The EverLearner

National Mock Exams 2024

POWERED BY ExamSimulator

Mark Scheme

BTEC Level 3 Sport Unit 1 (Anatomy and Physiology)

Please read before distributing to students.

Purpose of this document

This document and the associated question paper are based on the data analysis performed by The EverLearner Ltd and published within the 2024 infographics. Please, note the following:

- We believe this mark scheme has a very strong association with previous BTEC L3 Sport Unit 1 sample assessment material in relation to command terms, skills, extended writing requirements and topics.
- However, this is categorically NOT a mark scheme for a predicted paper. No one can accurately predict an exam paper and we make no claim to this end.
- It is vital that you only use this document internally in your school/college. Publishing the document online or sharing it in any other way is strictly prohibited as this will undermine the potentially educational experiences of students in other schools/colleges.
- Finally, please check the publication dates of the model answers for this paper as well as the associated revision sessions in May.

This mark scheme contains:

- Copy of each question for reference
- Marking guidance where appropriate
- Marking points containing alternative acceptable responses plus relevant assessment objective

How should schools use this mark scheme?

The mark scheme has been constructed specifically for the exam paper used in The EverLearner's National Mock Exams from 2024. The model answers will be available in early April and many of these questions will be discussed in the live revision show provided by James Simms (**Thursday, 2nd of May, 15:00-16:30** on youtube.com/TheEverLearner).

All questions/mark schemes are available on ExamSimulator. Please note, there are hundreds of additional questions and mark schemes on ExamSimulator covering the IGCSE PE topics and skills. Within the platform, the teacher is assisted with the marking and full diagnostic feedback is also provided. ExamSimulator is a premium resource available via TheEverLearner.com.

I hope this helps both students and teachers in their exam preparations.

James Simms

The EverLearner

Subject	Physical Education
Course	BTEC Level 3 Sport: Unit 1 Anatomy and Physiology
Time allowed	1 hour 30 minutes

Title	BTEC Level 3 Sport Unit 1 Anatomy and Physiology National Mock Exam Summer 2024

Guidance	• This paper is marked out of 80 marks. • You have 90 minutes (plus additional time for those who have Exam Access Arrangements). • Answer all questions. • A calculator is permitted for this exam. • This paper contains one 8-mark question. • Good luck.

Total marks	80

1. Describe **two** functions of long bones.

Marking points **(maximum 2)**

(1) [AO 1] Provide leverage/Leverage/Levers

(2) [AO 1] Red-blood-cell production/Erythropoiesis/Blood-cell production

2. Identify the three bones labelled on this image.

Marking points **(maximum 3)**

(1) [AO 1] A is femur/Option A is femur/A=Femur

(2) [AO 1] B is pelvis/Option B is pelvis/B=Pelvis

(3) [AO 1] C is sacrum/Option C is sacrum/C=Sacrum

3. Protection, support and store of minerals are all functions of the skeleton. Identify **one** other function of the skeleton.

Marking points **(maximum 1)**

(1) [AO 1] Attachment for skeletal muscle/Muscle attachment

(2) [AO 1] Source of blood-cell production/Blood-cell production/Production of blood cells

(3) [AO 1] To provide leverage/Leverage/Levers

(4) [AO 1] To bear weight/Weight-bearing area of the body/Weight-bearing in the foot

(5) [AO 1] Reduces friction across a joint/Reduce friction at joints/Reduce friction

4. Look closely at this image. Explain how the skeleton protects the performer during entry to the water in a high dive.

Marking guidance

Candidate must specify the bone and organ protected. Do not accept "protects vital organs", as this is too vague. Accept other suitable examples of protection relevant to the diver.

