

2023 ASSESSMENT REPORT

SPT315118 SPORT SCIENCE 3

This report is comprised of **General Comments** regarding the paper, followed by specific **Examiner's Comments** about each section of the paper, then followed by **Solutions** for each Section.

General Comments

The 2023 paper was considered a fair paper that allowed candidates of all abilities to perform to their potential, with few mentioning that the paper could not be completed within the allocated time. While not all candidates were able to match their internal results in the exam setting, an awareness of the comments made in this Examiner's Report will help provide guidance on what can be done to increase the likelihood of such an outcome.

The first hurdle for candidates is entering the exam with a specific plan on the order in which they will tackle each section of the paper. Do you start with your strongest section, or leave that until last, or simply go through the sections in the order they are written? The next is to know exactly how you are going to use your reading time now that it can no longer be used for starting the actual exam. Some use it to note down their own mental notes so they will not forget them once the exam has begun; some use it for reading the CDL questions and deciding which ones they will do and planning the links they will use for each question; some use it for gaining a clear understanding of what the data questions are asking as this can be misinterpreted under pressure, and; others use it to read through the paper as a whole. There is no correct way to use the time; however, it is strongly advised that candidates have a plan, determined as the year has unfolded and based on specific, individual needs.

Every year there are several recurring themes. This year was no exception. However, it is hoped that the message is slowly getting through on some matters. Several markers still made comments about the number of candidates writing in pencil, although it does seem as if the number is decreasing each year. To be clear – do NOT write exam answers in pencil as there is a risk answers can be rubbed out and thick pencil can become very difficult for Markers to read and understand. Also, some colours of pen are very difficult for Markers to read, so avoid using green, pink, or purple and stick to using black or blue pen.

Candidates have drummed into them all year by their teachers the need to provide accurately measured, supportive data with relevant units when answering Criterion 5, data questions; yet still many forget to do this in the exam, costing themselves easy marks for which there could ultimately be a heavy price.

Unfortunately, many candidates still think they can put down as many answers as they can think of for a question and hope that if the correct answers are included, they will be marked as such. It must be made clear that if two answers are asked for and four are given, only the first two will be considered – even if they are incorrect and the last two are correct.

Finally, in the interests of being fully prepared for the exam, candidates should ensure they have a dictionary with them so that they can understand what certain words mean. An example of such an issue this year was when many candidates failed to fully comprehend the meaning of the words “antecedents”, and “anomaly” costing themselves valuable marks.

As the subject is called Sport Science, it tends to attract many candidates with an interest in Sport. Perhaps a more apt name would be the Science of Sport, as the subject is better suited to those with a science background than those who simply love their sport. Someone with a combination of both attributes, as well as the ability to write concisely and succinctly is the ideal candidate. While the option to apply knowledge to a sport of choice is sometimes provided, having a strong general knowledge regarding as many different sports as possible would be advised, given the range of sports that information was asked to be applied to this year included basketball, soccer, pole vault, Formula 1, CrossFit and Powerlifting to name just a few. This, coupled with carefully reading questions, would have prevented errors which detract from the quality of the answer provided by referring to athletes by the incorrect gender, or suggesting a wheelchair athlete can go for a “jog” as part of her cool down. It is strongly recommended that teachers and candidates alike try to expose themselves to a wider range of sports throughout the year so they are better equipped to provide meaningful answers to the sports that may be presented to them in future exams.

With an increasing emphasis in some spaces for the online submission of assignments throughout the year, it is critical that candidates remember the need to practice their handwriting in preparation for exams. In addition, few lessons last for a 3-hour duration, so they must also practice being able to both concentrate and write for extended periods of time, so that the 3-hour exam period is not a new condition to them. If not, mental and physical fatigue can cause errors which impact their overall performance and make it difficult for markers to read and understand the work in front of them.

Candidates hoping to achieve at the higher levels are reminded of the need to use the more technical and specialised language that is relevant to the question at hand. In addition, candidates are reminded that there is a limited range of universally known and accepted abbreviations and acronyms suitable for exam use in Sport Science; many of which only have relevance when related to a specific context (eg: ATP, VO₂ Max, LIP, EPOC, DOMS, etc). Most of these abbreviations occur in the Exercise Physiology section of the exam. Consequently, many acronyms and abbreviations developed by individuals or classes to assist in learning and recall, particularly in the Skill Acquisition and Sport Psychology sections, may not be suitable and may cause marks to be deducted if they are unknown to the marker (e.g. HIPS; VAMP; CAR).

The criterion which continues to consistently cause the biggest challenge for candidates to match their internal marks on is Criterion 6, Cross-Discipline Links (CDL's). Thankfully there are only a small number of candidates to whom this applies, but it continues to confound as to how or why some attempt all three questions in this section. It is pleasing to note that the number of candidates who failed to even attempt any of the CDL questions could be counted on one hand. However, it does seem that some candidates enter the exam with the specific plan of only doing the minimal work required to gain a “t” on this criterion, such as only completing one link in each question. It should be noted that a “t” will only be given when a genuine attempt to answer the question has been made.

In marking these CDL questions, 4 out of the 7.5 marks for each link are currently allocated to the **relevance** and **application** of the theory to the specifics of the question - the sport, the athlete, the scenario, etc, which includes the use of examples. Many candidates continue to score quite poorly on each link. Consequently, when candidates provide little more than vague or general theory with little relevance to the scenario, their mark for that link is usually no more than 3-3.5 out of the 7.5 marks on offer.

ALL candidates should ensure they leave enough time to complete this section to the required standard. Some try to rush through other sections of the exam to “make extra time” for this section. Such haste can cause errors in the work that is rushed and is not advised. Candidates should be encouraged to make use of the reading time to consider the three questions and determine which two they could do best in and

perhaps plan the two links they could use for each question. For many candidates, time is saved by entering the exam with 'pre-prepared, generic links' - for their two preferred core unit links (often Phys – Psych and Psych – Skill). While such a method can be effective for stronger candidates with the knowledge and understanding to adapt and adjust these links to the respective athlete/sport, it seems to catch out those who lack that ability, especially when they cannot adjust the link to work with the scenario (particularly if their preferred link is an “own scenario” question), or their knowledge of the required sports is limited. There also seems to be a rise in the number of candidates trying to rely on the exemplar answers from previous years as their “own scenario” answers. Such a tactic has risk as these answers are carefully constructed by experienced teachers to show the development and transition of the same link from a “C” to a “B” to an “A” standard, primarily for teaching purposes. They also represent the highest standard for each rating. There is also only one link for each answer, whereas two are required in the exam. Candidates would be better served to learn how to answer the questions themselves and create their own answers. Invariably, candidates who write good quality CDL's also do well on other criteria, as they need the breadth and depth of knowledge to provide detailed answers in the first place.

Examiner's Comments

Section A – Exercise Physiology A/B

Question 1 – Criterion 1

- a. Very few candidates gained full marks on this question, and it was generally not answered well. Far too many candidates simply mentioned the main energy system ATP-PC rather than the specific fuels of ATP and Creatine Phosphate (CP, PC)
- b. Candidates generally gained full marks on this question. Most were able to indicate the appropriate high energy bond within ATP or reference high energy bonds. Some candidates indicated incorrectly that the phosphates themselves were the source of energy or repeated ATP as the source of energy.
- c.
 - i. Most candidates suggested the appropriate fibre type. However, others added information that contradicted their first answer, such as saying Type I, Fast Twitch. Others got the fibre type completely wrong.
 - ii. Generally answered appropriately in regard to muscle fibre type characteristics. Many candidates did not reference the event in the answers which had a negative impact on their support for the choice of muscle fibre characteristic.
- d. Very few candidates gained full marks on this question. Many candidates listed relevant chronic adaptation but did not outline the adaptation relevant to the event. Therefore, they answered without sufficient detail in support of their chosen chronic adaptations. Some candidates incorrectly referenced components of fitness rather than chronic adaptations.

Question 2 – Criterion 1

- a. Candidates provided broad answers for this question. Many were general in their reference to the impact of increased aerobic capacity on the intensity and duration of exercise which limited the ability to express understanding of aerobic energy pathways. Candidates with stronger answers provided explicit understanding of impact of increased aerobic capacity on aerobic intensity and the recovery between bouts of intense activity.

