



---

A-level  
**PHYSICAL EDUCATION**  
**7582/2**

Paper 2 Factors affecting optimal performance in physical activity  
and sport

---

Mark scheme

June 2024

---

Version: 1.0 Final



2 4 6 A 7 5 8 2 / 2 / M S

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 which all associates participate in 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 Examiner.

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.

No student should be disadvantaged on the basis of their gender identity and/or how they refer to the gender identity of others in their exam responses.

A consistent use of 'they/them' as a singular and pronouns beyond 'she/her' or 'he/him' will be credited in exam responses in line with existing mark scheme criteria.

Further copies of this mark scheme are available from [aqa.org.uk](http://aqa.org.uk)

#### **Copyright information**

AQA retains the copyright on all its publications. However, registered schools/colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools/colleges to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Copyright © 2024 AQA and its licensors. All rights reserved.

## 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 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**

**Exercise physiology and biomechanics**

**0 1**

Which **one** of the following is an acute injury?

**[1 mark]**

**Marks for this question: AO1 = 1**

**B** – Dislocated shoulder

**0 2**

Which **one** of the following is a correct unit of measurement for acceleration?

**[1 mark]**

**Marks for this question: AO2 = 1**

**C** – Metres per second squared ( $m/s^2$ )

**0 3**

State **three** factors which affect stability.

**[3 marks]**

**Marks for this question: AO1 = 3**

- Height of centre of mass
- Area of base of support/number of contact points
- (Position of) line of gravity
- (Body) mass

Accept any other appropriate statement of factors which affect stability.

**Maximum 3 marks**

**0 4 . 1**

Height of release and speed of release are two factors affecting the horizontal displacement of a projectile.

Name **one other** factor which affects the horizontal displacement of a projectile.

**[1 mark]**

**Marks for this question: AO1 = 1**

Angle of release (1)  
A named force (air resistance/weight) (1)

**Maximum 1 mark**

**0 4 . 2** **Figure 1** shows the flight path of a shot put.

Sketch the vector components at the three points shown on **Figure 1**, which represent:

- the point of release
- the highest point of flight
- the point immediately before landing.

**[3 marks]**

**Marks for this question: AO2 = 3**

**Horizontal component**

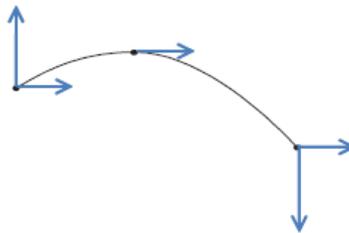
- Horizontal component equal at each point (1)

**Vertical component (submax 2)**

- (the point of release) Positive vertical component. (1)
- (the highest point of flight) No vertical component. (1)
- (the point immediately before landing) Negative vertical component. (1)

All vectors must be drawn from the correct starting points.

Vector arrows must be present and attached to the correct point on the parabolic curve



**Maximum 3 marks**

**0 5** **Figure 2** shows a gymnast performing a front tuck somersault.

Analyse how the gymnast makes use of the principle of conservation of angular momentum when performing this front tuck somersault.

**[3 marks]**

**Marks for this question: AO3 = 3**

**Tuck position**

- Gymnast tucks (distributing mass closer to the axis of rotation) reducing their moment of inertia. (1)
- Decrease in moment of inertia increases angular velocity, allowing a full rotation. (1)

**Open position**

- Gymnast opens out, (distributing mass further from their axis of rotation) increasing their moment of inertia. (1)
- Increase in moment of inertia decreases angular velocity allowing a controlled landing. (1)

Accept any other appropriate analysis of how the gymnast makes use of the principle of conservation of angular momentum when performing this front tuck somersault.

**Maximum 3 marks**

**0 6**

Following intense exercise elite athletes are required to maximise their recovery.

Analyse how nutrition can contribute to effective recovery from intense exercise, resulting in improved performance in the future.

