ASSESSMENT REPORT

SPT315118 SPORT SCIENCE

This section will be comprised of General Comments with regard to the paper as a whole, followed by specific Examiner’s Comments with regard to each Section, followed by Solutions for each Section.

General Comments

The consensus of the Marking Panel was that the 2019 paper was one which gave all candidates the opportunity to demonstrate their level of knowledge and understanding of the course, and achieve a result consistent with their abilities; IF they knew their content and were able to manage their time effectively.

Perhaps the biggest concern is with a wide range of generic issues which seem to come down to candidates’ lack of experience and/or unfamiliarity with exam technique. Throughout all sections of the paper, a number of common issues for concern were raised by Markers, where those who obviously had some knowledge of what they were writing about, lost marks due to some simple mistakes that those with more experience tend not to make.

Such mistakes included:

• failure to fully read the question and understand exactly what it is asking
• not explaining, when questions ask for that level of detail
• not providing examples, or providing examples not relevant to the question
• not justifying their responses when asked to
• not using required units in the criterion 5, data questions
• using ‘approximately’ in criterion 5, data questions accompanied by a ball park figure
• an inability to effectively manage their time, especially when the time allocation for the booklets varies from 30 to 45 to 60 minutes.

If candidates can be aware of these matters and do their best to address them, it is hoped they will achieve greater success.

While the majority of candidates are using black or blue pen to complete their papers, it remains a source of frustration and disappointment that many candidates continue to use pencil throughout their paper. Yet again, it is strongly advised that candidates use pen NOT pencil to complete their paper, in order to make their writing easier for the Marker to read and assess, and to avoid any risk of their work being erased.

There continues to be an issue raised from Markers, about the legibility of candidates’ handwriting. With an ever increasing number of assignments throughout the year being typed and/or submitted electronically, many candidates are losing the ability to write at speed, in a clear and legible manner, for prolonged periods of time. Candidates are running the risk that their marks will be negatively affected if the Marker cannot clearly read the writing in front of them. It is strongly recommended that in preparation for the exam, candidates spend more time practicing their handwriting, hopefully while doing previous exams, for durations up to as long as their exams will be.
Another aspect noted by several Markers is where candidates take a “stab in the dark” by offering many more options than are asked for in a question; in the hope that the correct answer is contained somewhere within their answers. Candidates should be aware that if, for example, two pieces of information are asked for, and they give four, the Marker will mark the first two and disregard the last two.

Some concern was expressed by Markers about the use of casual language in a formal exam: e.g. “pumped over”, to “ease the players back”, “max out”, “switch up”. Consequently, those candidates aiming for higher grades are reminded to ensure they use appropriate, relevant and, wherever possible, specialised language/terminology. 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 (e.g. CHO’s, bpm, RHR, MHR, SMARTER, FITT, VO₂ Max, a-v O₂ diff, etc.). Consequently, individual acronyms and abbreviations developed by individuals or classes to assist in learning and recall, may not be suitable and may cause marks to be deducted if they are unknown to the Marker (e.g. HIPS).

The criterion which continues to cause the most issues is Criterion 6, Cross-Disciplinary Links (CDL).

Candidates are reminded that as of last year, only two out of three questions need to be answered, meaning they have more time to complete their links and, as such, a slightly higher standard of answer is expected in comparison to previous years.

Given that 4 out of the 7.5 marks for each link are allocated for the relevance and application of the theory to the specifics of the question - the sport, the athlete, the situation, etc., which includes the use of examples; many candidates scored 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 7.5, which is usually only equivalent to a “t” rating.

It seems that some candidates enter the exam with the specific plan of only doing the minimal work required to gain a “t” for this section. Such a plan can come unstuck if candidates do not do as well on other sections as they hoped to do; so ALL candidates would be encouraged to ensure they have the ability and the time to complete this section to a higher standard.

Others, it seems, enter the exam with “pre-prepared, generic links”. While such a method can be effective for better candidates with the knowledge and understanding to adapt and adjust these links to the specifics of the question, it seems to catch out those who lack that ability, especially when they cannot adjust the link to work equally effectively in either direction, or their knowledge of the required sports is limited.

