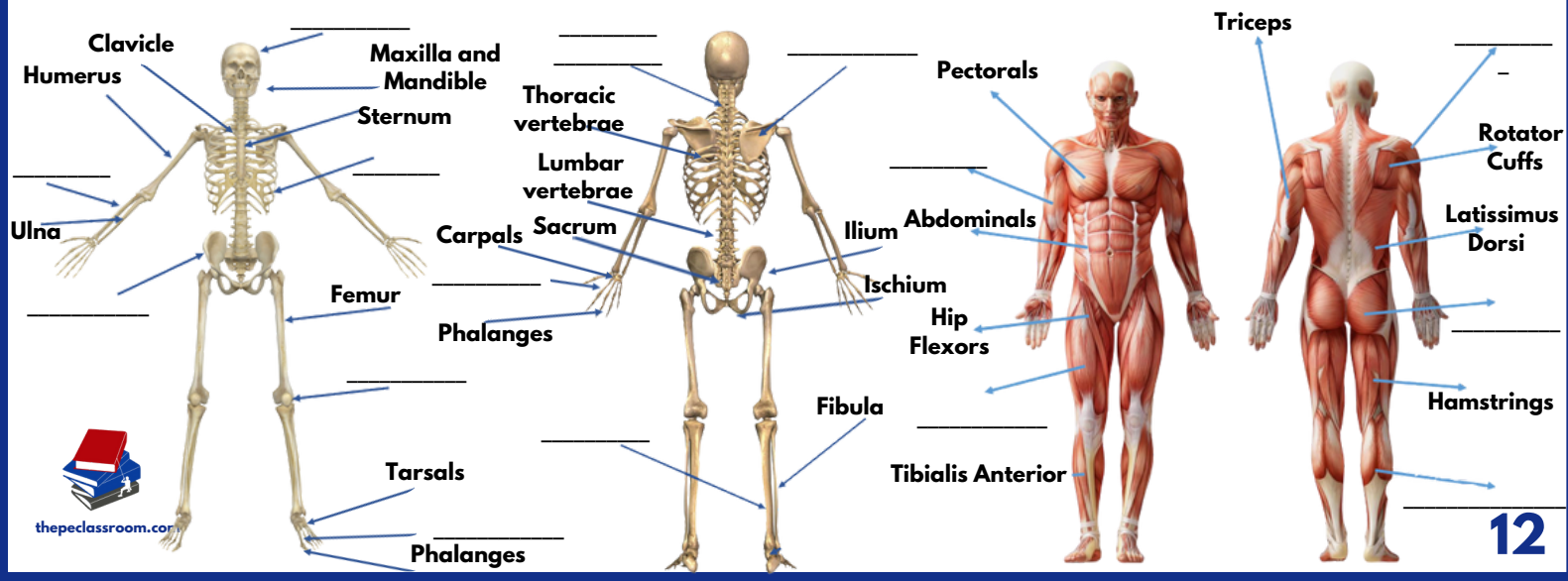
Concentric contraction - muscle shortens therefore generating force

_____ **contraction** - muscle lengthens due to a greater opposing force

The **vertebral column** is the central axis of the skeleton.

There are **5 groups** of the vertebral column -

_____ curve
Thoracic curve
Lumbar curve
_____ curve
Coccyx (tailbone)



1 Markers

1. Which of the following shows all of the articulating bones at the shoulder joint? (1 mark)

A) Clavicle, Scapula, Humerus
B) Scapula, Humerus
C) Clavicle, Humerus
D) Clavicle Scapula

2.Which of the following muscle fibre is most suited to weight lifters? (1 mark)

A) Slow Oxidative
B) Fast Oxidative Glyolytic
C) Fast Glycolytic
D) Slow Glycolytic

4 Marker

3. Outline the role of the muscle spindles and golgi-tendon organs in preventing injury (4 marks)

15 Markers

4. In 2012 Greg Rutherford won a gold medal in the long jump event at the London Olympic Games. Discuss the methods of muscle fibre recruitment that can be used to create the required muscle contraction for a long jumper and evaluate the type of muscle fibres used throughout a competition. (15 marks)