**[8 marks]**

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

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

Level	Marks	Description
4	7–8	Knowledge is consistently accurate and well detailed. Application of breadth or depth of knowledge is clearly evident. Analysis and/or evaluation is coherently and consistently made between different relevant factors and their impact. Relevant terminology is consistently used. The answer almost always demonstrates substantiated reasoning, clarity, structure and focus.
3	5–6	Knowledge is usually accurate and detailed. Application of breadth or depth of knowledge is often evident. Analysis and/or evaluation is often made between different relevant factors and their impact, and is usually coherent. Relevant terminology is often used. The answer usually demonstrates substantiated reasoning, clarity, structure and focus.
2	3–4	Knowledge is sometimes accurate with some detail. Application of breadth or depth of knowledge is sometimes evident. Analysis and/or evaluation is sometimes made between different relevant factors and their impact, but may lack coherence. Relevant terminology is sometimes used. The answer occasionally demonstrates substantiated reasoning, but may lack clarity, structure and focus.
1	1–2	Knowledge may be limited. Application of breadth or depth of knowledge may be limited or not evident. There may be little or no analysis and/or evaluation between different relevant factors and their impact. Relevant terminology is occasionally used. The answer may lack substantiated reasoning, clarity, structure and focus.
	0	No relevant content.

**Possible content may include:**

**AO1 Knowledge of nutrition for recovery**

Following intense exercise athletes may consume the following to maximise recovery:

- Carbohydrates
- Protein
- Water
- Sodium
- Vitamins
- Creatine

**AO2 Application to recovery from intense exercise**

- Carbohydrate is required as it will have been used up to produce energy during intense exercise.
- Protein/vitamins are required for growth and repair as muscle damage will be sustained during intense work.
- Sodium/water is required to replace that which has been lost through sweat during high intensity exercise.
- Vitamins are required as they will help with the repair of tissue etc...
- Creatine is required to increase phosphocreatine stores and speed up muscle recovery after intense exercise.

**AO3 Analysis of how nutrition can contribute to effective recovery from intense exercise and result in improved performance in the future**

- Replenishing carbohydrate/creatine stores will allow the athlete to work at a high intensity again in their next training session/competition.
- Replenishing carbohydrate/creatine will allow the athlete to work hard more frequently will allow the athlete to maximise the gains they can make from regular training.
- Consuming protein/creatine for growth and repair will allow muscle damage/micro tears to be repaired more quickly and effectively.
- Consuming protein/creatine will increase the speed of recovery and increase muscular hypertrophy resulting in greater strength and power gains.
- Consuming enough water post exercise will prevent dehydration.
- If dehydration to occur it would prevent the body from getting rid of waste products eg lactic acid as quickly/prevent the normal functioning of body systems and increasing recovery time.
- Sodium stores need to be replenished for the normal functioning of muscles cells. If sodium is low this can result in cramps, decreasing recovery, and performance.

Accept any other appropriate analysis of how nutrition can contribute to effective recovery from intense exercise resulting in improved performance in the future.

**Maximum 8 marks**

**0 7**

Hayley is training for a half marathon (21 km). Her target is to run the race in 1 hour and 45 minutes.

**Table 1** shows her training programme in the 6 weeks leading up to the race.

Evaluate how well the principles of training have been applied to the training programme shown in **Table 1**.

Refer to ways that Hayley could improve her programme.

**[15 marks]**

**Marks for this question: AO1 = 4, AO2 = 5, AO3 = 6**

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

Level	Marks	Description
5	13–15	Knowledge is consistently comprehensive, accurate and well detailed. Application of breadth or depth of knowledge is clearly evident. Analysis and/or evaluation is coherently and consistently made between different relevant factors and their impact. Relevant terminology is almost always used. The answer demonstrates a high level of substantiated reasoning, clarity, structure and focus.
4	10–12	Knowledge is usually comprehensive, accurate and detailed. Application of breadth or depth of knowledge is often evident. Analysis and/or evaluation is often made between different relevant factors and their impact, and is usually coherent. Relevant terminology is usually used. The answer usually demonstrates substantiated reasoning, clarity, structure and focus.
3	7–9	Knowledge is generally accurate and sometimes detailed. Application of breadth or depth of knowledge is sometimes evident. Some analysis and/or evaluation is made between different relevant factors and their impact, but may sometimes lack coherence. Relevant terminology is used but may sometimes be missing. The answer sometimes demonstrates substantiated reasoning, clarity, structure and focus.
2	4–6	Knowledge is sometimes accurate but may lack detail. Application of breadth or depth of knowledge is occasionally evident. Some analysis and/or evaluation is attempted between different relevant factors and their impact, but is likely to lack coherence. Relevant terminology is occasionally used. The answer occasionally demonstrates substantiated reasoning, but may lack clarity, structure and/or focus at times.
1	1–3	Knowledge is limited and may lack accuracy and detail. Application of breadth or depth of knowledge is likely to be limited or not evident. There may be very little or no analysis and/or evaluation made between different relevant factors and their impact. Relevant terminology used only very occasionally. The answer often lacks substantiated reasoning, clarity, structure and/or focus.
	0	No relevant content.

