



## Mark Scheme

# AQA 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](https://TheEverLearner.com).

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

*James Simms*

1.

The shot put is one of the most explosive events in athletics.  
Describe the predominant energy system which resynthesises ATP during this event.



### Marking guidance

Do not accept "breakdown of ATP." To access full marks, **three** separate descriptions must be made.

### Marking points

- (1) [AO 1] ATP-PC/ATPPC/PC system
- (2) [AO 1] PC breakdown releases energy/Releases energy/High energy bond is broken
- (3) [AO 1] Energy is used to resynthesise ATP/Resynthesise ATP/Energy + ADP + P = ATP
- (4) [AO 1] Reaction takes place without oxygen/Reaction without oxygen/Anaerobic reaction
- (5) [AO 1] The enzyme is creatine kinase/Enzyme creatine kinase/Creatine kinase
- (6) [AO 1] Reactions take place in the sarcoplasm/Sarcoplasm
- (7) [AO 1] 1 ATP per PC/1 ATP 1 PC/1:1 energy yield

2. Discuss the effectiveness of the anaerobic glycolytic system to resynthesise ATP.

Marking guidance

Not provided

Marking points

(1) [AO 3] No delay for oxygen/No delay oxygen

(2) [AO 3] Large fuel stores in the liver and muscle/Large glycogen and glucose stores/Large glycogen stores

(3) [AO 3] Relatively fast fuel breakdown/Glucose broken down quickly/Easy to break down stores

(4) [AO 3] Provides energy for high-intensity activities up to three minutes/Provides energy for moderately high intensity/Provides energy for high intensity

(5) [AO 3] Fatiguing byproduct of lactic acid/Fatiguing byproduct/Lactic acid as a byproduct

(6) [AO 3] Low ATP yield/Only two moles of ATP resynthesized/1:2 energy yield

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

Marking guidance

Not provided

Marking points

- (1) [AO 1] Aerobic glycolysis
- (2) [AO 1] Krebs's cycle/Citric acid cycle
- (3) [AO 1] Electron transport chain/ETC

4.

The image shows a 3,000m track race.

Analyse the role of the aerobic energy system throughout the race and the benefits of glycogen loading and bicarbonate supplementation for a 3,000m runner.



### Marking guidance

#### [15 Mark Level Descriptors](#)

Accept any other suitable analysis points about the benefits of the dietary supplements. NB\*\* only benefits of supplements are required as per question.

### Marking points

- (1) [AO 1] Aerobic energy transfer involves glycolysis, Krebs cycle and electron transport chain
- (2) [AO 1] Electron transport chain involves transfer of electrons down a carrier chain/Hydrogen is oxidised and resynthesises 34 ATP
- (3) [AO 3] Runner will finish with a quicker time
- (4) [AO 1] Binds with hydrogen ions/Mops up hydrogen ions/Bicarbonate binds with hydrogen ions
- (5) [AO 1] Glycolysis in the sarcoplasm
- (6) [AO 1] Replenishing glycogen in the first 20 minutes after exercise
- (7) [AO 3] Muscles need to stay relaxed and free of cramp to maintain an efficient running technique
- (8) [AO 1] 7-day process starting with full glycogen depletion, high intense exercise and then a diet rich in carbohydrate
- (9) [AO 1] Oxidation of Acetyl-coenzyme A
- (10) [AO 1] Carbonic acid breaks down to form CO<sub>2</sub> and H<sub>2</sub>O which is breathed out
- (11) [AO 1] Often taken with fluids
- (12) [AO 3] Less need for anaerobic energy and delay of OBLA
- (13) [AO 2] Runner competes with low to moderate intensity over a sustained period of time/Beyond 3-minute threshold

4.

The image shows a 3,000m track race.

Analyse the role of the aerobic energy system throughout the race and the benefits of glycogen loading and bicarbonate supplementation for a 3,000m runner.