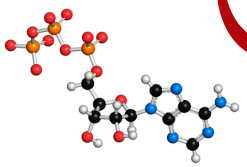
Applied Anatomy and Physiology - Energy Systems

_____Respiration
The usual process for releasing energy for your muscles - occurs **WITH** oxygen.

The equation for _____ respiration

_____+ Oxygen
=
Energy + _____+_____

Required for low intensity exercise that takes place over minutes or hours



Aerobic energy systems involved **three** stages -
1. Glycolysis
2. The _____ Cycle
3. The _____ Transport Chain

The **ATP** molecule is how your energy is stored and used in the body.
Up to **38 ATP** are produced across the 3 stages.

_____Respiration
This is when your muscles have to work at a very intense level - occurs **WITHOUT** oxygen.

The equation for _____ respiration

_____= Energy + _____ _____

Required for high intensity exercise that takes place over a short period of time

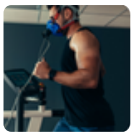
There are two anaerobic energy systems -
1. ATP-PC System
2. Anaerobic _____ System (Lactic Acid System)

Lactate _____ - the increase of lactate as a result of anaerobic activity.

Lactate _____ - the point during exercise at which lactic acid quickly accumulates in the blood.

OBLA (onset of blood lactate accumulation) - the point at which blood lactate levels go above ___ millimoles per litre.

VO2 max is the maximum volume of oxygen that can be consumed by the working muscles per minute.



Resynthesis ATP levels

After exercise, **post exercise oxygen consumption (EPOC)** will take place - it is the volume of oxygen consumed in recovery ABOVE the resting rate.

Repays the oxygen debt and begins to break down lactic acid

To resaturate myoglobin with oxygen

Factors affecting VO2 max
- Age
- _____
- Muscle Fibres
- Genetics
- Red Blood Cell Count
- _____
- Body Composition
- _____

Factors affecting rate of lactate accumulation -
- Intensity of exercise
- Fitness of performer
- VO2 max of performer
- Performer's OBLA

Measurements of Energy Expenditure
- _____ _____
- Lactate Sampling
- _____ _____
- Respiratory Exchange Ratio (RER)

Specialist Training Methods
- _____ Training
- _____ _____
- _____ (HIIT)
- _____ _____
- Quickness
- _____

1 Markers

1. Which type of muscle fibre would be most beneficial to a performer who is required to use their ATP-PC energy system? (1 mark)

A) Type I
B) Type II
C) Type IIa
D) Type IIx

2.The 'breakdown of fatty acids in order to provide ATP' is known as what? (1 mark)

A) Pyruvate
B) The Krebs Cycle
C) Beta Oxidation
D) Glycolysis

2 Marker

3. Explain what is meant by lactate threshold and OBLA. (2 marks)

3 Marker

4. Outline three factors that affect the rate at which a performer accumulates lactate. (3 marks)

4 Markers

5. A 400m runner is told that EPOC is occurring following a race.

Explain what is meant by EPOC and describe three reasons why EPOC occurs. (4 marks)

6. A coach has told a marathon runner that it is important for them to measure their Vo2 max.

Define Vo2 max and explain three factors that can affect a performer's Vo2 max score. (4 marks)

8 Marker

7. An 800m runner is looking to measure their energy expenditure during performance. Discuss the different methods of measuring energy expenditure and evaluate their appropriateness for an 800m runner. (8 marks)

15 Marker

8. Sarah is a shot putter whereas Mariam is 5000m runner. Explain the energy system used by each performer and evaluate the specialist training methods that could be used to improve performance in each event. (15 marks)

UNIT CHECKLIST
Cardiovascular System

Understanding of the impact of physical activity and sport on the health and fitness of the individual. ☐

- Health (heart disease, high blood pressure, effects of cholesterol, stroke).
- Fitness (cardiac output – trained and untrained individuals, maximal and submaximal exercise).