Marking points **(maximum 3)**

(1) [AO 2] Cranium protects the brain at impact/Cranium protects the brain from being damaged

(2) [AO 2] Ribs protect the heart and lungs at impact/Ribs protect heart and lungs/Ribs protect lungs

(3) [AO 2] Vertebrae protect the spinal cord at impact/Vertebrae protect spinal cord

(4) [AO 2] Pelvis protects intestines at impact/Pelvis protects reproductive organs at impact/Pelvis protects urinary bladder at impact

5. Look closely at this image. Explain how movements at the knee **and** ankle allow the player to take a successful free throw.

Marking guidance

Accept other suitable examples. Award one mark for each movement explanation. To gain full marks, three movements should be explained.

Marking points **(maximum 3)**

(1) [AO 2] Dorsiflexion at the ankle in the preparation phase allows player to be stable when taking the shot/Dorsiflexion allows player to have feet firmly on floor in preparation phase/Dorsiflexion at the ankle assists in player keeping balance

(2) [AO 2] Plantar flexion at the ankle during the execution phase assists player in balancing on toes/Plantar flexion at the ankle allows player to get maximum height as ball is released/Plantar exion at occurs due to gastrocnemius contracting which creates leg drive when releasing the ball

(3) [AO 2] Flexion at knee joint during preparation phase assists player balance/Flexion at the knee in preparation increases stability/ Flexion at the knee allow player to be in a powerful position ready for execution phase

(4) [AO 2] Extension at the knee allows player to gain maximum height in execution phase/ Extension at knee occurs due to quadrieps contracting to create power in the legs/Extension at the knee assists player to extend whole body upwards towards the basket

6. Describe adaptations to the muscular system as a result of regular circuit training.

Marking points **(maximum 3)**

(1) [AO 2] Muscular hypertrophy

(2) [AO 2] Increase in tendon strength/Strengthening of tendon

(3) [AO 2] Increase in myoglobin stores/Increase in myoglobin

(4) [AO 2] Increase in number of mitochondria/Increase in size of mitochondria

(5) [AO 2] Increase in tolerance to lactate/Increased lactate tolerance

(6) [AO 2] Increase in storage of glycogen/Increased glycogen

7. Identify the muscle group highlighted in this image.

Marking points **(maximum 1)**

(1) [AO 1] Gluteals/Gluteus maximus/Gluteus medius

8. Explain the role of this muscle group during a kick in taekwondo.

Marking guidance

Movement described must link to the the hip joint when kicking.

Marking points **(maximum 2)**

(1) [AO 2] Agonist during hip extension

(2) [AO 2] Antagonist during hip flexion during the kick

9. Describe **two** responses of the muscular system to a single exercise session.

Marking points **(maximum 2)**

(1) [AO 2] Muscles will receive more blood/Muscles will receive a greater amount of blood/Muscles receive increased blood supply

(2) [AO 2] There is an increase in muscle temperature/Increase in metabolic activity increases muscle temperature/Muscles produce heat, causing an increase in temperature

(3) [AO 2] There will be an increase in muscle pliability/Warmer muscles makes them more pliable/Fibres stretch to become more pliable

(4) [AO 2] There is an increase in lactate production/Increase in metabolic rate causes an increase in lactate production/Anaerobic activity will increase lactate production

(5) [AO 2] Microtears are tiny tears in the muscle fibres/Microtears occur when muscles are under stress/Microtears cause swelling in the muscle tissue

10. Name the muscle fibre type that would be **most** beneficial to a marathon runner.
Justify your choice.

Marking guidance

One mark for identifying the correct muscle fibre type. Two marks for justifying why this muscle fibre type is most beneficial.