- b. Most candidates were able to provide indication that relative V02 Max is based on body size of the athlete. However, few candidates received full marks for the question as most failed to indicate that by using relative V02 Max athletes can be compared more accurately.
- c. Very few candidates gained full marks on this question. Candidates generally provided a basic understanding of the Lactic Acid energy pathway and implications on physiology of muscular contractions. However, there were several points of confusion in the energy pathway e.g. stating that an increase in pH lead to increased acidity, when the opposite is correct. In addition, many candidates were very general in the response to the impact on performance with reference to fatigue only.
- d. Generally poorly answered by candidates. Many candidates indicating both systolic and diastolic increase without distinction and/or mixing up the terms and their relative measurements.

Question 3 – Criterion 1

- a. Generally mixed responses from candidates. Many correctly indicated the process by which energy is produced but many confused fuels with energy system and/or the stored form of the fuel (e.g. glucose v glycogen; triglycerides v Free Fatty Acids). Very few candidates received full marks for this question.
- b. Many candidates provided clear and concise answers leading to a full mark. Candidates who did not achieve full marks often had confusion between the roles of haemoglobin and myoglobin in O₂ transport and/or missed the role of myoglobin diffusing O₂ from the cell membrane to mitochondria.
- c. Generally poorly answered as many candidates did not include information regarding the manipulation of diet. Where candidates have considered manipulation there was considerable confusion between the time frames associated with carbohydrate loading and the fat adaptation process.
- d. Most candidates had an appropriate definition for aerobic steady state. Many candidates did not receive full marks for the question, however, as application to the athlete was either not appropriate (i.e. choice of time in the event) or was too general in nature (i.e. not giving an example specific to the event).
- e. Very few candidates gained full marks on this question. Many candidates misinterpreted the energy continuum concept, talking about the systems switching on at specific times (i.e. discretely). Better answers mentioned how all systems would make some contribution at different times during the 50km event, stating which system would be the most and least predominant overall based on intensity and duration within the event, as well as stating how the % contribution of each system at any point in time changed depending on the duration, distance and circumstances, such as during a surge, or up a hill, or sprinting to start/finish the races.

Question 4 – Criterion 2

- a.
 - i. Many candidates chose an inappropriate component of fitness for this question and/or did not utilise appropriate terminology for the most applicable component of fitness to the back squat. This meant that only a small cohort of candidates achieved the full mark for this question. Weaker responses provided a generalised answer of strength rather than specific reference to muscular strength.
 - ii. Many candidates connected the response to this question with the previous question; however, many also chose responses not associated with the component of fitness chosen in 4a i) as required. Weaker responses to this question indicated a volume of weight lifted as a means for testing muscular strength. Better answers included specific reference to the number of reps associated with the weight lifted (i.e. 1 RM).
- b. Generally mixed responses from candidates. Stronger responses indicating the appropriate training type for the athlete and a mostly appropriate definition of isotonic training. Many confused isometric and isotonic training and too many suggested other forms of training which were not appropriate to the question.
- c. Most candidates were able to give a basic explanation as to what 'tapering' was, although fewer were able to provide explicit descriptions of specific variables that could be manipulated in the athlete's training. Better responses included specific examples of the relevant variables and how they could be adjusted in the lead up to a major competition.

Question 5 – Criterion 2

- a. Many candidates struggled to achieve a full mark for this question due to incomplete information regarding the three parts of a training session. Most candidates were able to indicate warm up and cool down as components of a training session. However, many candidates referred only to conditioning or development stage as a second (middle) part of training.
- b. This question was generally poorly answered by candidates. Most candidates were able to list/identify relevant flexibility training methods (e.g. static, dynamic, PNF); however, very few were able to provide accurate descriptions of the stated methods and simply gave examples of an exercise instead. Many candidates also placed incorrect responses such as training principles, and/or other training methods.
- c. Most candidates were able to give a basic explanation as to what Lactate Threshold (LT) Training and its intention were. Some candidates were able to provide additional relevant and accurate descriptions regarding % MHR and/or % of LIP HR at which LT training may occur. Better responses indicated a clear link between the chronic adaptations from LT training and applied specificity to the sporting example with relevant examples.
- d. Many candidates were able to provide a relevant and accurate answer to this question. Most were able to provide a basic description of detraining linking to the 'use it or lose it' concept. Stronger answers were able to connect minimisation or a removal of training stimulus to the loss of biological/chronic adaptations. Basic answers indicated a superficial link to the impact for the athlete whereas stronger answers provided a relevant link to the athlete in regard to impact on performance.

Question 6 – Criterion 2

- a. A generally well answered question by candidates as a wide range of safety considerations could be accepted.
- b. Most candidates could indicate a basic understanding of EPOC but many provided a very general definition in which the time of oxygen consumption was missing and/or the comparison of oxygen consumption to resting levels was lacking. Stronger examples indicated that EPOC occurs post exercise and oxygen intake remain above normal resting levels for some time. Some candidates provided the alactacid and lactacid phases but did not define EPOC which limited their ability to meet the requirements of the question.
- c. Generally poorly answered by candidates. Many were able to provide an appropriate response of in-season or whole-season peaking but struggled to provide a description taking into account the sporting example. Better responses answered this question in full – they identified the appropriate peaking method, related how undertaking it could contribute to the sporting example of squash and gave a satisfactory example.
- d. This question was well answered as a wide range of variables could be accepted.
- e. Candidates gave a mixed response to this question with many gaining full marks, whereas others struggled to demonstrate adequate knowledge of the fate of lactic acid. Stronger answers included explicit and accurate percentages in connection to the fate of lactic acid and connected to the appropriate processes/outcomes. Many candidates were able to demonstrate understanding of the oxidation process and percentage but were unable to provide evidence of % converted to glucose by the liver, % converted in the liver to form protein and/or the % of LA converted to glucose.

Question 7 – Criterion 5

- a. Generally, poorly answered with many candidates taking the data from the table instead of the graph as instructed in the question.
- b. Many candidates were able to demonstrate a relevant and accurate response to this question. However, some candidates were inconsistent in their use of accurate and appropriate data in support of their choices in response to the question. Stronger answers included several points of data in support of the choice for the most effective recovery intensity.
- c. This question was well answered, and many candidates achieved full marks.
- d. A mixed range of responses but most candidates were able to provide a basic comparison between the three recovery techniques. Stronger responses included a comparison between the three recovery techniques between 0 and 5 minutes with explicit data, including a range difference and ranking of the three recovery techniques.

Section B – Skill Acquisition

Question 8 – Criterion 3

- a. Better answers recognised the key word was “motor” and noted that the movement had to relate to muscular movement and that as it was a skill, it would require voluntary and coordinated movement to achieve a predetermined outcome. Many candidates confused a motor skill for a motor program and others gave definitions for a skill without making it relevant to being a motor skill.
- b. Better answers were able to clearly show how and why the situation they described would have been open, such as it was unpredictable, and the timing was externally paced. They were then able

to contrast that to the internal timing and replicability of a free throw. Many candidates only described one of the two scenarios and received reduced marks.

- c.
 - i. Mostly answered well, although many candidates gave answers that were more applicable for the following question to do with instructional points for the coach.
 - ii. Mostly well answered, although many answers were given that could relate to any stage rather than specifically to the Cognitive stage.
- d. Better answers explained what anticipation was to begin with. Most candidates could explain how/why it could have a negative effect on team performance, and most were able to provide some form of example, although clear examples were not always given as many referred to the Psychological Refractory Period where the young basketballer falls for a 'fake' move. By its very definition, falling for a fake cannot be an example of anticipation, as this requires a response to be initiated before the cue, which is the fake movement. Poorer answers related to psychological factors which were not relevant to instructional points.

