The EverLearner

Mark Scheme

OCR A-Level PE - Anatomy & Physiology

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?

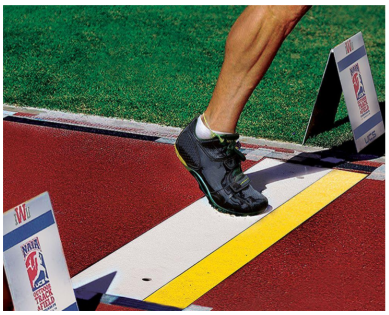
The mark scheme has been constructed specifically for the exam paper used in preparation for and during the live revision shows provided by James Simms in May 2022.

All questions/mark schemes are taken from ExamSimulator. Please note, there are hundreds of additional questions on ExamSimulator covering the AEI topics. 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

1. Complete the table to analyse the long jump take-off action at the ankle.
Ensure your responses are correctly linked to the relevant letter in your answer.



Joint	Type of joint	Joint movement	Agonist	Plane of movement
Ankle	A	B	C	D

Marking guidance

Mark the first answer for each letter/space only.
Only accept answers correctly linked to the relevant letter. For example, do not accept "A is plantar flexion."
Accept either "plantar flexion" or "plantarflexion" for B but guide students to use the correct format "plantar flexion". For reference, the correct format of the opposing movement is "dorsiflexion".

Marking points

(1) [AO 3] A is a hinge joint/A is hinge/A hinge

(2) [AO 3] B is plantar flexion/Ankle is in plantar flexion/B plantar flexion

(3) [AO 3] C is the gastrocnemius/C is the soleus/C is gastrocnemius

(4) [AO 3] D is the sagittal plane/D is saggital plane/D sagittal plane

2. Complete the table to analyse the lunge action at the hip.
Ensure your responses are correctly linked to the relevant letter in your answer.

Joint	Phase	Joint movement	Agonist	Type of contraction during the downward motion
Hip	Left (front)	A	B	C
	Right (back)	Extended	Gluteus maximus	D

Marking guidance

Mark the first answer for each letter/space only.
Only accept answers correctly linked to the relevant letter. For example, do not accept "A is iliopsoas."

Marking points

(1) [AO 3] A is hip flexion/A is flexion/A flexion

(2) [AO 3] B is the iliopsoas/B iliopsoas/B is the iliacus

(3) [AO 3] C is isotonic concentric/C is concentric/C concentric

(4) [AO 3] D is isotonic concentric/D is concentric/D concentric

3. This video shows a volleyball player performing a spike.
Using your knowledge of the musculoskeletal system and movement patterns, analyse the following:

The ankle joints during the take-off for the spike.
The knee joints during the landing phase of the spike.
Evaluate the use of plyometric training for a volleyball player.

Marking guidance

20 Mark Level Descriptors

Marking points

(1) [AO 1] Articulating bones of the ankle are the tibia, fibula and talus/Tibia fibula and talus

(2) [AO 1] Ankle is a hinge joint

(3) [AO 2] Ankle is moving with plantar flexion/Plantar flexion

(4) [AO 2] Isotonic concentric contraction of the gastrocnemius/Isotonic concentric contraction of the soleus/Isotonic concentric contraction

(5) [AO 2] Gastrocnemius is the prime mover/Gastrocnemius is agonist/Soleus is the agonist

(6) [AO 2] Tibialis anterior is the antagonist

(7) [AO 2] Plantar flexion occurs along the sagittal plane/Sagittal plane

(8) [AO 2] Plantar flexion occurs around the transverse axis/Transverse axis

(9) [AO 1] Articulating bones of the knee are the tibia and femur/Tibia and femur

(10) [AO 1] Knee is a hinge joint

(11) [AO 2] Knee is moving with flexion/Knee flexion/Flexion

(12) [AO 2] Isotonic eccentric contraction of the rectus femoris/Isotonic eccentric contraction of the vastus lateralis/Isotonic eccentric contraction of the vastus medialis

(13) [AO 2] Rectus femoris is the prime mover/Rectus femoris is agonist/Vastus lateralis is the agonist

(14) [AO 2] Biceps femoris is the antagonist/Semimembranosus is the antagonist/Semitendinosus is the antagonist

(15) [AO 2] Flexion occurs along the sagittal plane/Sagittal plane

(16) [AO 2] Flexion occurs around the transverse axis/Transverse axis

(17) [AO 1] Plyometric training is eccentric contraction rapidly followed by concentric contraction/Eccentric then concentric contraction/Muscle lengthens under tension and then shortens under tension

(18) [AO 2] Lower-body examples are bounding/Skipping/Depth jumps

3.	This video shows a volleyball player performing a spike. Using your knowledge of the musculoskeletal system and movement patterns, analyse the following: The ankle joints during the take-off for the spike. The knee joints during the landing phase of the spike. Evaluate the use of plyometric training for a volleyball player.