Marking points **(maximum 3)**

(1) [AO 2] Slow oxidative/SO/Type 1

(2) [AO 2] Slow speed of contraction is suited to marathon/Slow speed of contraction

(3) [AO 2] Low force of contraction is relevant to marathon running

(4) [AO 2] High fatigue resistance allows muscles to continue working for long periods/High fatigue resistance is beneficial for marathon

(5) [AO 2] High aerobic capacity/High aerobic capacity is beneficial as marathon in mainly aerobic event

11. Identify the **two** parts of the respiratory system labelled in this image.

Marking points **(maximum 2)**

(1) [AO 1] A is diaphragm/A=Diaphragm

(2) [AO 1] B is pharynx/B=Pharynx

12. Describe residual volume.

Marking points **(maximum 1)**

(1) [AO 1] Amount of air that is left in the lungs after fully exhaling/Volume of air that remains in the lungs after maximum expiration/Amount of air present in the lungs following maximum expiration

13. Explain the mechanics of breathing during **inspiration** whilst exercising.

Marking points **(maximum 3)**

(1) [AO 1] External intercostals contract/External intercostals/Intercostals contract

(2) [AO 1] Diaphragm contracts/Diaphragm flattens/Diaphragm

(3) [AO 2] Ribcage moves upward and outward/Ribcage upward and outward/Upward and outward

(4) [AO 2] Increased volume of thoracic cavity/Increased volume of chest cavity/Thoracic cavity

(5) [AO 2] Reduced pressure in the lungs/Pressure in the lungs decreases/Pressure

(6) [AO 2] Gases move from high to low pressure/Air moves from high to low pressure/Gases move into the lungs

(7) [AO 2] When exercising the sternocleidomastoid is recruited/Sternocleidomastoid contracts/Sternocleidomastoid

(8) [AO 2] When exercising the pectoralis major contracts/Pectoralis major contracts/Pectoralis major

(9) [AO 2] Recruitment of sternocleidomastoid and pectorals leads to volume of thoracic cavity increasing further/Recruitment of sternocleidomastoid and pectorals leads to ribcage moving upwards and outwards further

14. Explain how breathing rate is controlled during exercise.

Marking points **(maximum 4)**

(1) [AO 2] Breathing can be controlled through neural and chemical control/Neural and chemical controls maintain breathing rate/Breathing is modified with neural and chemical controls

(2) [AO 2] Chemoreceptors detect a change in the partial pressure of gases/Changes in partial pressure of gases are detected/Any changes to partial pressures are detected

(3) [AO 2] There is a low partial pressure of oxygen/Low levels of oxygen will be detected/Low ppO_2 will be present

(4) [AO 2] There is a high partial pressure of carbon dioxide/High levels of carbon dioxide will be detected/High $ppCO_2$ will be present

(5) [AO 2] Messages are set to the medulla oblongata/Medulla oblongata receives signals from the chemoreceptors/Medulla oblongata receives a message from the chemoreceptors

(6) [AO 2] Messages are relayed to the respiratory muscles/Respiratory muscles receive signals from the respiratory control centre/Respiratory control centre sends signals to the respiratory muscles

(7) [AO 2] The diaphragm and intercostal muscles will work harder/Diaphragm and intercostals will contract with more force/The diaghragm and intercostals will contract more frequently

(8) [AO 2] More oxygen will enter the lungs/More oxygen will reach the capillaries/More oxygen will be inspired

(9) [AO 2] More carbon dioxide will be removed from the body/More carbon dioxide will be removed from the capillaries/More carbon dioxide will be expired

(10) [AO 2] Joe can inspire more oxygen and work aerobically for longer/Joe's muscles can be provided with more oxygen/Joe can work aerobically for longer periods

15. Explain why a coach would encourage an endurance athlete to attend a high-altitude training camp.

Marking points **(maximum 6)**

(1) [AO 5] Allows athlete to acclimatise to conditions/Acclimatisation/Period of acclimatisation

(2) [AO 5] Minimises the impact of decreased partial pressure of oxygen/ppO_2

(3) [AO 5] Increased release of erythropoietin/Increase in red-blood-cell production/Increase in concentration of red blood cells to make oxygen transport more e cient

(4) [AO 5] Altitude training helps to stabilise breathing rate and ventilation after acclimatisation

(5) [AO 5] Oxygen extraction becomes more efficient/Oxygen extraction efficiency leads to lower stroke volume/Cardiac output