**Possible content may include:**

**AO1 Knowledge of principles of training**

**Specificity**

- Training should be relevant to your chosen activities, reflecting the energy systems, muscles, and movement patterns.

**Progressive Overload**

- Training should gradually increase in difficulty to mirror improvements the athlete is making in their fitness.

This can be done by applying the following FITT principles.

- Frequency: The performer can train more often.
- Intensity: The performer can train harder.
- Time: The performer can train for longer.
- Type of Training: The performer can include different types of training to challenge the body in different ways.

**Reversibility**

- The performer must avoid detraining. If training is stopped then the adaptations which have been gained will gradually be lost.

**Recovery:** Rest days should be included as these are when the body repairs and adapts to the demands of training, gradually becoming fitter. Failure to include enough rest days can result in overtraining.

**AO2 Application of principles of training to Hayley's training programme**

**Specificity**

- Hayley's training is specific as it focuses on running.
- It also focuses on the aerobic energy system which will be the primary energy system for the race.

**Progressive Overload**

- Hayley has progressively overloaded her training by increasing the time she trains for.
- She may also be increasing the intensity by running at a quicker pace, but this is not clear from her programme as it is.

**Reversibility**

- Hayley will limit reversibility by training consistently two days a week over a six-week period.

**Recovery**

- Hayley has allowed 2/3 days recovery between sessions.

**AO3 Evaluation of how well the principles of training have been applied to the training programme shown in Table 1 with reference to improvements where appropriate**

**Specificity**

- While Hayley's training programme is specific to running and the aerobic energy system it is not specific to distance/time she intends to run for.
- Hayley could make this more specific by increasing the time/distance she runs for in week 1/ progressively overloading by larger amounts.

### **Progressive Overload**

- Hayley could achieve this by increasing her frequency in weeks 3, 4 and 5 to 3 sessions a week eg training on a Monday.
- While Hayley is increasing the time/distance she trains for it is possible this may not have a big effect on the intensity if she does this at a slower pace each week.
- Hayley could ensure the intensity increases by running each week at a quicker pace eg week 1 5:30/km, week 2 5:25/km etc.
- She could also use this session to progressively overload further adding in additional types of training, using fartlek or interval training.
- This would still benefit her aerobic system while also helping her should she need to run up a hill/increase her speed towards the end of the race.

### **Reversibility**

- Hayley is also only training twice per week which will give her plenty of **recovery** but may allow some **reversibility** to occur between sessions.

### **Recovery**

- Hayley's recovery periods are all at least 48 hours which should give enough time for replenishment of glycogen stores/recovery from DOMS etc.
- Keeping a rest day after each session/adding only one additional session would allow **sufficient recovery**.

Accept any other appropriate evaluation of how well the principles of training have been applied to the training programme shown in Table 1 with reference to improvements where appropriate.

**Maximum 15 marks**

**Section B**

**Sport psychology**

**0 8**

Which **one** of the following terms is defined as ‘individual productivity declining as group size increases’?

**[1 mark]**

**Marks for this question: AO1 = 1**

**D** – Ringelmann effect

**0 9**

Which **one** of the following attributions would be categorised as unstable **and** external?

**[1 mark]**

**Marks for this question: AO2 = 1**

**B** – I had a favourable refereeing decision

**1 0**

Bandura’s model outlines four factors which will affect a performer’s self-efficacy.

Describe **three** of these factors.