(19) [AO 2] Upper body examples are press up claps/Medicine ball throw and catch/Medicine ball work

(20) [AO 3] Plyometric training improves power/Improves explosive strength/Improves elastic strength

(21) [AO 3] Plyometric training causes an increase in the elastic recoil of muscle tissue/Elastic properties of the muscle improve

(22) [AO 3] Compared to weight training, plyometrics maintain extensibility/Does not shorten the muscle/Does not decrease range of motion

(23) [AO 3] Plyometrics causes an increased contracility of the muscle tissue

(24) [AO 3] Plyometrics improves the stretch reflex

(25) [AO 3] Plyometrics causes an increased force of the concentric phase of the movement

(26) [AO 3] Volleyball players use plyometrics because it improves the power of the serve/Smash serve becomes more powerful/Improves the height of their service jump

(27) [AO 3] Volleyball players use plyometrics because it improves the height of the jump for a spike/Spike becomes more powerful/Spike is harder to block or return

(28) [AO 3] A negative of plyometric training is it doesn't improve cardiovascular endurance/Does not develop stamina/Does not improve VO2max

(29) [AO 3] A negative is that it is maximal training which can lead to more injuries/Higher tendency to cause injury

(30) [AO 3] A negative is that plometric is weightbearing and puts stress on joints/Stress on joints/Joint stress

(31) [AO 3] As a summary, plyometrics is a suitable method for volleyball/Volleyball is a power-based sport/Plyometrics has more advantages than disadvantages for the volleyball player

Venous blood is under very low pressure.

4. Explain how venous return mechanisms ensure that sufficient blood arrives at the right atrium during exercise.

Marking guidance

No marks for stating the mechanisms. The student must state how each mechanism assists venous return.

Marking points

(1) [AO 2] Skeletal muscle pump squeezes veins and increases pressure/Veins run through muscles and this increases pressure/Muscle pump squeezes on the veins forcing blood upwards

(2) [AO 2] Gravity forces blood downwards from the upper body/Gravity can be used if the performer raises their legs/Gravity applies weight force to the blood

(3) [AO 2] Respiratory pump uses pressure differences in the thoracic cavity to aid the movement of blood/Pressure in the chest cavity moves the blood/Respiratory pump is useful for the final part of the journey

(4) [AO 2] Pocket valves in veins prevent backflow of blood during diastole/Pocket valves prevent backflow/Valves in veins keep blood moving in one direction only

(5) [AO 2] Smooth muscle around veins pulses to increase pressure in the vein/Smooth muscle squeezes on the vein/Smooth muscle constricts and dilates squeezing blood back

5. Using your knowledge of the vascular shunt mechanism, explain how blood is redistributed during recovery from exercise.

Marking guidance

Marking points

(1) [AO 2] Blood is shunted away from skeletal muscle/Blood is shunted towards other organs such as the stomach/Smaller proportion of blood is distributed to the muscles

(2) [AO 2] Arterioles leading to skeletal muscle vasoconstrict/Precapillary sphincters at the muscle increase vasomotor tone/Increased resistance to blood flow to the muscle

(3) [AO 2] Arterioles leading to other organs vasodilate/Precapillary sphincters at the other organs decrease vasomotor tone/Decreased resistance to blood flow to other organs

6. Chemoreceptors are one example of neural control of heart rate.
Identify **two** other forms of neural control and explain how each helps to regulate heart rate **after** the final whistle in a rugby match.

Marking guidance

Marking points

(1) [AO 1] Baroreceptors

(2) [AO 2] Detect decrease in blood pressure and causes heart rate to decrease/Detect decrease in blood pressure

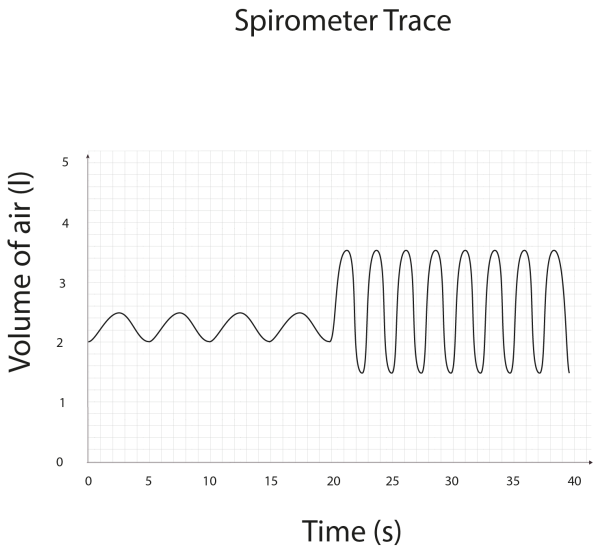
(3) [AO 1] Proprioceptors/Mechanoreceptors

(4) [AO 2] Detect decrease in muscle and contraction and cause heart rate to decrease/Detect decrease in tendon tension and cause heart rate to decrease/Detect absence of movement and cause heart rate to decrease

7. Analyse this spirometer trace showing the breathing patterns of a track athlete and do the following:
Estimate the resting tidal volume.