(6) [AO 5] Reduces chances of altitude sickness/Reduces chances of becoming unwell/Reduces chance of breathlessness

(7) [AO 5] Improves sleep/Improves sleep patterns

16. Describe **three** features of veins.

Marking points **(maximum 3)**

(1) [AO 1] Thin walls/Thin walls due to carrying blood at low pressure

(2) [AO 1] Valves/Veins have valves to direct blood flow/Valves to prevent backflow of blood

(3) [AO 1] Carry deoxygenated blood

(4) [AO 1] Large lumen/Wide lumen

17. Cardiac hypertrophy and a decrease in resting heart rate are two cardiovascular adaptations to exercise.
Identify **three** other adaptations.

Marking points **(maximum 3)**

(1) [AO 1] Increase in stroke volume/Increase in resting stroke volume/Increase in exercising stroke volume

(2) [AO 1] Capillarisation of skeletal muscle/Capillarisation of alveoli

(3) [AO 1] Reduction in resting blood pressure

(4) [AO 1] Decreased heart rate recovery time/Decreased recovery time

(5) [AO 1] Increase in blood volume

18. Explain how blood flow is redirected in response to exercise.

Marking points **(maximum 4)**

(1) [AO 2] Vascular shunt mechanism redirects blood flow/Vascular shunt occurs/Vascular shunting occurs

(2) [AO 2] Blood is shunted towards skeletal muscle/Blood is shunted towards working muscles/Smaller proportion of blood is distributed to other organs of the body

(3) [AO 2] Arterioles leading to skeletal muscle vasodilate/Decreased resistance to blood flow to the muscle

(4) [AO 2] Arterioles leading to other organs vasoconstrict/Increased resistance to blood flow to other organs

(5) [AO 2] Precapillary sphincters at the muscles decrease in vasomotor tone/Precapillary sphincters at other organs increase in vasomotor tone

19. Describe the role of Purkinje fibres **and** the sinoatrial node as part of the conduction system.

Marking guidance

Sub max two marks for Purkinje fibre description. Sub max two marks for sinoatrial node description.

Marking points **(maximum 4)**

(1) [AO 2] Purkinje fibres distribute an electrical impulse through ventricle walls/Purkinje fibres distribute electrical impulse

(2) [AO 2] Purkinje fibres cause ventricle walls to contract/Purkinje fibres causes contraction

(3) [AO 2] Sinoatrial node generates electrical impulse/Sinoatrial node produces electrical impulse

(4) [AO 2] Sinoatrial node fires impulse through atria walls/Sinoatrial node fires impulse through heart walls

(5) [AO 2] Firing rate of sinoatrial node will determine heart rate

20. Look closely at this line graph, which shows the heart rate of a performer before, during and after a continuous training session.
Analyse the performer's heart rate at points A-B ,C-D and E-F.

Marking guidance

Do not accept "decrease in heart rate" for E-F, as this is too vague. Candidate must refer to a "rapid" or "sharp" decrease.

Marking points **(maximum 6)**

(1) [AO 3] A-B is anticipatory rise/A-B is anticipatory rise prior to exercising

(2) [AO 3] Anticipatory rise occurs due to release of adrenaline/Anticipatory rise due to adrenaline release/Anticipatory rise due to adrenaline in preparation for starting exercise

(3) [AO 3] C-D heart rate is constant/C-D heart rate is at a steady state/C-D heart rate plateaus

(4) [AO 3] Steady state due to oxygen supply meeting demand/Steady state due to sufficient oxygen reaching working muscles/Steady state due to working muscles getting sufficient oxygen

(5) [AO 3] E-F is a rapid decrease in heart rate/E-F heart rate decreases rapidly/E-F sharp decrease in HR

(6) [AO 3] Rapid decrease due to performer entering recovery/Rapid decrease, as exercise has stopped/Rapid decrease, as action of muscle pump reduces