Overall, only a limited number of candidates were able to provide answers for CDL’s which addressed the standards at the highest level. Such a result should prompt those candidates with aspirations to achieve at this level to familiarise themselves more with the actual criterion standards and make greater use of the exemplars for each question provided in the solutions. Invariably, candidates who can write good quality CDL’s also do well in other criteria, as they need the breadth and depth of knowledge in order to provide detailed answers in the first place.
Examiner’s Report on Section A – Exercise Physiology A/B

General Comments
Most questions were answered.

The majority of candidates are remembering to include units in data questions.

The graph had labels on 3 axis and this caused some confusion for candidates as they labelled data with the incorrect units e.g. ml/kg/min vs km/hr vs mmol/L.

Describing a relationship causes problems for many candidates.

Precision with data was a concern. Too many candidates using the terms “approximate” or “about” when specific data can be referred to.

Question 1
a) Candidates that knew a pre-prepared definition did well. Those that attempted to “make up” a definition answered the question poorly. A small number of candidates just gave characteristics of steady state e.g. steady heart rate or steady respiration rate.
b) Candidates explained the concept of O₂ deficit well. However, many candidates did not give an example of how this would apply to Kate.
c) Most candidates could outline the role of Myoglobin. It was evident some used a pre-prepared definition. However, many candidates could not state how it assists Kate in her fun runs. Also some candidates were confusing myoglobin with haemoglobin.
d) Well answered. Apart from a small number of candidates confusing low GI and high GI.
e) Poorly answered. There was a lack of understanding around this question and how the amount of training undertaken, intensity of training undertaken and Kate’s diet could influence her body to produce ATP via glycolysis or lipolysis. Many candidates re-wrote the question or simply took a “guess”. Many candidates did not explain and justify their choice. Better answers mentioned that Kate does minimal training and eats a diet low in fat therefore her body is unlikely to have adapted to produce energy primarily through the breakdown of fats. Therefore, glycolysis being the primary source for ATP replenishment in Kate’s situation. Plus she would not have trained enough to be able to glycogen spare.

Question 2
a) Many candidates did not read this question carefully enough. As a result, many listed chronic circulo-respiratory adaptations e.g. cardiac hypertrophy or increased stroke volume. Some students referred to fitness components that had been developed. Of concern is that a large number of candidates stated that the number of slow twitch muscle fibres would increase; such a concept (hyperplasia as opposed to hypertrophy) is debatable in itself, and if it does occur, it is only under extreme loading using resistance training. Better answers listed a chronic adaptation and in the explanation demonstrated understanding of the adaptation through relating it to Amy.
b) Generally well answered. Most candidates who read the question correctly knew chronic responses at MAXIMUM exercise. However, some candidates gave answers at rest e.g. decreased HR at rest when the question stated during maximum exercise.
c) Generally answered well. However, some candidates did not know the 2 factors that combine to make Q with some stating TV x HR or oxygen x energy, etc. Candidates who answered part i) well did well on part ii) by answering that both SV and HR increase. However, Part iii) was answered poorly. Most candidates attempted definitions of Q and VO₂ without answering the question of their relationship. Therefore, many candidates found linking the two challenging. Candidates were also referring to VO₂ as the volume of air consumed and stating VO₂ is the ability to produce oxygen when both statements are incorrect.

d) Most candidates knew a pre-prepared definition of VO₂ MAX. However, many did not refer to "during maximal or exhaustive exercise". The relative and absolute concept was understood by candidates quite well. Better answers gave a definition, described the difference between relative and absolute with units, and applied it to Amy and other cyclists.