**[3 marks]**

**Marks for this question: AO1 = 3**

- (Performance accomplishment) How a performer has done in a task before. (1)
- (Vicarious experience) If a performer has seen someone perform in the task before. (1)
- (Verbal persuasion) If a performer is given reinforcement/feedback from others. (1)
- (Emotional arousal) If the performer is optimally aroused to perform the task. (1)

Accept any other appropriate description of three of the factors in Bandura’s model.

**Maximum 3 marks**

**1 1 . 1** Describe a 'performance-related goal'. Give an example from the event of javelin. **[2 marks]**

**Marks for this question: AO1 = 1, AO2 = 1**

- A goal set out to improve own personal standards/does not involve comparisons to others. (1)
- Such as beating a personal best by 1 m. (1)

Accept any other appropriate descriptions of a performance related goal and any other examples of performance related goals from the event of javelin.

**Maximum 2 marks**

**1 1 . 2** Give examples of how a javelin thrower can make sure their performance-related goal is measurable and realistic. **[2 marks]**

**Marks for this question: AO2 = 2**

- Measurable – aiming to increase the distance of their throw by 1 m/accept other distance. (1)
- Realistic – setting a distance of improving personal best by 1 m is more likely to be achieved than aiming to increase by significantly more. (1)

Give examples of how the javelin thrower can make sure that the goal they set themselves is measurable and realistic.

**Maximum 2 marks**

**1 2** Two dancers perform in front of a large crowd.

Analyse why the presence of an audience may impact the performances of each of the two dancers differently.

**[3 marks]**

**Marks for this question: AO3 = 3**

- One dancer might be a cognitive performer so the presence of a crowd would increase the likelihood of their dominant response occurring which is likely to be incorrect/social inhibition occurs. (1)
- One dancer might be an autonomous performer so the presence of a crowd would increase the likelihood of their dominant response occurring which is likely to be correct/social facilitation occurs. (1)
- One of the dancers may feel evaluated/judged which would increase the effect the presence of the audience would have on that performer. (1)

Accept any other appropriate analysis of why the presence of an audience may impact their performance differently.

**Maximum 3 marks**

**1 3**

A performer responds badly to losing and gives up easily when faced with challenging situations.

The performer's coach does **not** think that these personality traits can be changed.

Evaluate whether the coach's view is correct. Refer to personality theories in your answer.

**[8 marks]**

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

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

Level	Marks	Description
4	7–8	Knowledge is consistently accurate and well detailed. Application of breadth or depth of knowledge is clearly evident. Analysis and/or evaluation is coherently and consistently made between different relevant factors and their impact. Relevant terminology is consistently used. The answer almost always demonstrates substantiated reasoning, clarity, structure and focus.
3	5–6	Knowledge is usually accurate and detailed. Application of breadth or depth of knowledge is often evident. Analysis and/or evaluation is often made between different relevant factors and their impact, and is usually coherent. Relevant terminology is often used. The answer usually demonstrates substantiated reasoning, clarity, structure and focus.
2	3–4	Knowledge is sometimes accurate with some detail. Application of breadth or depth of knowledge is sometimes evident. Analysis and/or evaluation is sometimes made between different relevant factors and their impact, but may lack coherence. Relevant terminology is sometimes used. The answer occasionally demonstrates substantiated reasoning, but may lack clarity, structure and focus.
1	1–2	Knowledge may be limited. Application of breadth or depth of knowledge may be limited or not evident. There may be little or no analysis and/or evaluation between different relevant factors and their impact. Relevant terminology is occasionally used. The answer may lack substantiated reasoning, clarity, structure and focus.
	0	No relevant content.

**Possible content may include:**

**AO1 Knowledge of personality theories**

**Trait theory**

- A person is born with their personality/innate.
- Personality is stable/predictable/enduring.

**Social learning theory**

- Personality is learned through observation and imitation.
- Experiences throughout life shape our personality/reinforcement.

**Interactionist perspective**

- Personality is a combination of traits and environmental influences.
- Personality is generally stable but a change of environment can lead to a change of behaviour.

