Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events in which all associates participate and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students’ responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students’ scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised, they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students’ reactions to a particular paper. Assumptions about future mark schemes on the basis of one year’s document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk
Level of response marking instructions

Level of response mark schemes are broken down into levels, each of which has a descriptor. The descriptor for the level shows the average performance for the level. There are marks in each level.

Before you apply the mark scheme to a student’s answer, read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Step 1 Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student’s answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level, you should look at the overall quality of the answer and not look to pick holes in small and specific parts of the answer where the student has not performed quite as well as in the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level and then use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 3 with a small amount of level 4 material it would be placed in level 3 but be awarded a mark near the top of the level because of the level 4 content.

Step 2 Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student’s answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner’s mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do not have to cover all of the points mentioned in the Indicative content to reach the highest level of the mark scheme.

An answer which contains nothing of relevance to the question must be awarded no marks.
Section A
Applied physiology

01 Heart rate is controlled by the cardiac conduction system.

Which one of the following is the order of the cardiac conduction system?  

Marks for this question: AO1 = 1

C

02 During sprinting, flexion occurs at the hip.

Identify which plane and about which axis hip flexion occurs.  

Marks for this question: AO1 = 1

C

03 A long-distance cyclist may use continuous training to increase the strength of their heart.

State how this increase in fitness can lead to an increase in the cyclist’s performance and health.  

Marks for this question: AO2 = 2

Award one mark for each of the following points.

- Performance is improved as greater maximal cardiac output/greater heart rate range (1)
- Health is improved through a reduction in blood pressure (due to stronger heart) (1)

Accept other appropriate statements demonstrating improvement in health or performance.  

Maximum 2 marks
Using Figure 1, calculate the speed of the cyclist between 40 and 70 seconds. [2 marks]

Marks for this question: AO2 = 1 and AO3 = 1

Award one mark for each of the following points.

AO2
- 300m/30s (1)

AO3
- 10m/s / m.s\(^{-1}\) metres per second (must show units) (1)

Maximum 2 marks

Tidal volume and minute ventilation of a cyclist will vary at rest and during a race.

Define tidal volume and minute ventilation. [2 marks]

Marks for this question: AO1 = 2

Award one mark for each of the following points.

Must state which term is being defined.
- Tidal volume – Amount of air breathed in or out in one breath (1)
- Minute Ventilation – Amount of air breathed in or out per minute/tidal volume x number of breaths (1)

Accept other appropriate definition of tidal volume and minute ventilation.

Maximum 2 marks

Explain how the cyclists’ increase in minute ventilation allows them to maintain performance throughout the race. [3 marks]

Marks for this question: AO3 = 3

Award one mark for each of the following points.

AO3
- Increased oxygen exchange in the alveoli (1)
- Increased oxygen delivery to the working muscles (1)
- Working muscles are able to work aerobically/with oxygen (1)
- Less lactic acid produced (1)
- Increased rate of removal of carbon dioxide in the alveoli (1)

Maximum 3 marks
06 Justify why a gymnast may include ballistic stretches in a warm up.  

Marks for this question: AO2 = 2 and AO3 = 1

Award one mark for each of the following points.

AO2 (sub max 2 marks)
• Includes bouncing/jerky movements which are replicated in some gymnastic moves (1)
• Range of motion is greater using this method of stretching therefore more appropriate to a gymnast (1)

AO3 (sub max 1 mark)
• Gymnastic moves require greater range of motion compared to other sports (1)
• Therefore they have greater flexibility so reduce risk of injury (1)

Accept other appropriate justifications for why a gymnast may include ballistic stretches in a warm up. Justifications must be relevant to a gymnast.

Maximum 3 marks

07 Muscle spindles are proprioceptors located between the muscle fibres.

Outline the role of muscle spindles.  

Marks for this question: AO1 = 2

Award one mark for each of the following points.