Question 9 – Criterion 3

- a. Better answers recognised the question was specifically targeting the area regarding the factors affecting Skill Acquisition and gave the relevant answers, although some considered the negative impact of those factors while others more appropriately considered the positive impact of factors which enabled Oscar to reach the level he has. It was not considered that gender or heredity were appropriate answers unless they could be justified as to the specific attributes which could affect Oscar's chances of becoming an F1 driver.
- b. The question very specifically asked for the "most important sense". Despite this, many candidates described multiple senses, which meant markers only considered the first one described. While most candidates recognised that 'sight' or 'vision' would be the correct answer, many used terms that were not correct such as 'visualisation'. Most were able to give many suitable examples of things which a driver would need to look out for that made sight the most important sense, such as the position of other cars, the location of the corners, the telemetry on their steering wheel, the flags from the Marshals, etc. Many candidates suggested proprioception/kinaesthesia or even hearing, and while those are considered important, they are not considered THE most important sense.
- c.
 - i. Many different answers were given here that were not appropriate such as to the feedback being positive/constructive or negative and that it was verbal. Surprisingly, few candidates were able to recognise all the relevant categories under which the feedback would be classified and many only gave one and explained why it would be that, despite the question only requiring a "list".
 - ii. Most were able to recognise this situation as being one of information overload for full marks, or something similar for partial marks.
- d. Most candidates were able to give a basic definition of what schema is although the detail contained in some definitions was more complete than in others. Most were also able to list a basic example of how and where schema would be applied, such as comparing wet versus dry conditions, or old versus new tyres. Better answers gave context to the differing situations by outlining how schema was used to implement the changes required, such as noting that in wet conditions, the drivers would need to drive slower and brake earlier into corners compared to dry conditions due to limited traction and an increased risk of crashes.
- e. Answered correctly by almost all candidates. Some lost partial marks for using the unit km/hr (speed) rather than just km's (distance).

- f. Most candidates recognised the correct answer as Drag Force or Air Resistance, although some mentioned Friction, which is only partially correct.

Question 10 – Criterion 3

- a. Many candidates were able to correctly identify a factor that influenced projectile motion, but only the better answers gained full marks by applying that factor to the relevant aspect of the elevated position.
- b. While most candidates were able to correctly state Newton's first law of motion, they usually only gave part of the law, either by stating it only applied to stationary objects, such as the ball on the tee until it is hit, OR the ball in motion until a force such as gravity brings it to the ground. The better answers acknowledged both aspects of the law.
- c. This question was answered poorly. Most candidates could not name the four specific roles of feedback although they could roughly describe what each role was trying to achieve. Many tried to incorrectly relate the answer to reasons for conducting a de-brief or the steps in conducting a biomechanical analysis.
- d. Better answers to this question correctly identified that input factors relate to information collected by the senses from scanning the environment, prior to the decision-making aspect of the Information Processing Model. Consequently, deciding what club to use and how hard to swing the club were not accepted.
- e.
 - i. Unfortunately, errors with this answer meant that the answer to the follow up question were also incorrect. Some candidates confused the observation techniques being sought with types of visualisation and others with attentional styles.
 - ii. Having identified a correct response in the previous question, most candidates were able to outline an appropriate advantage for each type.
- f. Generally well-answered, although many candidates used vague references to a “good” or “strong” base of support or centre of gravity without suggesting what that entailed. Better answers stated a specific action Minjee could take and then related it to how it helped in optimising balance.

Question 11 – Criterion 5

- a. Answered correctly by almost every candidate.
- b. Mostly answered well, although many suggested that as the load doubled from set 1 to 5, the average velocity halved, which is not correct as 0.41 m/s is not half of 0.88 m/s.
- c. Most candidates recognised the correct answer here, although many tried to answer the question based on theory such as progressive overload or they confused strength with power, or they equated power with average velocity. The data was clear that the greatest power (195 W) was achieved with a load of 30 kg. A comparison of this set of data with another was required for full marks.
- d. Far too many candidates did not think this question through and simply added the average distance the barbell travelled in each set, while forgetting the number of reps completed in each set which that distance needed to be multiplied by to give the correct answer.
- e. Mostly answered well, although some candidates forgot to divide the total watts by 5 and others multiplied the watts by 5.

Section C – Sport Psychology

Generally, this sectioned was answered well with an expected distribution of marks. Question 12 proved the most challenging for candidates to be able to score full marks.

Question 12 – Criterion 4

- a. Various strategies were used as examples; however, many had no context. For example, 'spare equipment' instead of 'a pair of spare shoes in case the others break'. A few candidates gave a definition of a coping strategy, not an example. Most answers could be related to rugby.
- b. This was answered very well. A lot of 'textbook' responses about increasing motivation, work output and providing direction.
- c. The best answers included KPI's and Task Relevant Factors, with explanations. Several candidates had 'blocking noise, selective attention and training in similar circumstances' which were also accepted if appropriately explained.
- d. Some candidates incorrectly wrote from the perspective of players, rather than for coaches as required. However, most could identify some internal stressors that relate to the stimulus. Some candidates incorrectly used physiological responses which would be external stressors.
- e. Most candidates were able to provide an acceptable definition of state anxiety. Better answers referred to the stimulus information and how in the Bedisloe Cup, state anxiety is more likely to have a negative impact on the Wallabies performance.

Question 13 – Criterion 4

- a. A few definitions of Flow State were accepted. Some incorrect answers included attentional demands and focus. Overall, the question was answered well.
- b. Some candidates forgot this was the Sport Psychology section and answered 'overtraining'. A vast majority answered correctly.
- c. This was answered well. Not all labelled their answers with the subheadings, and some did not read the question and used competition strategies instead.
- d. There appeared to be some confusion about this question. Most candidates could provide a definition of pre-play, but many went on to give examples of 'when' it would be used in CrossFit, instead on explaining 'why' as asked for in the question. The better answers included information about the connection of neural pathways.
- e. Answers were brief but mostly CrossFit related (overhead press, etc). Several candidates confused performance goals with one of the required types.
- f. The best answers included 'stepping stones' or a 'staircase model' to achieve their outcome goal. Some answered only from the perspective of why outcome goals are not the best, rather than also highlighting the benefits of process goals.

Question 14 – Criterion 4

- a. Some different definitions accepted for this, but generally answered well. Some incorrect answers included self-efficacy.
- b. Answered very well by nearly all candidates.
- c.
 - i. Some confusion between Inverted-U hypothesis and the Catastrophe Theory, but most candidates explained the theory and reduced performance from over arousal well.
 - ii. Another well answered question.

- d. There appeared to be some confusion for candidates in this question regarding the meaning of “antecedents”. Some answered as though Peter had taken performance enhancing drugs. Many answered in a positive context instead of him ‘lacking self-efficacy antecedents would have a negative impact’.
- e. Answered well. Candidates understood the process of attentional change from a training context to a race. Some had different attentional domains but justified well such as having to take instructions from a coach in training and training partners. Quite a few understood that the first 100m of the race is in separate lanes before merging to a pack.

Question 15 – Criterion 5

- a. Answered very well. Majority included the data associated with each category.
- b. Answered well. Candidates who explained comparison data did best.
- c. Many candidates seemed confused about the meaning of the word ‘anomaly’. A range of answers were accepted provided appropriate justification was given.
- d. A few candidates did not use the 4 required categories which included motivational music but still managed to calculate an appropriate average.

Section D – Cross-Discipline Links (CDL’s)

General Comments on Section D

Candidates attempted the questions at a higher rate to previous years with only a very small number making no attempt to attempt either of the questions.

To continue the move towards achieving greater success on this criterion the following **common errors should be avoided**:

- Providing definitions of the linking areas for most of the answer (lumping theory) without relating the theory to the question (application). Additionally, some answers used several vague mentions of different theory elements rather than being concise which specific theory linked between the relevant core areas.
- Only attempting one link per question – limiting themselves to a maximum of 7.5 marks out of a total possible 15 marks, which is rarely ever achieved.
- Not reading the question carefully for the relevant scenario characteristics and then adding inappropriate context to application i.e., a wheelchair athlete performing running sprints for recovery, detracting from the correctness of the answer.
- Omitting a linking statement, making identifying the linking areas difficult.
- Directional changes in the answer. Stating a specific link direction and then responding to it in the other direction in the detail.
- Disconnection from the scenario – through the whole response not mentioning the athlete involved or even their sport.
- Invalid/irrelevant link ideas – i.e., elite athletes using motivation to become autonomous when they are already autonomous.
- Incorrect exam format responses – some candidates still attempting all 3 questions.
- Reversing the positive perspective answers – examples being in negative perspective or spending too long in discussion on negative perspective before flipping to positive.
- Using the incorrect core area (i.e., meant to be addressing Sport Psychology, but relating to an area from Skill Acquisition or Exercise Physiology instead).

- Using links from within the same core (Intra-relationships) as opposed to the required links between cores (Cross Disciplinary or Inter-relationships).
- Many answers were not structured as well as they could be with missing paragraphs and jumping from one link to the next.
- Including examples that are not from the same sport when attempting to show sport specific theory to the question; for example, referring to Ronaldo doing pre-play visualisation prior to taking his free throws.