Question 3

a) Most of this question was answered well. The majority of candidates could discuss which energy systems each swimmer would explicitly use. However, very few candidates discussed the interplay of the energy systems and did not identify that all three energy systems contribute to exercise. A lot implied that each system switched on when the previous one ran out or that one would "take over". The ability of candidates to explain the gradual transition between systems, as the concept of interplay, proved difficult for many.

b) Not well answered. The majority of candidates could not explain ATP production through anaerobic glycolysis. Some candidates explained ATP splitting whilst others said that aerobic glycolysis takes place in the Krebs cycle (or Crebs cycle). Some candidates only stated what it was eg, the incomplete breakdown of glycogen without explaining the process of production.

c) Not well answered. Some candidates knew a pre-prepared definition that they attempted to use but on a whole the concept was not well understood and applied to the question.

d) Most candidates who read the question attempted to provide two other characteristics of fast twitch muscle fibres. Some candidates gave other information that is not considered a characteristic.

e) Not well explained. LIP is the LAST point of balance between LA entry and removal. However, many candidates referred to LIP as the point where LA begins to accumulate faster than it can be removed. This only occurs once the LIP has been exceeded. Many candidates did not refer to H⁺ ions in their answer. Some candidates thought that an increased LIP would not benefit either athlete, and the majority of candidates said it would only benefit the 800m athlete.

Question 4

a) Poorly answered. Some candidates knew that game related skills and fitness work would be the focus of this phase with it having a distinct change towards sport specific training, higher intensity and lower durations, but many just mentioned general fitness work. Better answers contained some information about the focus of the phase and an example from their chosen sport. A large number of candidates did not relate back to their chosen sport with an example.

b) Poorly answered. A large proportion of candidates confused Exercise Physiology “methods of training” with Skill Acquisition “practice” concepts, such as drilled, variable or massed. Schema was also inappropriately mentioned. Some candidates also chose cross training as their method of choice. “Cross training” is by definition, general and non-specific. The competitive phase requires highly sport specific training methods and cross training goes against this concept. Better answers gave an appropriate method, a short definition and an example of how it would be used in the specifically
chosen sport. Some demonstrated knowledge of the training method through their explanation of its use.

c) Poorly answered. The majority of candidates wrote ‘fitness testing’ and did not relate it specifically to their sport as the stimulus required. More information was required with a specific test or fitness component that would be measured through fitness testing for the chosen sport. Other answers included feedback sheets, goal setting, interviews, diary writing.

d) Poorly answered. Most candidates were very vague with their answer which included repetitive use of the words individual and weaknesses stating “the coach could work with the athlete on their individual weaknesses”. Many candidates used Skill Acquisition theory rather than Exercise Physiology theory in their answer. Better answers demonstrated knowledge of the principle and gave a specific example of how it might work for their sport.

Question 5

a) Generally well answered. Most candidates could explain why Porte should undertake an active cool down. Some candidates did not read the question carefully and wrote what he could do as a cool down instead of why he does a cool down.

b) Many candidates answered this with a basic answer of ‘RP would need to eat CHO and drink fluids’. A number of candidates did not mention protein. Plus a large number of candidates either gave a vague answer as to why he should consume these eg. ‘to re-fuel’ or did not complete this part of the question.

c) Candidates could state two OTHER recovery techniques but were very basic in their explanation of the technique. Some candidates did not read the question carefully and gave nutrition and/or hydration strategies as their answer.

d) Not answered well. A large number of candidates just wrote ‘causes fatigue’ or similar. They did not seem to understand the word ‘fate’.

Question 6

a) LT threshold training as a concept was generally well explained. A relevant example of a specific training session was either vague or not provided. Some candidates were referring to using fartlek training rather than interval or continuous training at 95-105% of LIP. Some candidates stated “go for a run” without providing any reference to the necessary intensity required.

b) Well answered. Most candidates knew DOMS and could state two appropriate treatment options.

c) Generally well answered. Candidates could identify two appropriate fitness components. However, there was a lack of specific justification and/or application to the AFL player or the justification and/or application was too basic and generalised.

d) Not well answered. A large number of candidates did not read the question correctly and discussed the question based on a one off taper and peak. Candidates needed to ensure they referred to the WEEKLY tapering and peaking of an AFL player. The majority of candidates only referred to some of the terms mentioned in the question. Better answers referred to terms eg. Intensity, duration, tapering and peaking. Candidates were also stating that in a taper an athlete must decrease intensity to peak when this is not always correct.