21. Describe the ATP-PC energy system.

Marking points **(maximum 4)**

(1) [AO 2] PC breakdown releases energy/Releases energy/High energy bond is broken

(2) [AO 2] Energy is used to resynthesize ATP/Resynthesize ATP/Energy + ADP + P = ATP

(3) [AO 2] Using coupled reactions/Coupled reactions/Endothermic and exothermic reactions

(4) [AO 2] Reaction takes place without oxygen/Reaction without oxygen/Anaerobic reaction

(5) [AO 2] The enzyme is creatine kinase/Enzyme creatine kinase/Creatine kinase

(6) [AO 2] Reactions take place in the sarcoplasm/Sarcoplasm

(7) [AO 2] 1 ATP per PC/1 ATP 1 PC/1:1 energy yield

(8) [AO 2] Used during high-intensity activity/During high-intensity exercise/During intense activity

22. Identify the three stages of the **aerobic system**.

Marking points **(maximum 3)**

(1) [AO 1] Aerobic glycolysis

(2) [AO 1] Kreb's cycle/Citric acid cycle

(3) [AO 1] Electron transport chain/ETC

23. Evaluate the use of the aerobic energy system for the long jump.

Marking guidance

Sub max four marks for advantages of the aerobic energy system for long jump.

Marking points **(maximum 6)**

(1) [AO 4] Aerobic system is used for low-intensity work/Long jump contains more explosive elements

(2) [AO 4] Aerobic system is used between three minutes and two hours/ Long jump is very short duration

(3) [AO 4] Aerobic system is used by endurance athletes/Long jump requires power and explosiveness

(4) [AO 4] Aerobic system cannot power the most explosive parts of the long jump/Anaerobic systems are also required

(5) [AO 4] Good for recovery between jumps/To last the whole competition/When recovering between jumps

(6) [AO 4] Not good for execution of the jump/Not good for the approach/Not good for the take-off

(7) [AO 4] Long jumper will not focus solely on training their aerobic system/Also train their ATP-PC system/Also train their lactate system

24. Look closely at this image.
Analyse the role of the musculoskeletal system at the shoulder and elbow joints to allow the performer to propel the javelin.

Marking guidance

To award each marking point, there should be reference to how the skeletal and muscular systems work together during the javelin throw. Reference should only be made to movement and the shoulder and elbow. Sub max six marks for shoulder. Accept other relevant examples of movement at the shoulder or knee joint relevant to the javelin throw.

Marking points **(maximum 8)**

(1) [AO 5] Elbow extension due to triceps contracting allows performer to pull javelin backwards before throwing

(2) [AO 5] Shoulder extension due to deltoids contracting allows performer to pull javelin backwards before throwing

(3) [AO 5] Elbow flexion due to biceps contracting allows the performer to release the javelin and pull the arm through/Elbow flexion due to biceps contracting allows performer to carry javelin with a bent arm in the run-up

(4) [AO 5] Shoulder flexion due to the pectorals contracting allows the performer to release the javelin and pull the arm through

(5) [AO 5] Shoulder abduction due to detoids contracting allows the performer to pull javelin away as they approach the throw

(6) [AO 5] Shoulder adduction due to pectorals contracting allows performer to draw javelin towards body in the throwing action

(7) [AO 5] Rotation at the shoulder due to trapezius contracting allows performer to gain a full range of movement throughout the throwing action/Roatation at the shoulder allows performer to pull back and follow through effectively

(8) [AO 5] Muscles attach to bones via tendons to create movement in the elbow and shoulder during javelin throw

(9) [AO 5] Skeleton provides broad surfaces for muscles around the shoulder and elbow to attach

(10) [AO 5] Skeleton can provide protection to muscles around the shoulder and knee

(11) [AO 5] Muscles provide force of contraction to move the skeleton/Muscles contract to create movement at the elbow and shoulder in the javelin throw