Better responses included the following elements:

- Well set out with inclusion of a relevant linking statement.
- Applied the concepts and reflect the depth of understanding required.
- Are concise and efficient, with good spacing and the use of appropriate, specialised terminology. (The candidate clearly prepared well, knowing what relevant examples are.)
- Refer to the question details throughout including background theory, or as a combination of sport specific theory and examples blended into one.
- The best answers had a clear, logical structure and explained within the application how theory inter-related and not just happened ‘side by side’.
- Related to the scenario set out in the question.
- Used relevant examples to show deeper understanding.
- Comprehensively demonstrated how the core areas affect one another.

Question 16 – Criterion 6

This question was the most attempted question by candidates, likely due to the widely known sport and athlete (Cristiano Ronaldo – CR). The inability to perform well on this question usually had more to do with the common errors noted earlier, rather than the lack of specific knowledge of the sport and athlete. A unique error arising from the question related to the negative description of Ronaldo’s form **prior** to leaving Manchester United, while the question required a positive answer regarding how he can return to his best form at his new club. Some candidates did not detect this requirement and gave answers from a negative perspective regarding his performance at his new club.

It was noticeable that some candidates entered the exam with pre-prepared links for these two cores. For example, “Optimal arousal to improved selective attention” was commonly used. Whilst such a link is appropriate, when the majority of candidates explained the link they changed the linking area by switching to attentional dimension theory as application, when the context of the stated link would be better explained through arousal theory of optimal levels of alertness to a given task i.e. gross motor skill of striking a soccer ball in a penalty shot to selective attend to relevant factors of foot placement and angle of run up or defenders’ positions in a set shot with relevance to how optimal arousal has been achieved and why this skill would improve performance.

By far, the biggest candidate error was minimal or no examples of application. Too often theory was stated for each core area with no/minimal attempt to link the information together. Examples of weaker linking theory and application for this question showed how candidates know theory content i.e. playing some upbeat music to raise arousal levels but not then linking it to a situation in a soccer match. Better answers stated that CR would prepare pregame by increasing his arousal by listening to upbeat music. Further arousal control strategies in relation to the game would also then be required as its only dealing with one moment in time. Inclusion of when specific arousal levels/control would be required to selective attend were also a key part of the application and what to attend to. The understanding of relevant factors to

attend to was mostly vague and general. The previous examiner's feedback of knowing a range of sports and routines of preparing for competition and how athletes train/play would allow candidates to give more meaningful and relevant examples.

The use of less relevant/irrelevant linking areas. i.e. Autonomous/Stages of learning as a Skill Acquisition core concept was notable and given in both directions. Some candidates were equating CR starting on the bench with him being back at the cognitive or associative stage of learning and having to become autonomous again. Such a concept is completely irrelevant for an elite player such as CR. This highlights the common error of not reading the question carefully and checking the linking area is appropriate to the situation. Alternatively, it may be a case of pre-prepared links not fitting the scenario or candidates lacking knowledge of enough Skill Acquisition theory to create a viable alternative link.

Question 17 – Criterion 6

This was the second most attempted question for candidates. Unfortunately, some candidates found it more difficult to contextualise their application to their chosen links due to the limited knowledge some had regarding the specific challenges Madison (MdR) would face as a wheelchair athlete in either short or long-distance races. Candidates would give incorrect examples of MdR's being able to walk/run for cool downs or training sessions. Use of sport specific terminology of movements associated with wheelchairs and application examples were sometimes not appropriate, with some believing that it was a recoverable condition, and MdR would no longer need the use of a wheelchair once she had completed her recovery. There was an added condition of what she would do **prior** to the Australian Championships, so creating an appropriate timeline for the application become a relevant factor in sequencing of answers.

A common (pre-prepared?) link used in answering the question was 'goal setting to training year'. A common issue for this link saw errors in the training year application, as candidates use of the off season was generally improperly placed in the sequence of events as to what she would do prior to the Championships but mostly candidates struggled with the competition year application having vague understanding of the process goals a para-athlete may set. Setting appropriate long-term goals proved easier than short-term goals for candidates.

'Motivation to recovery' was another common link which worked well when done correctly by including application of the difficulty of recovery or the conscious effort it required, as opposed to requiring motivation to eat a snack after training or perform a recovery lap. The context was also having to place the recovery in the competition phase leading up to the Championships.

Question 18 – Criterion 6

This was the least attempted of the three questions and the candidates who answered this question were more likely to achieve an "A" or "B" on this question than on their other question. A broad range of athletes and sports were used in response to this question, and the selection process of who and what sport to write about ultimately strengthened or weakened the links provided. The broad range of choices were from now deceased athletes, younger cognitive versions of current athletes, to logical now competing athletes. Very few candidates took the option to create a statement of their own scenario - whilst it is listed as optional, it adds contexts to the situation and can make the link more applicable. It can be challenging for candidates to be concise and valid with a link that has no specific scenario/context.

A common link that appeared in the responses was variety of training to improved schema. This linking concept was not always answered very well. Many had not explained variety as an Exercise Physiology concept, rather they just explained doing different open training methods. Varied practice and variety of

training are in two different core units of the course. The theory of variety of training largely encompasses motivation to overcome plateauing and the schema is a natural by-product of any variation. Whereas varied practice is intentionally to develop schema. The application examples provided largely shifted more to varied practice rather than the variety of where, who and % MHR to train and schema coming from those sources. Such an answer then becomes an Intra, not Cross Discipline Link for which the candidate would be marked down quite harshly.

A second popular link was muscular power/aerobic capacity to improved movement time/response time that usually showed basic application of getting to the ball first or running faster than a competitor. The application only implies understanding, it doesn't explicitly explain it. To improve this linking area application, it would be better to see comments that show how it was achieved and why it's important i.e. for an athlete in a middle-distance race, having good muscular endurance also means the athlete can run faster + for longer as their muscles have been adequately trained to withstand fatigue (due to more mitochondria + increased capillarisation of skeletal muscles therefore supplying more O₂ and having less fatiguing by-products).

2023 Solutions

Section A – Exercise Physiology A/B

Question 1 – Criterion 1

- a. Fuel stores most utilised in the pole vault event would be stored ATP and Creatine Phosphate.
- b. The energy is stored in the bonds between the phosphate groups.
- c.
 - i. Type muscle fibre type that would be most advantageous for the pole vault event would be the Type IIb / Fast Twitch/ white muscle fibres.
 - ii. Type IIb muscle fibre is the most suitable choice for the event due to the high force production that is required to create the jumping action over a short duration, high intensity event.
- d. Chronic training effects to exercise that Nina would experience due to training for pole vault include (any two of the following for 1 mark each):
 - Increased muscles stores of ATP & PC stores, increased levels of enzymes & thus an increase in the capacity of the ATP-PC system
 - Increased muscle glycogen stores and glycolytic enzymes & thus increased glycolytic capacity
 - Increased storage of glycogen lead to increased glycolytic capacity
 - Increased speed & force of contraction due to increased size of fast twitch muscle fibres (Muscular Hypertrophy).

Question 2 – Criterion 1

- a. Reasons that it would be advantageous for Jenna to have a high V_{O₂} Max can include (any two of the following for 1 mark each):
 - Greater ability to supply oxygen to working muscles
 - Will not fatigue as quickly due to ...
 - Less likely to be impacted by fatiguing metabolic by-products due to...
 - Less reliance on the Lactic Acid System
 - Faster replenishment of ATP and PC
 - Can reach a steady state at higher intensities due to e.g. increased SV, Q

- Work at higher intensities aerobically due to...aerobic chronic adaptation/O₂ delivery
 - Could link to a higher LIP which will allow Jenna to work at a higher aerobic intensity.
- b. Relative VO₂ max considers **body weight/ body size/ mass** which means athletes **can be compared more accurately**.
- c. During periods of high intensity, such as sprinting, Jenna will utilise her lactic acid system to provide additional ATP for movement. Lactic acid and hydrogen ions accumulate in the muscle cells and blood causing an increase in acidity, which is often felt as a burning sensation in muscles. This accumulation reduces the cells' ability to resynthesise ATP. The result of this is that the muscle fibres stop sliding across each other ceasing muscle action i.e. – contributor to fatigue. The accumulation of Lactic Acid can be detrimental to Jenna's performance due to the decrease in muscular power, intensity, less explosive, etc.
- d. Systolic blood pressure is likely to increase. Diastolic blood pressure is likely to remain constant or increase slightly.