• Detect change in muscle length/tension/stretch (1)
• Prevent overstretching (1)
• By initiating the stretch reflex (1)

Maximum 2 marks
08 Analyse, using Newton’s First and Second Laws of motion, how a footballer will move towards the ball from a stationary position. [4 marks]

Marks for this question: AO1 = 2 and AO3 = 2

First Law
- The footballer will provide force by contracting his leg muscles (1) using this force he can overcome inertia, allowing him to move from a stationary position (1)

Second Law
- By varying the force of his muscles’ contraction/the number of motor units recruited the footballer can cause a change in momentum from stationary to moving (1) therefore the greater the force he generates the greater the acceleration to the ball (1)

Accept other appropriate responses using Newton’s First and Second Laws of motion to analyse how a footballer will move towards a ball.

Maximum 4 marks
Figure 2 shows a tennis player in stable position ready to return a serve.

Use Figure 2 to explain how the musculo-skeletal and neuromuscular systems assist the player in maintaining stability.

Marks for this question: AO1 = 2, AO2 = 3 and AO3 = 3

Students are expected to answer in continuous prose, use good English, organise information clearly and use specialist vocabulary where appropriate.

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Possible content may include:

**AO1 – Knowledge of stability and the neuromuscular system and musculo-skeletal systems**

Biomechanical factors affecting stability – Eg Height of centre of mass, ie lower centre of mass means more stability. Area of base of support, ie a wider base of support means more stability..

Musculo-skeletal system – Eg muscle attachment to bones and formation of joints allows movements into stable positions.

Neuromuscular system – Eg two types of muscle contraction – a stationary, stable position would require isometric muscle contraction brought about by the recruitment of muscle fibres.
AO2 – Application to the tennis player in Figure 2
Eg tennis player in Figure 2 is bending and therefore reducing the height of their centre of mass. Their mass is positioned over the base of support.

The tennis player has flexed the legs at the knee and hip, as shown in Figure 2, adducted the leg at the hip and dorsi-flexed the ankles.

By contracting the muscles to move the joints, the player can achieve the position shown in Figure 2. They require sufficient force/muscle-fibre recruitment to hold the body in that position. The muscles contract isometrically.

AO3 – Analysis/Evaluation of how the tennis player is able to maintain stability
Eg the area of the base of support affects stability. The base of support is the area beneath an object or person that includes every point of contact that the object or person makes with the supporting surface. The greater the base of support the more stable. The base of support for the tennis player is the area between her feet and so in Figure 2 she has her feet wide apart to increase her base of support to become more stable when receiving a serve.

Due to movement possibilities at joints, the tennis player is able to adopt this stable position. This is achieved by isometrically contracting her muscles in her legs (hamstring and quadriceps) to allow flexion at the knee and hip to achieve a lower centre of mass, therefore increasing stability. Adduction of the hip and plantar flexion at the ankle allows the player to increase the width of the area of the base of support, again increasing stability.

Whilst the performer is stationary, they will use large motor units to produce the required force to maintain the position. Due to the all or none law, all of the muscle fibres within a motor unit will contract and the amount of force produced by the tennis player will be varied by spatial summation. The stationary position will require the recruitment of fewer motor units compared to when they are moving across court to play a shot.

Credit other relevant explanations of how the musculo-skeletal and neuromuscular systems assist the player in maintaining stability.

Maximum 8 marks
Section B
Skill acquisition and sports psychology

10 Which one of the following classifications accurately describes the skill of taking a football penalty kick?  

[1 mark]

Marks for this question: AO2 = 1

D

11 Tuckman suggested the formation of a group occurs in a specific order. Which one of the following orders is correct?  

[1 mark]

Marks for this question: AO1 = 1

A

12 Figure 3 shows the success rate of two badminton players, during a number of trials, performing a serve into a target area. Using Figure 3, identify the stage of learning of player A and state two characteristics of a performer in this stage of learning.  

[3 marks]

Marks for this question: AO1 = 3

Award one mark for each of the following points.

- Performer A – Autonomous (1)  
  Maximum of 1 mark

- Skill is performed easily/habitual/sub-consciously (1)  
- High level of consistency (1)  
- Quick processing time/decisions made quickly (1)  
- Good selective attention/able to focus on relevant cues/not easily distracted (1)  
- Performer can detect and correct own errors/intrinsic feedback (1)  
  Maximum of 2 marks
13.1 To develop skills, performers will use different types of practice.