Estimate the exercising tidal volume.

Estimate the change in tidal volume between rest and exercise conditions.



Marking guidance

Marking points

(1) [AO 3] Resting tidal volume is approximately 500ml/0.5l/500ml

(2) [AO 3] Exercising tidal volume is approximately 2l/2000ml/2l

(3) [AO 3] Change in tidal volume is approximately 1.5l/1500ml/1.5 litres

8. At the start of exercise, the diaphragm and external intercostals contract with more force to increase tidal volume.
Explain how this change is controlled.

Marking guidance

Marking points

(1) [AO 1] Controlled by the respiratory control centre in the medulla oblongata/RCC in the brain/Respiratory control centre

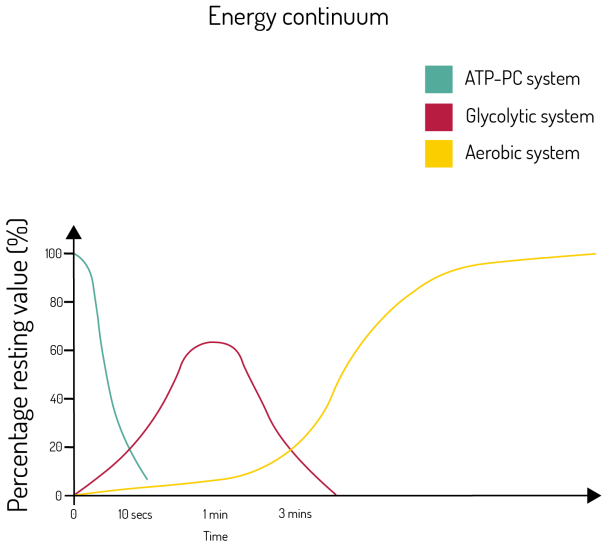
(2) [AO 1] The Inspiratory control centre is a part of the RCC which controls inspiration depth/Inspiratory control centre/ICC

(3) [AO 1] Neural control via baroreceptors and proprioceptors/Baroreceptors and proprioceptors/Mechanoreceptors

(4) [AO 1] Neural control sympathetically stimulates the diaphragm and external intercostals/Sympathetic stimulation

(5) [AO 1] Chemical control via chemoreceptors/Chemoreceptors

9. The graph shows the relative contributions of the three energy systems during a sporting performance.
Analyse the graph.



Marking guidance

No sub max for any particular system. However, students **must** make reference to all three systems to be awarded full marks.
For example, if they make six separate analytical points about the ATP-PC and Glycolytic system, then only award five marks.

Marking points

(1) [AO 3] The ATP-PC system is the predominant system for the first 8-10 seconds/ATP-PC system is the predominant system for the first few seconds/ATP-PC predominant system to begin with

(2) [AO 3] ATP-PC system drops off rapidly/Steep decline in the ATP-PC system contribution/Contribution of ATP-PC declines rapidly

(3) [AO 3] After around 10 seconds glycolytic system becomes the predominant system/Glycolytic system takes over as the predominant system after 10 seconds/Around 10 seconds glycolytic system becomes predominant

(4) [AO 3] Glycolytic system is predominant for around three minutes/Glycolytic system predominant 3 minutes/Predominant 3 minutes

(5) [AO 3] Glycolytic system contributes most at around one minute/One minute is maximal contribution of the glycolytic system/Glycolytic system 1 minute

(6) [AO 3] Aerobic system contributes at all times/Aerobic system always plays a role/Aerobic system works throughout exercise

9.	The graph shows the relative contributions of the three energy systems during a sporting performance. Analyse the graph.

(7) [AO 3] Aerobic system becomes the predominant system after 3 minutes of sustained exercise/Aerobic system takes over after 3 minutes/Aerobic system main contributor after 3 minutes

(8) [AO 3] All energy systems contribute at any one time/All energy systems work together/Work together

(9) [AO 3] This graph only applies to sustained exercise/Only works for exercise without breaks/Breaks or intervals interrupts this graph

10. Footballers competing in Mexico City see a drop in performance due to the altitude. Describe the **short-term effects** of performing at high altitude on the **respiratory system**.

Marking guidance

In order to access full marks, **three** separate short-term effects must be mentioned. Points must refer to the respiratory system.

Marking points

(1) [AO 1] Increase in tidal volume/Tidal volume

(2) [AO 1] Increase in breathing rate/Breathing rate/Increase in breathing frequency

(3) [AO 1] Decrease in partial pressure of oxygen in inspired air/Decrease in ppO2 in inspired air/Partial pressure of oxygen in inspired air

(4) [AO 1] Decrease in oxygen diffusion from alveoli to capillaries/Decrease in oxygen diffusion from blood to lungs/Decrease in diffusion gradient from alveoli to capillaries