Question 3 – Criterion 1

- a. The predominant fuel source that David would use for a 50km walk include:
- Fats/lipids via Aerobic Lipolysis
- OR
- Carbohydrates/CHO via Aerobic Glycolysis.
- b. The main role of myoglobin in an event is in aiding the delivery (diffusion) of oxygen from the muscle cell membrane to the mitochondria.
- c. David could manipulate his fat intake by consuming a diet high in fats and low in carbohydrates. This, combined with an appropriate training program, would allow David to become more fat adapted/glycogen sparing. This will allow for higher rates of fat oxidation during prolonged events such as the race walk.
- OR
- A race walker may choose to consume less fat, high CHO (Carbohydrate loading – pre and during event). Carbohydrate loading will allow for a greater glycogen store during event allowing for higher intensity.
- d. The aerobic steady state is reached when there is a balance between the amount of energy needed for activity and the amount of energy being supplied aerobically. David would typically reach an aerobic steady state within 1-5 minutes into the race and could be maintained throughout the race. It could be reached several times throughout the race, depending on the terrain; however, all times would be characterised by a consistent heart rate, respiratory rate, etc., as seen by a plateau of acute responses.
- e. Throughout a 50km race walk, all three (3) energy systems would be utilised, the aerobic system would be predominant after the initial start of the race with contributions from the ATP-PC and Lactic Acid system as required. At no point would the energy systems work in isolation. The anaerobic systems would be utilised at the start of the race when the competitor is in Oxygen Deficit and any time there was increase in intensity the anaerobic systems would be called up on to produce the extra ATP required.

Question 4 – Criterion 2

- a.
 - i. The most applicable component of fitness related to the back squat is muscular strength
 - ii. Methods that muscular strength can be measured may include:
 - 1 Repetition Maximum Lift
 - The use of Dynamometers
 - Repetition Maximum e.g. 2-5 RM.
- b. The most appropriate type of resistance training Tony would undertake is Isotonic Weight Training in which joints are moved under load and the load remains constant throughout the range of movement.
- c. Tapering is a reduction in training before a major event to allow for complete recovery to allow for optimal performance. A Powerlifter may reduce the overall load (duration x intensity) of their training through the weight lifted via manipulating any of the following variables:
 - Intensity: reduce the number of sets, reduce the number of reps, increase the rest periods, reduce weight per rep/set, increase intensity but decreased volume.
 - Volume: reduce the number of training sessions.

Question 5 – Criterion 2

- a. Warm-up; Conditioning/Skill Development Phase; Warm/Cool Down.
- b. Any three of the following for 1 mark each:
 - Static (passive) stretching – involves taking a muscle to its greatest range and holding this position for 30-45 seconds.
 - PNF take a muscle to its maximum range, contract the muscle against an immovable resistance, usually provided by a partner (isometric contraction).
 - Dynamic stretching involves athletes performing a gradually intensifying series of movements which replicate those specific to their sports/activities.
 - Ballistic stretching involves athletes performing a dynamic “ballistic” movement applied on the stretched structure at the end of the range of motion of the joint.
- c. Definition - Fast race-type work form of continuous training whereby the athlete's HR should be at or over 85% of their HR maximum, or training at 95-105% of LIP HR, causing lactate to be accumulating.
Application to Rob – MMA rounds can go for 5 minutes at a time where HR would be raised to over 85% HR max and significant Lactate would be produced. LT training will increase Rob's Lactate Tolerance (e.g. buffering) in order to perform at a higher intensity for longer.
- d. When training is ceased or reduced too much then biological/chronic adaptations will be lost. If Rob stops training his adaptations are lost (e.g. components of fitness, chronic adaptations), then he will not be able to perform at his capacity and will not be competitive in his sport.

Question 6 – Criterion 2

- a. Any two “appropriate” considerations for 1 mark each:
 - Plyometrics should only be performed by well-conditioned athletes.
 - Good levels of strength and flexibility should be achieved prior to commencing plyometric training.

- An appropriate warm-up should be conducted prior to plyometric training.
 - Application of appropriate Training Principles – e.g. progressive overload.
- b. After the cessation of exercise, oxygen consumption drops rapidly at first but remains above normal resting levels for some time.

OR

Post exercise, oxygen consumption remains above normal resting levels to resynthesise ATP & PC, haemoglobin/myoglobin (Alactacid phase) and metabolise lactate in the blood (Lactacid phase).

- c. In-season peaking relates to peaking for specific major Squash events throughout the year. E.g., Squash players will need to peak for in season minor and major events throughout the competition season.

OR

Whole season peaking: where players peak during the in-season period for one major final. E.g. Squash player will need to peak for a major final at the end of the competitive year.

- d. When planning the training year, Squash players may consider any four “appropriate” variables for 1/2 mark each. These include:
- The individual’s test results
 - Calendar dates of competitions
 - Rate of progressive overload
 - Fitness components to be developed
 - Climate and season
 - The fact that a high level of competitive fitness cannot be maintained for the whole year
 - Training principles
 - Specificity of training
 - Intensity of training
 - Volume of training.
- e. Each of the following to be included with an appropriate % value:
- 65% of lactic acid is re-synthesised/oxidised (to form CO_2 and H_2O)
 - 20-25% into glycogen
 - 10% into protein
 - 5% into glucose.

Question 7 – Criterion 5

- a. At a point between the 11th and 12th minutes, at a clearance of 7.2 mM.
- b. 35% intensity recovery method most effective. At the end of the recovery period 35% - 2 mM, 65% 3 mM, Passive Recovery 3.3 mM.
- c. 65% intensity decreases from 4.6 mM to 3.2 mM (1.4mM difference). Passive recovery decreases from 3.9 mM to 3.5 mM (0.4mM difference).
- d. In the first 5 minutes:
- 65 % starts at 11 mM and goes down 9.8 mM after the first 5 mins. 65% difference/ range of 1.2mM
 - 35 % starts at 11 mM and goes down 9.0 mM after the first 5 mins. 35% difference/range of 2 mM

- Passive Recovery starts at 11 mM and goes down 8.7 mM after the first 5 mins. Passive difference/ range of 2.3mM
- Passive Recovery had the greatest decrease in blood lactate, followed by 35% and 65% was the least effective.

Section B – Skill Acquisition

Question 8 – Criterion 3

- A motor skill is an activity that involves **voluntary** muscular movement with the correct degree of **muscular control**.
- An open environment occurs in general play when you are confronted with multiple teammates and opponents that impact on the timing and nature of the skill to be executed. If fouled, a player finds a more closed environment at the foul line, where they have no defenders or opponents to worry about and they have more control over the timing and the ability to perform it the same every time.
- Identification: Cognitive Stage of Learning (understanding) (1/2 mark).
Characteristics: Any three of the following for 1/2 mark each:
 - Identification and development of the component parts of the skill/sub routines
 - Make lots of errors
 - High attentional demand
 - Can perform skill slowly
 - Watch for feedback from previous skill attempt
 - Inconsistent technique
 - Lots of self-talk, etc.
 - Any four of the following for 1/2 mark each:
 - Provide accurate demonstration
 - Allow time for practice after re-demonstrating the skill
 - Relate the skill to other previously learnt skills
 - Give clear instruction
 - Don't overload with information
 - Allow the learner to 'feel' the movement
 - Develop an understanding of cue words with the learner (e.g., Snap the wrist)
 - Say what 'to' do not what 'not to' do, etc.
- The primary disadvantage of anticipation is that the already prepared movement or response may be incorrect as sometimes the anticipated event will not occur OR it occurs at a different time than you may have expected, therefore delaying your response. It will therefore take time to 'unprepare' the movement and select a more appropriate response. For example, anticipating a pass and moving to intercept, the pass does not happen and a change in direction is required.