**AO2 Application of theories to the performer's actions**

- According to trait theory it would mean that the performer's anger when losing was a trait which could not be changed.
- According to social learning theory the performer would have observed others behaving badly when losing/giving up easily when facing challenging situations and copied this behaviour.
- The performer may also have experienced reinforcement, such as praise/avoided punishment, despite reacting badly to losing in previous performances.
- According to interactionist theory it would mean that the performer may have an innate trait of responding badly to losing/giving up in challenging situations but environmental factors, such as if it was an important competition, could have increased this behaviour.

**AO3 Evaluation of whether the coach's view is correct**

**For**

- According to trait theory the coach's view could be correct as personality tends to be stable and some traits can be difficult to change.

**Against**

- According to social learning theory the coach's view may not be correct because they do not consider that the performer can change these personality traits through positive experiences, such as positive reinforcement when the performer doesn't give up during a challenging situation.
- According to social learning theory the coach's view may not be correct as they don't consider that the performer can learn to lose graciously through watching positive role models accepting defeat.
- According to the interactionist perspective, even if the performer does have negative traits of giving up easily/reacting badly to a defeat, giving them responsibility, such as making them captain, may change their behaviour.

Accept any other appropriate evaluation of whether the coach's view is correct.

**Maximum 8 marks**

**1 4**

One coach believes improving a runner's **motivation** is the easiest way to improve their 10 km time.

Another coach believes improving a runner's **VO<sub>2</sub> max** is the easiest way to improve their 10 km time.

Evaluate these statements.

Refer to how the coaches could improve a 10 km runner's motivation and VO<sub>2</sub> max in your answer.

**[15 marks]**

**Marks for this question: AO1 = 4, AO2 = 5, AO3 = 6**

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

Level	Marks	Description
5	13–15	Knowledge is consistently comprehensive, accurate and well detailed. Application of breadth or depth of knowledge is clearly evident. Analysis and/or evaluation is coherently and consistently made between different relevant factors and their impact. Relevant terminology is almost always used. The answer demonstrates a high level of substantiated reasoning, clarity, structure and focus.
4	10–12	Knowledge is usually comprehensive, accurate and detailed. Application of breadth or depth of knowledge is often evident. Analysis and/or evaluation is often made between different relevant factors and their impact, and is usually coherent. Relevant terminology is usually used. The answer usually demonstrates substantiated reasoning, clarity, structure and focus.
3	7–9	Knowledge is generally accurate and sometimes detailed. Application of breadth or depth of knowledge is sometimes evident. Some analysis and/or evaluation is made between different relevant factors and their impact but may sometimes lack coherence. Relevant terminology is used but may sometimes be missing. The answer sometimes demonstrates substantiated reasoning, clarity, structure and focus.
2	4–6	Knowledge is sometimes accurate but may lack detail. Application of breadth or depth of knowledge is occasionally evident. Some analysis and/or evaluation is attempted between different relevant factors and their impact, but is likely to lack coherence. Relevant terminology is occasionally used. The answer occasionally demonstrates substantiated reasoning, but may lack clarity, structure and/or focus at times.

1	1–3	<p>Knowledge is limited and may lack accuracy and detail. Application of breadth or depth of knowledge is likely to be limited or not evident. There may be very little or no analysis and/or evaluation made between different relevant factors and their impact. Relevant terminology used only very occasionally. The answer often lacks substantiated reasoning, clarity, structure and/or focus.</p>
	0	No relevant content.

- **Possible content may include:**

- **AO1 Knowledge of VO<sub>2</sub> max and motivation**

- **Motivation:** A performer's desire to succeed.
- Motivation can be intrinsic, from within, or extrinsic, from external factors.
- Extrinsic motivation can be either tangible, you can touch it, or intangible, you cannot touch it.
- **VO<sub>2</sub> max:** The maximum volume of oxygen which can be taken in and used by the body per minute.
- Measured in ml/kg/min
- Factors affecting VO<sub>2</sub> max include genetics; physiology; training etc.

- **AO2 Application of VO<sub>2</sub> max and motivation to the 10 km run**

- A coach could increase extrinsic motivation by offering tangible rewards such as money.
- A coach could increase intrinsic motivation by setting SMARTER goals with the runner.
- Increase motivation would mean the runner might be willing to run faster / train harder.
- The coach could increase the runner's VO<sub>2</sub> max using an appropriate training programme based around continuous/interval training.
- This training would result in physiological changes, eg increase capillarisation, which would improve oxygen delivery to the working muscles.