Define the term ‘massed practice’.

[1 mark]

Marks for this question: AO1 = 1

- Repeated practice of the same skill with little or no recovery periods between blocks of practice (1)

Accept other appropriate definitions of massed practice.

Maximum 1 mark

13.2 Explain three reasons why a coach would use massed practice to produce optimum improvements in performance.

[3 marks]

Marks for this question: AO2 = 3

- Performer has high levels of fitness so they can work for longer before fatigue affects the learning of the skill (1)
- Skills are discrete/simple/ballistic therefore they take a short time to perform reducing impact of fatigue (1)
- Replicates fatigue of a game situation so the performer becomes familiar with situations/condition they will need to perform the skill under (1)
- Performer is highly skilled/autonomous stage of learning/experienced therefore they are familiar with the task and need to be placed under pressure to replicate the demand of the game/physical activity (1)

Accept other appropriate explanations of why a coach would use massed practice to produce optimum improvements in performance. Answers must relate directly to improvements brought about by massed practice.

Maximum 3 marks

14 Describe what you understand by the term ‘competitive state anxiety’.

[2 marks]

Marks for this question: AO1 = 2

Award one mark for each of the following points.

- Anxiety experienced at a specific time during a competitive situation (1)
- May be cognitive and/or somatic anxiety (1)

Accept other appropriate descriptions of competitive state anxiety.

Maximum 2 marks
Performers who display a negative attitude will often disrupt the performance of a team. When using persuasive communication, explain the factors that need to be considered to change the negative attitude of a performer. [3 marks]

Marks for this question: AO2 = 3

Award one mark for each of the following points.

• Ensure the messenger is of high status/significant other/credible so that the performer values their opinion (1)
• New information given so that old beliefs are outweighed allowing a change in attitude (1)
• Current strength of attitude will impact because if the performer values their belief highly they will be more resilient to change (1)

Accept other valid explanations of the factors that need to be considered to change the negative attitude of a performer. Answers must relate to persuasive communication.

Maximum 3 marks

During competitive situations, performers may display aggressive behaviour. Suggest three strategies a coach could use to eliminate aggressive behaviour. [3 marks]

Marks for this question: AO3 = 3

Award one mark for each of the following points.

• Punish aggressive acts/fine player/drop for next match or equiv (1)
• Develop players’ code of conduct/promote fair play (1)
• Remove from situation/change position/substitution/change tactics (1)
• Encourage peer support/group pressure (1)
• Give role of responsibility/set performance goals/process goals (1)
• Highlight non-aggressive/positive role models (1)
• Reduce importance of event/avoid ‘win at all cost’ attitude (1)
• Stress management techniques/accept named examples (1)
• Rewards/positive reinforcement for assertive play (1)
• Develop fitness levels (1)

Accept other relevant strategies that a coach could use to eliminate aggressive behaviour. Answers must relate to competitive situations.

Maximum 3 marks
The way in which performers within a team relate to each other is known as cohesion. Suggest why cohesive teams tend to be more successful. [3 marks]

Marks for this question: AO3 = 3

Award one mark for each of the following points.

- Success is possible only if there is good task cohesion as the team will be working together towards a common goal (1)
- Therefore the team will work together effectively concentrating on the task/goal rather than personal disputes (1)
- Compared to social cohesion which helps the team support each other (1)
- Often success improves the overall cohesion of a team leading to further success (1)

Accept other relevant responses why cohesive teams tend to be more successful.

Maximum 3 marks
A coach may use punishment as part of operant conditioning to improve an individual’s performance.

Explain the principles of operant conditioning and discuss the impact that punishment has on motivation when developing skills. 

Marks for this question: AO1 = 2, AO2 = 3 and AO3 = 3

Students are expected to answer in continuous prose, use good English, organise information clearly and use specialist vocabulary where appropriate.