Question 9 – Criterion 3

- Any two of the following for 1 mark each:
 - Age & maturity – As Oscar has aged and matured, he would be able to better process information

- When racing motor cars
 - Motivation – his motivational level impacts which kind of activity he prefers
 - How persistent he is and how much effort he is willing to put in as to make it to Formula One hours of practice are required
 - Quality of instruction or training – skill learning is more rapid if Oscar receives professional coaching or teaching
 - Other applicable answers depending on justification.
- b. Vision/Sight. Seeing other cars and judging the distance between you and them; seeing the corners and judging when to apply the brakes coming into them, etc.
- c.
- i. All the following for ½ mark each: External/Extrinsic; KR; KP; Continuous/Concurrent
 - ii. Information overload.
- d. Schema are rules which we learn in order to execute skills in differing environments/situations. Examples may include things such as:
- Practicing in both dry and wet conditions so you know the different affect each has on braking time and distance.
 - Practicing on different tyre compositions so you understand how the car reacts and feels as they tyres age/wear, etc.
- e. 420 kilometres or 4200 metres.
- f. Drag force
- OR
- Air Resistance.

Question 10 – Criterion 3

- a. Projectiles (golf ball in this case) would travel further as the release point is higher from the ground. Because projectiles (golf ball) released/struck from an elevated position will travel further, she may need to consider the angle of release (which club) and/or the velocity of/at release (swing speed) to compensate for the extra distance she will gain.
- b. Definition: Newton's 1st law of motion: A body continues in its state of rest or state of motion unless acted upon by a force.
- c. Application: A golf ball will remain stationary until the force of the club moves the ball.
All the following for 1 mark each:
- **Motivate:** Receiving information can play a strong motivating role for performers. KR and KP make the task seem more interesting, keeps the learner alert, results in learners setting higher performance goals and makes tasks more enjoyable.
 - **Reinforcement:** Feedback can reinforce efficient motor programs and schema.
 - KR will reinforce to the learner that the movement they have developed is working efficiently.
 - **Regulate or change the performance during the activity:** Feedback guides the learner on ways to move more efficiently. Feedback acts to specifically instruct the learner about aspects of a movement which need changing during the movement.
 - **Inform and improve future performance:** Feedback provided to assist players to improve future performances.

- d. Any four for ½ mark each: wind speed and direction, presence and location of hazards (bunkers and water) and location of rough or out of bounds, advice from Caddy, distance to the hole, etc.
- e.
- Technique 1 = Naked-eye analysis and Technique 2 = Video/Computer Analysis.
 - Technique 1: This will demonstrate the skill as it is naturally performed in real time: its timing, coordination, sequencing, and spatial characteristics and allow for the development of ‘feel’ for the movement, etc.
Technique 2: The skill can be replayed, paused, and analysed many times. The footage can also be viewed by the performer and can be observed at varying speeds.
- f. Answers may include things such as: widening base of support by spreading feet apart; bending knees to lower centre of gravity; making sure the centre of gravity is aligned over the base of support.

Question 11 – Criterion 5

- a. 22 reps.
- b. As the load on the bar was increased the average velocity at which the bar was moved decreased. The relevant data included that from the table below:

Sets	Load (kg)	Av velocity (m/s)
1	20	0.88
2	25	0.74
3	30	0.66
4	35	0.54
5	40	0.41

A comparison between at least two sets is required for full marks.

- c. A load of 30 kg would be most appropriate. At 30 kg the athlete generated the most power of 195 watts, which was 9 watts more than the next highest load of 35 kg.
- d. $5 \times 43 = 215 \text{ cm}$, $5 \times 39 = 195 \text{ cm}$, $5 \times 41 = 205 \text{ cm}$, $4 \times 42 = 168 \text{ cm}$, $3 \times 49 = 147 \text{ cm}$
 $+ 195 + 205 + 168 + 147 = 930 \text{ cm}$ or 9.3 m
- e. $176 \text{ W} + 183 \text{ W} + 195 \text{ W} + 186 \text{ W} + 160 \text{ W} = 900 \text{ W}$
 $900 \text{ W} / 5 = 180 \text{ Watts}$

Section C – Sport Psychology

Question 12 – Criterion 4

- a. Examples include things such as: replacing an injured player with a fresh player off the bench; changing the positions of different players on the field; spare equipment if something breaks; accepting the pain when injured.
- b. Any two of the following for 1 mark each:
- Goals enhance focus & concentration** – For example, a rugby they may concentrate on the skills that they need to improve such as tackling. Focus on wrapping their arms and driving back.
 - Goals boost self-confidence** – Individuals need to know that they are competent and that they have choices. Goal setting is an excellent way to improve self-confidence as it is a way of seeing evidence of choosing right.

- **Goals help create a positive mental attitude** – Goal setting improves performance by encouraging perseverance and contributing towards a positive psychological state.
 - **Goals increase intrinsic motivation to excel** – The goal that is valued and considered worthwhile will provide the spur needed to overcome tiredness, boredom, disappointment, and poor performance and to maintain an effort and strategy which is seen to be taking an athlete closer to that goal.
 - **Goals enhance playing skill, techniques, and strategies** – The goal is the end point and the instigation for the processes needed to reach it. A goal will rarely be achieved without the requisite strategies.
 - **Goals improve overall performance** – The underlying reason for goal setting. If each of the above is in place, it will be very difficult for performance not to improve.
- c. Any two of the following for 1 mark each:
- focusing on your game plan as it is the most important task
 - bring your thoughts back to KPIs (e.g., time in possession)
 - focus on task relevant factors (rolling defence)
 - using mood/cue words can help athletes to focus back on their game/event plan
 - blocking out “noise” and using selective attention, etc.
- d. Any two of the following for 1 mark each:
- losing a game they should have won
 - change of coach – different personality/style
 - player unrest – distractions of poor behaviour
 - change of game plan – hard to execute, etc
 - financial pressure from potential lack of sponsorships
 - pressure from Board to achieve results or lose your job.
- e. State anxiety is our response to a given situation. If coupled with excess arousal, it could have caused the Wallabies to ‘choke’ at critical times in a match. Not beating the All Blacks for so long has negatively affected their self-efficacy preventing them from believing in their ability to execute their skills properly.

Question 13 – Criterion 4

- a. Flow is characterised by complete immersion in an activity, to the degree that nothing else matters.
- OR
- A perfect match between the perceived demands of an activity and an athlete’s perceived ability or skills.
- OR
- Flow state is considered the highest level of intrinsic motivation.
- b. Amotivation.
- c. Any four of the following for 1 mark each:

- **Rest** – What time to bed and what time to wake up? Each is determined by how much sleep you need and the following preparation factors. You should wake with your initial thoughts being positive and directed toward your schedule for the day.
 - **Diet** – What, how much and when to eat? This will often be a process of trial and error to determine which foods provide you with the necessary fuel and do not make you feel bloated and uncomfortable. Hydration is also very important.
 - **Equipment check** – What do I need? Spare equipment in case of breakages or changing weather conditions. Food and fluid requirements during travel and at the competition site. This is usually carried out the night before.
 - **Spare time** – How will any spare time be spent? Mentally rehearsing? Watching TV? Reading? Listening to music in the bath...? Plan to fill in this time. Unoccupied spare time will often lead to increasing anxiety levels and unplanned and unwanted distractions.
 - **Travel** – What time do I need to be there? What time do I need to leave? How am I getting there? What happens if my transport breaks down or fails to arrive? This reads as being perhaps a little “over the top” but is also one area which often leads to athletes becoming over aroused. If you get caught in traffic and arrive later than planned, it can influence team requirements prior to competition and your own mental preparation and physical warm up program.
 - **Mental preparation** – When do I begin to prepare mentally for the event/competition? Find a time and a place which suits you. It could be when you first wake up or it could be while sitting on the team bus travelling to the venue.
- d. Definition: instant pre-play involves taking a few moments prior to executing your skill to mentally rehearse the process.

Application: athletes visualises themselves successfully completing the lift prior to executing the overhead press.

OR

Application: as it is a closed skill, and is repeatable and self-paced, helps athlete shift into a performance mindset and prepares nervous system/neural pathways for OH press.

- e.
- i. Process goal: a CrossFit athlete may set a goal of maintaining good posture/neutral spine when executing the overhead press.
 - ii. Outcome goal: to finish Top Three in 2023 National CrossFit Championships.
- f. If we fail to achieve the desired outcome, for example, a win, a score, a weight lifted in CrossFit, we will come away with nothing from that performance and feel like a failure. By setting process goals as well, we can still achieve success and take away positives, despite the outcome.

Question 14 – Criterion 4

- a. Any two of the following for 1 ½ marks each:
- **Competence** – The need to control the outcome and experience mastery. That is, Peter’s need to be good at what he does, feel confident and self-efficacious.
 - **Relatedness** – Person’s need to feel a sense of belonging by being part of a group or community. That is, Peter’s need to relate to and care for others, and have them care for him.
 - **Autonomy** – Involves the need to self-initiate and self-regulate one's own behaviour. Peter’s need to have the freedom of choice and input into decision making.