- **AO3 Evaluation of statement (which method is easier)**

Coach believes improving a runner's motivation is the easiest way to improve their 10 km time.

- Increasing the performer's motivation would mean they were willing to run at a higher percentage of their VO<sub>2</sub> max and tolerate any discomfort this may cause.
- Improving motivation could have an immediate impact on the runner's 10 km time.
- While offering extrinsic rewards improvements may be short lived, however, as the effects wear off and the difficulty of running fast increases.
- Intrinsic motivation would be more powerful, and it is likely that, if intrinsically motivated to improve, the runner would also be willing to train and improve their VO<sub>2</sub> max as well.

Coach believes improving a runner's  $VO_2$  max is the easiest way to improve their 10 km time.

- Improving  $VO_2$  max will allow the runner to run the race in a faster time as they will be able to run quicker while using the aerobic energy system / delay fatigue / limit lactate build up.
- If  $VO_2$  max was increased the athlete would not need as much motivation to improve their time as they would find running faster easier.
- While it is true that an increase in  $VO_2$  max would improve their 10 km time this may not be the easiest way to do it.
- The runner would have to commit to training regularly and it may take time to see real improvements in  $VO_2$  max depending on the starting point.
- A large percentage of  $VO_2$  max is dictated by genetic factors so the amount that it can be improved is limited.
- A combination of both would be the best/it depends on the individual performer as to which one is easier.

Accept any other appropriate evaluation of each of the coaches' statements with reference to how each factor could be improved.

- **Maximum 15 marks**

### Section C

#### Sport and society and technology in sport

1 | 5

Taking performance-enhancing drugs can result in lasting damage to your health.

Which one of the following is most likely to occur as a result of taking erythropoietin (EPO)?

[1 mark]

**Marks for this question: AO1 = 1**

**A** – Blood clotting

1 | 6

A sports scientist uses a metabolic cart to measure the volume of  $CO_2$  expired by an athlete.

Which **one** of the following describes the type of data the scientist is collecting?

[1 mark]

**Marks for this question: AO2 = 1**

**C** – Quantitative and objective

1 | 7 | 1

**Figure 3** represents UK Sport's World Class Performance Pathway.

Name the stages labelled **A** and **B** in **Figure 3**.

[2 marks]

**Marks for this question: AO1 = 2**

- **A** = Podium (1)
- **B** = Podium potential (1)

**Maximum 2 marks**

1	7	.	2
---	---	---	---

 State how many years away from winning a medal at a major championship an athlete at stages **A** and **B** would be.

**[2 marks]**

**Marks for this question: AO1 = 2**

- **A** = 1/2/3/4 (Maximum of 4) (1)
- **B** = 4/5/6/7/8 (Maximum of 8) (1)

**Do not accept 4 for A and B**

**Maximum 2 marks**

1	8
---	---

GPS technology can be used to measure the speed of movement and distance covered by players during a team sport.

Explain how a coach can use this GPS information to make effective decisions before **and** during a game.

[3 marks]

**Marks for this question: AO2 = 3**

- GPS provides data such as speed / distance **which** the coach can use to build a picture of typical performances / identify strengths and weaknesses of a player. (1)
- GPS data can be used to assess a player's fitness levels **which** allows the coach to make decisions about who to select. (1)
- GPS data can be provided for a player recovering from injury **which** allows a coach to decide when they are ready to return to competition. (1)
- GPS data can be provided in real time **which** allows the coach to decide if a player is affecting a game/executing tactics effectively. (1)
- GPS data allows a coach to see who is fatigued/tired **which** allows them to use substitutions more effectively. (1)

Accept any other appropriate explanation of how a coach can use the information provided by GPS technology to make effective decisions before and during a game.

**Maximum 3 marks**

1	9
---	---

Evaluate the impact of technological developments in sport on the audience.