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Possible content may include:

**AO1 – Knowledge of principles of operant conditioning and motivation**

Eg operant conditioning aims to shape or modify behaviour by changing the environment by using reinforcement if the actions are correct/successful. Motivation is the performers drive/desire to succeed.
AO2 – Application for skill development in physical activity and sport.
Coaches may use positive reinforcement and negative reinforcement to strengthen the stimulus-response bond and punishment to weaken the S-R Bond. The coach will structure practices to use drills, targets, small-sided games to allow conditioned practices for trial and error learning to occur. They will provide positive reinforcement, eg praise, feedback or withdrawal of an adverse stimulus, stop shouting if using negative reinforcement. The coach would use punishment to weaken the S-R Bond.

AO3 – Analysis/Evaluation of the impact of punishment on motivation
Eg, overuse of punishment will have a negative impact because with excessive use of punishment the performer is no longer motivated to try to break the S-R bond and therefore there will be no skill development leading to further loss of motivation.

Appropriate use of punishment will lead to breaking the S-R bond (as motivated to avoid punishment) so that the correct skill can be learnt further enhancing motivation due to increased performance levels, especially if there is also appropriate use of reinforcement.

Credit other relevant explanations of the principles of punishment as part of operant conditioning and discussions on the impact of punishment on motivation when developing skills.

Maximum 8 marks
Section C

Sport and society and technology in sport

19 Which one of the following is a primary agent of socialisation?

[1 mark]

Marks for this question: AO1 = 1

A

20 Which one of the following was played in pre-industrial society?

[1 mark]

Marks for this question: AO1 = 1

D

21 Explain two characteristics of pre-industrial football.

[4 marks]

Marks for this question: AO1 = 2 and AO2 = 2

- Played occasionally/holy days (1) because no other time available to play sport (1)
- No clear division of labour/little strategy (1) as not yet rationalised (1)
- No pitch/common land between villages used (1) because minimal equipment and facilities available (1)
- Locally based (1) as poor transport/communication (1)

Accept other relevant characteristics of pre-industrial football.

Maximum 4 marks
22 Explain how the church encouraged the post-industrial game of football. [2 marks]

Marks for this question: AO1 = 1 and AO3 = 1

- Gave facilities such as church land and halls (1) therefore providing a place for people to play (1).
- Established social activities to increase opportunity to play (1), eg Sunday school teams like Aston Villa (1)
- Clergy were ‘old boys’ of public schools (1) who encouraged parishioners to play football (1)
- They established youth sections of the church (1), eg Boys Brigade/Scouts/Muscular Christianity which encouraged parishioners to play football (1)

Accept other relevant explanations of how the church encouraged the post-industrial game of football.

Maximum 2 marks

23 Explain how the modern form of association football can match the concept of sport. [6 marks]

Marks for this question: AO2 = 3 and AO3 = 3

Students are expected to answer in continuous prose, use good English, organise information clearly and use specialist vocabulary where appropriate.

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<td>Knowledge of the modern form of association football is clear and generally well detailed and applied to the concept of sport. Aspects of the modern form of association football are analysed to give appropriate and detailed links to the concept of sport. Relevant terminology is normally used. The answer sometimes demonstrates substantiated reasoning, is clear, coherent and focused.</td>
</tr>
<tr>
<td>2</td>
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<td>Knowledge of the modern form of association football is evident with some application to the concept of sport. Some aspects of the modern form of association football are analysed to give some appropriate links to the concept of sport. Relevant terminology is occasionally used. The answer occasionally demonstrates substantiated reasoning, but may lack clarity, coherence and focus.</td>
</tr>
<tr>
<td>1</td>
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<td>Knowledge of the modern form of association football is limited with limited application to the concept of sport. Limited or no evidence of analysis of the modern form of association football linked to the concept of sport. Relevant terminology is rarely used. The answer lacks substantiates reasoning, clarity, coherence and focus.</td>
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Possible content may include:

- Football has specific rules governing how it is played, which makes it highly structured therefore matching the concept of sport.
- Highly structured – time/space/rules.
- Rules externally enforced by officials.
- Winning taken seriously/serious end product.
- Skilful/refined skills.
- Training/specialisation/trials/selective.
- Administration – clubs/NGB’s.
- Display/spectators/entertainment.
- Sophisticated facilities and equipment.
- Pre-planned strategies/tactics.