- b. Any four of the following for ½ mark each:
- gold medal – Olympics, World champs, etc
 - fame
 - money from endorsements
 - attention from fans and the media, etc (tangible and intangible accepted).
- c.
- i. As arousal increases so too will the quality of performance until arousal passes beyond an optimal level. Beyond this optimal range of arousal performance will diminish. Over arousal will result in him being too nervous and inhibit his performance.
- ii. Any four of the following for ½ mark each:
- accept that some tension or anxiety is usual prior to competition
 - engage in preferred relaxation technique such as controlled breathing, centering, progressive relaxation techniques, imagery, visualisation, massage, meditation, and yoga
 - engage in mental rehearsal
 - focus on task relevant factors (if over aroused during performance)
 - seek out others who are calm
 - listen to his favourite music
 - engage in a preferred distracting activity.
- d. Any two of the following for 1 mark each:
- **Performance accomplishments:** Not having raced and performed well for a period after the drug test, Peter may feel he is not as good as he was beforehand.
 - **Vicarious experiences (or modeling):** After not having raced for a while, Peter may not have felt he was as good as those he used to race against and beat.
 - **Verbal persuasion:** A lack of support for the crowds or selectors may have had Peter believing he is not as good as he once was or did not deserve to be back at the same level.
 - **Physiological states (Arousal control):** Peter may have been too aroused to be able to control his arousal level due to the concern about the reactions of others towards his positive drug test and whether he was guilty or not.
- e. During training, Peter's attentional focus would primarily be Narrow Internal as he is focussing mainly on aspects of his running technique, such as cadence and breathing patterns. During a race, Peter would need to change to an attentional focus that was predominantly Broad and External as he is having to worry about multiple other runners in the race and is trying to avoid being tripped while he navigates his way through the race.

Question 15 – Criterion 5

- a. Least to Most:

• Pep Talk Only (PTO)	55 seconds
• Motivational Music Only (MMO)	61 seconds
• Visualisation, Motivational Music, Pep Talk (VMMPT)	64 seconds
• Pep Talk and Motivational Music (PTMM)	66 seconds
• Visualisation Only (VO)	69 seconds
• Pep Talk and Visualisation (PTV)	71 seconds
• Motivational Music and Visualisation (MMV)	75 seconds

- b. Pep Talk on its own had 55 seconds. The lowest of the three individual conditions (PTO 55 seconds, VO 69 seconds and MMO 61 seconds).

The Pep talk when used in conjunction with one other stimuli was also the lower when compared to the condition without a pep talk using two other stimuli. (PTMM 66 seconds, PTV 71 seconds and MMV 75 seconds).

- c. VMMPT with 64 seconds. This condition had 3 stimuli, yet it produced results that were worse than others which had only 1 or 2 stimuli (e.g. – VO had 69 seconds and MMV had 75 seconds). In addition, the only things it was better than were single condition stimulus.
- d. VMMPT = 64 seconds; PTMM = 66 seconds; MMV = 75 seconds; MMO = 61 seconds
 $66 + 66 + 75 + 61 = 266$ seconds Therefore, average is $266/4 = 66.5$ seconds.

Section D – Cross-Discipline Links (CDL's)

It should be noted that the following exemplars represent the highest level for each rating and are meant to act as a teaching tool for candidates to see the transition of how the same CDL changes as you move from a “C” to a “B” to an “A” rating. Four links across two questions would be needed to ensure the final rating.

Question 16 – Criterion 6

Earlier this year in one of the most sensational transfers of recent times, Portuguese star soccer player Cristiano Ronaldo moved to Saudi club Al-Nassr. Prior to his signing with Al-Nassr he had been playing at Manchester United where his form was poor and he was not in the starting 11.

Use two (2) cross discipline links between sport psychology and skill acquisition that will explain how Cristiano can find his best form at his new club. (15 Marks)

- The two core units are: **Sport Psychology** and **Skill Acquisition**.
- Links can be made in either direction (Sport Psychology to Skill Acquisition or vice versa).
- Links must be made from a **positive** perspective, for example, what Sport Psychology aspects did CR use and how might these positively impact on his ability to execute his Skills for his new club?
- 2 Links are to be completed, worth 7.5 marks each, according to the CDL Marking Guide.
- Examples of possible links could include:
 - CR can use visualisation to improve his execution of subroutines and find his best form with his new club.
 - CR's ability to effectively control arousal allows him to selective attend and perform at his new club.
 - The different types of feedback CR receives can allow him to create more focussed improvement goals.
 - CR's motivation allowed him to undertake effective practice methods.

The main linking responses received by candidates for this question revolved around “arousal to selective attention” and “feedback to goal setting”.

Exemplars

“C” Standard

The following is an example of a link that could have been made. Four similar standard links would be needed to ensure an overall “C” rating.

Ronaldo’s types of practice develop his confidence.

Practice of skills is necessary for improvement. As an elite athlete, Ronaldo would undertake massed practice. Massed practice involves consistently and continuously practising a skill, such as a penalty kick, without breaks. As soccer is played in an open environment, Ronaldo and his team would also engage in variable practice. Variable practice is best used for open skills like kicking to teammates under pressure or on the move.

Confidence is a person’s belief in themselves and their abilities. Undertaking individual massed practice to improve a particular skill of kicking set shots in a closed environment can allow him to feel confident in his abilities. Ronaldo’s confidence in his skills can be transferred to play soccer in more open environments, increasing his self-efficacy (situational confidence) when faced with needing to perform that skill in a game. Variable practice with his new teammates will also improve Ronaldo’s confidence to play as an effective team member, regardless of changes in the open environment.

With effective practice and increased confidence, Ronaldo is more likely to find his best form at his new club.

“B” Standard

The following is an example of a link that builds on from the previous “C” standard link. Four similar standard links would be needed to ensure an overall “B” rating.

CR utilises effective practice types to develop his confidence and self-efficacy.

Soccer is a team sport played in an open environment, except for situations such as a penalty shootout (closed end of the continuum). Therefore, for training to be most effective, CR should engage in variable practice that more closely replicates the open playing environment. Varying practice could include doing different types of centre pass kicks, dribbling past different skilled defenders, and playing on a variety of opponents. CR could utilise problem solving to develop understanding of the strategies/game plans with the new team, to align his stimulus identification responses with the new team’s formation/tactics (decision-making skills), continuing his development as a skilled player to make correct decisions. This problem solving and variation will help CR develop his schema (rules which we learn to execute skills in changing environments). With practice, the comparisons CR makes between his belief in himself and his abilities will increase. Confidence in his skill execution will improve during competition if he has been successful in practice under the same playing conditions. Engaging in these practice types with his teammates will also develop team cohesion and increase CR’s confidence.

Additionally, if CR succeeds in these open practice types, his self-efficacy (which is his situational self-belief) will increase. He will experience self-efficacy regarding playing on a variety of opponents or being able to dribble past players with varying strengths. As a flow on effect, with CR experiencing high self-efficacy, he is more likely to display the following high self-efficacy traits:

- persist for longer (train harder and play harder)
- take on more challenging tasks (such as playing outside of his position or taking penalties)

- being resilient (if he didn't start in the 11 this would not discourage him).

Therefore, CR is more likely to play better at his new club because of his effective practice and have improved confidence levels.

"A" Standard

The following is an example of a link that builds on from the previous "B" standard link. Four similar standard links would be needed to ensure an overall "A" rating.

It is important that Cristiano Ronaldo (CR) engages in effective practice to improve his confidence and self-efficacy and ultimately find his best form.

Soccer is a team sport with most skills being executed in an open, unpredictable environment. Therefore, training must include effective practice to enhance individual skills as well as promote team cohesion. As a new player to the club, this will enable CR to feel confident in his general abilities and achieve self-efficacy, situational self-confidence, in executing specific team plays and individual skills.