(14) [AO 1] Glycogen loading is a form of dietary manipulation to increase glycogen stores above and over what are normally stored

(15) [AO 1] Krebs's cycle and electron transport chain in the mitochondria

(16) [AO 3] Increased muscle glycogen can prevent hitting the wall/Prevents glycogen depletion during the race

(17) [AO 3] Prevents denaturing of glycolytic enzymes

(18) [AO 3] Neutralises lactic acid without the need for a reduction in intensity

(19) [AO 1] Bicarbonate supplementation is taking an antacid also called soda loading

(20) [AO 3] Delays fatigue during higher intense periods of the race

(21) [AO 1] Increases glycogen storage

(22) [AO 2] Aim to run in the quickest time possible/First and last lap require more anaerobic transfer

(23) [AO 3] Runner can maintain glycogen delivery for both aerobic respiration and anaerobic respiration towards the latter stages of the race

(24) [AO 3] Run at higher intensities aerobically

(25) [AO 1] To form carbonic acid

(26) [AO 2] 3000m is an endurance event/Relies on mainly cardiovascular and muscular endurance

(27) [AO 3] Increased buffering capacity/Reduced blood acidity

(28) [AO 1] Glucose broken down into pyruvate

5.

The Denver Nuggets often have a large home-court advantage due to the opponents not having acclimatised to the altitude.

Describe the **short-term effects** of performing at high altitude.



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### Marking guidance

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

### Marking points

- (1) [AO 1] Reduced haemoglobin saturation/Haemoglobin saturation/Haemoglobin
- (2) [AO 1] Decrease in oxygen transport to the muscles/Decrease in oxygen transport/Oxygen transport
- (3) [AO 1] Decrease in diffusion gradient/Diffusion gradient
- (4) [AO 1] Increase in tidal volume/Tidal volume
- (5) [AO 1] Increase in breathing rate/Breathing rate/Increase in breathing frequency
- (6) [AO 1] Decrease in partial pressure of oxygen in inspired air/Decrease in ppO<sub>2</sub> in inspired air/Partial pressure of oxygen in inspired air
- (7) [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

6. Discuss the use of plyometrics for a high jump athlete.



### Marking guidance

Answer must include advantages and disadvantages of plyometrics and be specific to a high jump athlete.

Sub max 3 marks for advantages.

### Marking points

(1) [AO 3] Plyometrics uses larger concentric muscle contraction followed by eccentric muscle contraction to develop power to be able to clear the bar/Eccentric to concentric to develop power to jump higher/Jumper higher from increased power

(2) [AO 3] Plyometrics maintain muscle length and improves efficiency of movement for a high jumper/Maintains muscle length improving efficiency of movement for the high jumper/Improves efficiency of movement by maintaining muscle length

(3) [AO 3] Plyometrics training can be specific to muscles in the legs which are vital in the run up and take off the high jump/Specific to leg muscles for the run up and take off/Run up and take off uses the leg muscles

(4) [AO 3] Bounding activity replicates movements used in the high jump/Replicates bounding movements/Same movements used in plyometrics and the high jump

(5) [AO 3] Same recruitment of Type II muscle fibres/Recruitment of Type II fibres

(6) [AO 3] Plyometrics will develop balance and core stability which are needed in a high jump take off/Balance and core stability also developed/Take off uses balance

6. Discuss the use of plyometrics for a high jump athlete.

(7) [AO 3] However plyometrics focuses on power and will not develop flexibility needed in the back to clear the bar/Does not develop flexibility for an arched back/Does not develop flexibility

(8) [AO 3] There is a high risk of injury which may be unsuitable due to the repetitive nature of the high jump/High risk of injury could delay developments in the high jump technique/High jump technique reversed if injuries occur

(9) [AO 3] Suggested reps and sets for plyometrics are not similar to the one explosive movement of a high jump/High jump is only one explosive movement whereas bounding is 12-15 reps/12-15 reps is different to one jump movement

7.

High-intensity interval training (HIIT) can be altered in different ways. Describe **three** methods of altering a HIIT session.

### Marking guidance

In order to access full marks, **three** separate methods must be stated.

### Marking points

- (1) [AO 1] Change the work intervals/Timing of the work intervals/Work intervals
- (2) [AO 1] Change the rest intervals/Timing of the rest intervals/Rest intervals
- (3) [AO 1] Adding low intensity exercise to the rest interval/Low-intensity exercise in the rest/Active rest
- (4) [AO 1] Alter the intensity of the work interval/Intensity used/Changing intensity
- (5) [AO 1] Change the type of exercise used/Altering exercise/Type of exercise
- (6) [AO 1] Duration of the HIIT session/Duration