The hormonal, neural and chemical regulation of responses during physical activity and sport. ☐

- Anticipatory rise.
- Redistribution of blood (vascular shunting vasoconstriction, vasodilation).
- Cardiac conduction system.
- Sympathetic and parasympathetic.
- Carbon dioxide.

Receptors involved in regulation of responses during physical activity. ☐

- Chemoreceptor, proprioceptor, baroreceptor.

Transportation of oxygen. ☐

- Haemoglobin.
- Myoglobin.
- Oxyhaemoglobin disassociation curve.
- Bohr shift.

Venous return. ☐

- Mechanisms.
- Relationship with blood pressure (systolic, diastolic).

Starling's law of the heart. ☐

Cardiovascular drift. ☐

Arterio-venous oxygen difference (A-VO2 diff). ☐

- Variations in response to an exercise session.
- Variations between trained and untrained individuals.
- Adaptations to body systems resulting in training effect.

UNIT CHECKLIST
Respiratory System

Understanding of lung volumes and the impact of and on physical activity and sport ☐

- Residual volume, Expiratory reserve volume, Inspiratory reserve volume, Tidal volume, Minute ventilation

Gas exchange systems at alveoli and muscles ☐

- Oxygen and carbon dioxide
- Principles of diffusion and partial pressures

Neural and chemical regulation of pulmonary ventilation during physical activity and sport ☐

- Sympathetic and parasympathetic
- Carbon dioxide

Receptors involved in regulation of pulmonary ventilation during physical activity ☐

- Chemoreceptor
- Proprioceptor
- Baroreceptor

Impact of poor lifestyle choices on the respiratory system ☐

- Smoking
- Oxygen transport

UNIT CHECKLIST
Neuromuscular System

Characteristics and functions of different muscle fibre types for a variety of sporting activities ☐

- Slow Twitch (Type I), Fast glycolytic (Type IIx), Fast oxidative glycolytic (Type IIa)

Nervous System ☐

- Parasympathetic and Sympathetic

Role of proprioceptors in PNF ☐

- Muscle spindles, Golgi tendon organ

The recruitment of muscle fibres ☐

- Motor units, Spatial summation, Wave summation, All or none law, Tetanic

UNIT CHECKLIST
Musculoskeletal System

Joint action in the sagittal plane/tranverse axis ☐

- Shoulder and hip (flexion, extension and hyperextension)
- Elbow and Knee (Flexion and extension)
- Ankle (Plantar flexion and dorsi flexion)

Joint actions in the frontal plane/sagittal axis ☐

- Shoulder and hip (adduction and abduction)

Joint actions in the tranverse plane/longitudinal axis ☐

- Shoulder and hip (Horizontal abduction and adduction)

Types of joint, articulating bones, main agonists and antagonists, types of muscle contraction ☐

- Isotonic (concentric and eccentric)
- Isometric

UNIT CHECKLIST
Energy Systems

Energy Transfer in the body ☐

- Aerobic energy system (Glycolysis, kreb/citric acid cycle, beta oxidation, electron transport chain)
- Anaerobic energy systems (ATP-PC system, anaerobic glycolytic system)

Energy continuum of physical activity ☐

- Considerations for different intensities and durations
- Differences in ATP generation between fast and slow twitch muscles fibres

Energy transfer during short duration/high intensity exercise ☐

- Anaerobic energy system, ATP-PC system, Anaerobic glycolytic

UNIT CHECKLIST
Energy Systems (Cont.)

Energy transfer during long duration/low intensity exercise ☐

- Aerobic energy system, oxygen consumption during exercise and recovery

Factors affecting VO2 max/aerobic power ☐

Measurements of energy expenditure ☐

- Indirect calorimetry
- Lactate Sampling
- VO2 Max Test
- Respiratory exchange ratio (RER)

Impact of specialist training methods on energy system ☐

- Altitude training
- High Intensity Interval Training (HIIT)
- Plyometrics
- Speed Agility Quickness

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