Practice of skills is necessary for improvement; however, it must be suitable for CR as an elite soccer player and appropriate for the type of skill. Massed practice, involving continuous repetition of a skill without breaks, is suitable for CR when perfecting his corner kicks. He may be aiming to set a team mate up for a header from the back post, so he repetitively practices this pass. He can continue to use massed practice to perfect the curve on his corner kick, aiming to kick the goal himself and make the play more unpredictable. Additionally, massed practice can replicate executing the skill under fatigue, which CR will experience during a game lasting up to 120 minutes if it goes to overtime. It also builds CR's confidence that he can adjust the motor program and execute this skill in a variety of situations with his new team. Therefore, self-efficacy is developed as CR feels in control of the situation, his actions are intentional, and he will experience less anxiety.

Variable practice is used best for open skills such as dribbling past an opponent and moving the ball from defence to offence. It involves practising in a variety of situations to develop schema to use in game situations. Schema are rules learnt from experience regarding how to best execute skills in a range of situations, such as playing different teams, individual opponents, or weather conditions. In variable practice, CR and his teammates can be rotated around from attacking roles to defending roles, allowing for attacking practice and defensive practice against a variety of players. One on one defence can be changed to two on one. Shorter or longer passes can be practiced moving the ball more effectively out of the defensive half and schema is developed regarding how much force to apply to the kick. As a result, variable practice develops CR's confidence to execute skills in a variety of situations with his new team and that they can work cohesively. Variable practice also develops CR's self-efficacy in specific situations such as being double teamed. Therefore, CR can remain calm under pressure due to his high levels of confidence and can re-establish himself as one of the best soccer players in the world.

Question 17 – Criterion 6

Madison de Rozario (MdR) is an Australian Paralympic athlete and wheelchair racer who specialises in middle and long-distance events. Madison holds the world record in the women's 800m and previously held the record in the women's 1500m.

Use two (2) cross discipline links between sport psychology and exercise physiology to demonstrate how her overall fitness and psychological preparation can positively impact her training prior to the upcoming Australian championships.

- The two core units are: **Sport Psychology** and **Exercise Physiology**.
- Links can be made in either direction (from Sport Psychology to Exercise Physiology or vice versa).
- Links must be made from a positive perspective; for example, what Sport Psychology strategies did MdR use and how did these positively impact on her Physiology?
- 2 Links are to be completed, worth 7.5 marks each, according to the CDL Marking Guide.
- Examples of possible links could include:
 - MdR's specificity of training allowed her to increase for self-efficacy for improved performance
 - MdR's effective goal setting strategies allowed her to periodise her training year for competition
 - MdR's use of motivation to overcome diminishing returns in her training
 - MdR's used debriefing strategies to improve her training sessions.

The main candidate responses to this link revolved around “goal setting to training year” and “motivation to recovery”.

Exemplars

“C” Standard

The following is an example of a link that could have been made. Four similar standard links would be needed to ensure an overall “C” rating.

MdR set a goal to peak for competition.

Goals give MdR direction and focus her efforts to achieving well in her training sessions and to do well at competition. Madison won't train the same all year, she will have hard/easy cycles.

MdR wants to improve her aerobic capacity as a performance goal, so she will be able to peak her training to be at optimal level of fitness to achieve the outcome goal of winning the Australian Champs. The chosen goal will improve the quality of her training program and training sessions by determining what type of training she does and the frequency, so she is fit and ready to compete. MdR would use fartlek training method to work on her aerobic energy system before the event. This method allows her to change the high/low intensity ratio in each session and to also build up the high work intervals over time on her long wheelchair distances. This training period will allow more efficient use of oxygen in her body over a longer time of training. Measuring performance goals can then be done by comparison of her own times to check how well she is peaking. As the time gets closer, MdR will use the easy cycle of her training to completely recover.

“B” Standard

The following is an example of a link that builds on from the previous “C” standard link. Four similar standard links would be needed to ensure an overall “B” rating.

Effective goal setting by MdR and her coach has allowed her to increase the training load to peak at the right time for competition.

Goal setting gives structure to MdR's training and helps identify both positives + weaknesses in her performance. For goal setting to be effective, it must use the SMARTER acronym. Goal setting improves both her self-confidence + improves overall performance by 50% if she had not set specific goals.

Peaking is using training intensity + workload to improve different energy systems/fitness components + muscle groups and must be specific in its timing, in this case MdR's preparation towards the Australian wheelchair racing Championships.

To be competitive at the right time she would use the stepping stone goals to reach her long-term goal of being at peak fitness/strength for Aus Champs and win. One process goal (shorter term goal focussing on an action or performance of a skill i.e., generate more force on her wheel stroke) MdR may use in-season peaking to train to improve her shoulder press from 12kg-16kg @ 10 Rep Max 18 weeks before the championships. Chronic anaerobic adaptations can be made in at least 8 weeks of training, so the goal is realistic, it is specific (improves should press power), measurable in 18 weeks (improvement = 4kg), coach agrees this is an area of improvement and progress can be reviewed along the way. Performance progress could be measured against her own standard of strength at fitness testing.

Improvement of her muscular shoulder power is extremely important for middle/long distance wheelchair racing times and finishing the race by overpowering her competitors. With her effective goal setting, she was able to peak, achieving the specific muscular improvements and perform to a high level of performance.

"A" Standard

The following is an example of a link that builds on from the previous "B" standard link. Four similar standard links would be needed to ensure an overall "A" rating.

MdR followed the stepping stone model to taper and peak for Australian championships.

MdR's goal planning directed her to construct a comprehensive plan for her training schedule around the calendar year dates, to include the fitness components to be developed and the rate of progressive overload of when to peak for competition, as maintaining peak fitness all year around can be difficult.

MdR's goal setting included a progressive, structured pathway to success, using overarching types of process/performance/outcome goals. By doing so it will improve MdR's quality of her training sessions and overall performance leading into competition.

MdR's long-term goal - to taper and peak for her major event, would first be followed by smaller short-term goals of completing each block of training at the right intensity and performance goals of beating personal best times. These goals work in cohesion with one another to act as the stepping stones to achieve the long-term goal of peaking for the event. With MdR goals agreed to by her coach she aims to reach fitness adaptations in time for competition, as peaking involves her being at optimal physical condition. When to progressively overload her training would correlate with when to peak (Aus Champs), MdR training at the right intensities (80% of MHR - endurance) at the right times of the year (at least 12 weeks prior for aerobic adaptations). i.e., a regular in-season wheelchair training week completing 80km for fitness maintenance and then progressively overloading with longer weeks of 100km in the training block prior to competition for peak competition fitness. For this to occur MdR scheduled in the correct number of sessions a week (5-6 for aerobic adaptations), the duration (sessions would well over 20+ mins), training methods (Continuous for mitochondrial biogenesis) improving her aerobic capacity for race day.

MdR could choose to use whole year peaking to have good performance throughout the competition season; however, she would more probably utilise in-season peaking for Aus Champs to allow her body more rest time for recovery and build up her muscular strength and endurance. MdR's last stepping stone for her goal of peaking was to follow her tapering plan, for MdR this means reducing her training load 1 week out from competition.

MdR schedule of training (Middle distance wheelchair sprints)	
2 weeks prior	1 week prior
Adjustments	
4x400m (2min rest)	2 x 400m (5min rest)
2 x 400m (5min rest)	1 x 800m (80% MHR on straight, 60% MHR on corners)
2x1200m (3min rest)	1 x 1200m (80% MHR corners, 60% MHR straights)
1x1500m	1 x 1500m As normal

As an example, the above workout shows a reduction in sets/change of intensity and longer recovery intervals in the training sessions 1 week prior. This process combined with peaking allows MdR to be at optimal condition and fully recovered from any metabolic by-products, having appropriate fuel stores and have her skeletal muscles feeling fresh for competition.

Question 18 – Criterion 6

No matter which sports they compete in, athletes will always try to gain an advantage over their opponents by improving their physical condition and their skill execution. Select an athlete or team, specify their sport, and use two (2) cross-discipline links between **Exercise Physiology** and **Skill Acquisition** to demonstrate how they can improve their performance. My sport

is:.....

My athlete and/or team is:.....

You may wish to consider a specific scenario: e.g., lead up to a major match/competition, during pre-season; returning to a team after being 'dropped'/injured, etc.

- The two core units are: **Exercise Physiology** and **Skill Acquisition**.
- Links can be made from both directions (Exercise Physiology to Skill Acquisition and vice versa).
- Links must be made from a positive perspective, for example of how they can improve their performance.
- 2 Links are to be completed, worth 7.5 marks.
- Links dependent on student choices.

Due to the varied nature of responses to this question, no exemplars have been provided.