Accept other relevant explanations as to how the modern form of association football can match the concept of sport.

Maximum 6 marks

24 Define the term ‘discrimination’.

[2 marks]

Marks for this question: AO1 = 2

Award one mark for each of the following points.

- To treat people unfairly (1).
- Based on a stereotype or prejudice (1).
- Can be overt – obvious OR covert – hidden (1).

Maximum 2 marks

25 Explain two reasons why raising participation in physical activity and sport will lead to increased health benefits for the individual.

[4 marks]

Marks for this question: AO2 = 2 and AO3 = 2

- By participating more frequently in weight bearing activity, the skeletal system will adapt so bones will become more dense (1) reducing the risk of osteoporosis (1)
- Increased participation in aerobic activity can reduce cholesterol levels (1) therefore the individual is less likely to suffer a stroke (1)

Accept other relevant explanations as to why the health of an individual could improve as a result of increased participation.

Maximum 4 marks
One objective of Sport England’s 2012/2017 strategy is to raise the percentage of females playing sport once a week. Figure 4 shows the once a week participation in key sports by gender.

Using the data in Figure 4, evaluate the sociological and psychological factors affecting female participation in football, athletics and tennis.

**Marks for this question: AO1 = 2, AO2 = 3 and AO3 = 3**

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**Possible content may include:**

**AO1 – Knowledge of the sociological and psychological factors affecting female participation**

Possible sociological factors – Eg discrimination, stereotyping, lack of access to clubs and competitive structures, limited access to curriculum time in schools, lack of media coverage, lack of sponsorship

Possible psychological factors – Eg social learning, reinforcement of feminine behaviour, formation of attitudes and changing attitudes, and aggression.
AO2 – Application of the sociological and psychological factors affecting female participation in football, athletics and tennis
Eg lack of interest in activities offered at school means fewer female students found an activity they enjoyed enough to continue to play in higher level club situations. Small number of lessons in school PE curriculum for each activity means that females do not have the time to develop the skills and confidence to join local clubs in the community. Narrower participation base means fewer numbers likely to progress to elite level in football, athletics and tennis. Lack of media coverage, means that there are fewer role models to inspire younger generation.

Eg Due to early socialisation, attitudes towards choice of activity formed, ie better to play ‘female’ activity such as tennis compared to ‘male’ activity football. Aggressive nature of some sports, eg football, could discourage female participation.

AO3 – Evaluation of the sociological and psychological factors affecting female participation in football, athletics and tennis
Eg The graph shows lower participation rates than men in all three named sports. This could be attributed to greater media coverage of men in these sports, providing positive role models to encourage males. However, media coverage about female performers, such as Maria Sharapova, is often about image, rather than sport, which is seen as negative media coverage.

In terms of female participation athletics is the most popular with football being the least popular. This could be attributed to a narrower participation base, meaning too few females to make up numbers in team games like football.

The higher female participation rates appear in individual sports and fitness related activities rather than competitive activities. This greater interest in gym could be attributed to it not being competitive/is more sociable, for example offering female only classes to cater for those females concerned about image and health.

Eg Attitudes towards female/male activities need to be changed through cognitive dissonance if more women are to take up certain sports, eg football. Perceptions due to social learning of football would also need to be challenged to increase participation in traditional male sports, eg football. To maintain change in attitude, there would need to be reinforcement of changed attitudes.

Credit other relevant evaluation of the sociological and psychological factors affecting female participation in football, athletics and tennis.

Maximum 8 marks
### Assessment Objective Grid

<table>
<thead>
<tr>
<th>Applied Physiology and Exercise Physiology and Biomechanics</th>
<th>AO1</th>
<th>AO2</th>
<th>AO3</th>
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AO1 % targeting knowledge in isolation  10.83%
Quantitative = 8 marks  6.67%