[3 marks]

**Marks for this question: AO3 = 3**

**Positive impact of technology on the audience (sub max 2)**

- Improve the overall standard of sport, making it more exciting to watch. (1)
- Improve the decision making of officials, making it less frustrating for the audience. (1)
- Involves the audience in the officiating processes, creating more suspense/excitement. (1)
- Improvements in media technology mean that the audience benefits from a more convenient/personalised/interactive experience. (1)

**Negative impact of technology on the audience (sub max 2)**

- Use of technology in officiating can lead to stoppages in play, which are boring for spectators. (1)
- Technology can limit the skill required to be successful/change the nature of the sport, reducing the entertainment value for the audience. (1)
- Use of technology can highlight officials' errors, meaning the audience loses respect for them. (1)
- Costs limit the use of technology, making it an inconsistent experience for spectators. (1)

Accept any other appropriate evaluation of the impact of technological developments in sport on the audience.

**Maximum 3 marks**

**2 0**

**Figure 4** shows an elite golfer putting. The golfer is struggling with their putting because of cognitive and somatic anxiety.

Evaluate the use of thought stopping **and** beta blockers to reduce the effects of anxiety and improve the golfer's performance in their next competition.

**[8 marks]**

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

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

Level	Marks	Description
4	7–8	Knowledge is consistently accurate and well detailed. Application of breadth or depth of knowledge is clearly evident. Analysis and/or evaluation is coherently and consistently made between different relevant factors and their impact. Relevant terminology is consistently used. The answer almost always demonstrates substantiated reasoning, clarity, structure and focus.
3	5–6	Knowledge is usually accurate and detailed. Application of breadth or depth of knowledge is often evident. Analysis and/or evaluation is often made between different relevant factors and their impact, and is usually coherent. Relevant terminology is often used. The answer usually demonstrates substantiated reasoning, clarity, structure and focus.
2	3–4	Knowledge is sometimes accurate with some detail. Application of breadth or depth of knowledge is sometimes evident. Analysis and/or evaluation is sometimes made between different relevant factors and their impact, but may lack coherence. Relevant terminology is sometimes used. The answer occasionally demonstrates substantiated reasoning, but may lack clarity, structure and focus.
1	1–2	Knowledge may be limited. Application of breadth or depth of knowledge may be limited or not evident. There may be little or no analysis and/or evaluation between different relevant factors and their impact. Relevant terminology is occasionally used. The answer may lack substantiated reasoning, clarity, structure and focus.
	0	No relevant content.

**Possible content may include:**

**A01 Knowledge of thought stopping, beta blockers, and anxiety**

- Thought stopping involves saying a particular word or carrying out a particular action to divert attention away from negative thoughts.
- Beta blockers block the effects of adrenalin/slow sympathetic nervous system/slow heart rate/lower blood pressure.
- Somatic anxiety involves physiological reactions to stress such as increased heart rate or sweaty palms.
- Cognitive anxiety involves psychological reactions to stress such as unpleasant thoughts.

**A02 Application of use of thought stopping and beta blockers on an elite golfer**

- When a golfer suffers from cognitive anxiety, eg thinking 'I'm going to miss', they could tap use the cue word 'stop'/tap their putter on the ground.
- Stopping negative thoughts may increase confidence/decrease cognitive anxiety.
- Beta blockers would decrease somatic/physiological effects of anxiety.

**A03 Evaluation of the use of thought stopping and beta blockers to reduce the effects of anxiety and improve the golfer's performance**

**Positives of thought stopping**

- Thought stopping can decrease cognitive anxiety which will also decrease somatic anxiety making them more likely to be successful with their putting.
- Thought stopping is a quick and simple technique which could be included in the golfer's routine.

**Negatives of thought stopping**

- Thought stopping must be learnt so would take time to become effective.
- The effectiveness of thought stopping is linked to the ability of the golfer to use it, so may not work under the highest levels of anxiety.

**Positives of beta blockers**

- The effect of beta blockers will reduce tremors therefore improving accuracy.
- The effect of beta blockers can be relied on to have an effect even under high levels of anxiety.

**Negatives of beta blockers**

- Beta blockers would only address the somatic anxiety, so cognitive anxiety may still negatively affect putting.
- Beta blockers are a banned substance, by taking them the golfer risks being banned from the sport/loss of income/damaged reputation.
- By taking beta blockers the golfer is at increased risk of dizziness/circulatory problems/trouble sleeping.

Accept any other appropriate evaluation of the use of thought stopping and beta blockers to reduce the effects of anxiety and improve the golfer's performance.

**Maximum 8 marks**

**2 1**

**Figure 5** shows the total number of football-related arrests in England and Wales for 10 seasons between 1990 and 2000.

Evaluate whether strategies used to prevent spectator violence were successful in reducing the number of football-related arrests between 1990 and 2000. Refer to **Figure 5** in your answer.

**[15 marks]**

**Marks for this question: AO1 = 4, AO2 = 5, AO3 = 6**

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

Level	Marks	Description
5	13–15	Knowledge is consistently comprehensive, accurate and well detailed. Application of breadth or depth of knowledge is clearly evident. Analysis and/or evaluation is coherently and consistently made between different relevant factors and their impact. Relevant terminology is almost always used. The answer demonstrates a high level of substantiated reasoning, clarity, structure and focus.
4	10–12	Knowledge is usually comprehensive, accurate and detailed. Application of breadth or depth of knowledge is often evident. Analysis and/or evaluation is often made between different relevant factors and their impact, and is usually coherent. Relevant terminology is usually used. The answer usually demonstrates substantiated reasoning, clarity, structure and focus.
3	7–9	Knowledge is generally accurate and sometimes detailed. Application of breadth or depth of knowledge is sometimes evident. Some analysis and/or evaluation is made between different relevant factors and their impact but may sometimes lack coherence. Relevant terminology is used but may sometimes be missing. The answer sometimes demonstrates substantiated reasoning, clarity, structure and focus.
2	4–6	Knowledge is sometimes accurate but may lack detail. Application of breadth or depth of knowledge is occasionally evident. Some analysis and/or evaluation is attempted between different relevant factors and their impact, but is likely to lack coherence. Relevant terminology is occasionally used. The answer occasionally demonstrates substantiated reasoning, but may lack clarity, structure and/or focus at times.
1	1–3	Knowledge is limited and may lack accuracy and detail. Application of breadth or depth of knowledge is likely to be limited or not evident. There may be very little or no analysis and/or evaluation made between different relevant factors and their impact. Relevant terminology used only very occasionally. The answer often lacks substantiated reasoning, clarity, structure and/or focus.
	0	No relevant content.

**Possible content may include:**

**AO1 Knowledge of strategies used to reduce spectator violence**

- Control/ban alcohol sales.
- Increased use of CCTV to monitor spectators.
- More severe punishment for spectators who are caught committing violent acts.
- Earlier kick-off times.
- Legislation passed to allow prosecution.
- All-seater stadiums.

**AO2 Application of strategies used to reduce spectator violence to football**

- No alcohol can be taken into football stadia, alcohol purchased on site cannot be taken into seating area/police segregate local pubs to keep home and away fans apart.
- CCTV used on football stadia to identify known troublemakers/quickly eject spectators who commit violent acts.
- Football banning orders prevent spectators with a record of violent behaviour from entering any football stadium in the UK/internationally.
- Local derbies/games between rivals kick-off at 12:00 noon/lunchtime to limit spectator's opportunity to drink alcohol/commit violent acts.
- Laws preventing spectators from entering the field of play limit spectator's opportunity to engage in violence with opposing fans.
- All seater stadia used to separate rival fans/use of family enclosures to change to culture/atmosphere at football stadia.

**AO3 Evaluation of the strategies effectiveness using Figure 5**

- Overall Figure 5 shows a downward trend in the number of football-related arrests between 1990 and 2000, showing strategies to reduce violence between spectators have worked.
- Where arrests have increased, this could be down to wider use of CCTV/ improved liaison between stadia staff and the police rather than a greater volume of incidents.
- Still a large number of arrests in 1999–2000 show that strategies may have reached the limit of their effectiveness, meaning violence amongst spectators continues.
- Earlier kick-off times limit the amount of time to consume alcohol before games, however many fans will drink earlier in the day meaning violence amongst spectators still occurs.
- All seater stadia/CCTV have reduced incidents leading to fewer arrests in and around the ground, but incidents still occur in town centres, pubs, railway stations leading to arrests.

Accept any other appropriate evaluation of the effectiveness of the strategies used to reduce spectator violence.

**Maximum 15 marks**