Question 7

a) Very well answered unless candidates only answered the first part of the question and gave a VO₂ MAX reading without the running speed.
b) Well answered unless candidates read the incorrect side of the graph giving \( \text{VO}_2 \) data instead of blood lactate data. Most candidates could state that the blood lactate levels had changed due to an increase in intensity.

c) Generally well answered. Candidates could state that it was an increasing trend. Most included some supporting data but in most cases not enough for the full two marks. Some candidates clearly didn’t understand what test was being done though and used the term steady state. Better answers made reference to a number of data points to highlight the increasing trend and then the decrease at the end of the test.

d) Poorly answered. Many candidates gave an approximate answer of 2.1 km/hr when this is clearly incorrect. Need to give specific data not approximate data. Some candidates only provided one piece of information and therefore did not fully answer the question. Some candidates looked at the incorrect axis and gave a blood lactate reading rather than a \( \text{VO}_2 \) reading. Candidates need to read lines and axes carefully.

e) Generally well answered. Most candidates could determine that the athlete was an advanced runner and gave supporting evidence. However, the evidence was not always ‘explained’ as asked by the question.

Examiner’s Report on Section B – Skill Acquisition

Question 8

a) Many candidates answered this question well, although some used an individual sport, despite the question asking for an example of KR from a team sport.

b) This question was answered quite poorly and many candidates claimed that receiving KR resulted in a loss of motivation (role of feedback), rather than focussing on the notion that only receiving KR fails to give the athlete information on how to improve the skill; and as a result performance may decline. Some candidates defined both KR and KP but did not state how KR only was detrimental to performance.

c) A number of candidates gave poor definitions of schema. Also, many gave a sporting example of schema, but were unable to explain how KP assists the development of schema. Once again, some candidates gave an example of an individual sport rather than a team sport.

d) i) Generally well answered, although some candidates once again gave an example using an individual sport, rather than a team sport.

ii) Many candidates explained how each factor affected projectile motion, however, did not relate the factor to a team sport.

e) Most candidates were able to identify the major subroutines in order, however, many listed the subroutines, rather than discussing. A number of candidates did not state ‘the ball of their choice’.

f) Generally answered well. Most candidates identified the units of measurement as Newtons (N).

Question 9

a) Generally answered well. Better answers gave specific detail, such as ‘the position of the ball in the bowler’s hand, prior to release’, rather than a more general answer such as the ‘bowler’s run-up’.

b) Most candidates were able to give appropriate examples of ‘noise’ during a cricket match. However, some gave incorrect definitions with a number of candidates referring to ‘noise’ as ‘any noise in the environment’.

c) i) Generally well answered, with better answers identifying both long term memory and muscle memory.

ii) This question was well answered, with better answers recognising that for information to be permanently stored in LTM it must be rehearsed and encoded.
d) i) This question was answered quite poorly. Most candidates were able to accurately describe reaction time by referring to an example from cricket, however, despite recognising that ‘response time = reaction time + movement time’, many candidates then went on to give an example in cricket that related to movement time, rather than response time.

ii) This question was answered very poorly, with many candidates not even attempting it. Those that did answer the question, in most cases, confused stimulus-response compatibility with choice reaction time.

e) The majority of candidates were able to accurately describe temporal and spatial anticipation by referring to an example from cricket or a sport of their choice. Very few, however, explained how each type of anticipation may give an athlete an advantage over their opponent.

Question 10

a) Very few candidates were able to accurately define a motor skill. Instead, many gave a definition of a motor program.

b) This question was generally well answered, however, a number of candidates did not give a justification for their classification of a tennis serve. Better answers referred to the open-closed continuum and identified several environmental factors that meant that a tennis serve was not a totally closed skill.

c) Most candidates were able to accurately compare two different types of practice, however, many did not explain how each type of practice improved the precision of the tennis player’s skills.

d) This question was generally well answered, with better answers identifying an improved signal detection of visual cues.

e) A number of candidates were unable to identify a biomechanical principle of kinetics, with several candidates, instead, referring to one of the steps in a biomechanical analysis. Candidates who were able to successfully identify a principle found it difficult to accurately explain how a tennis player could use it to an advantage.

f) Most candidates gave accurate definitions of the psychological refractory period and were able to give an example in tennis. Better answers were able to use the example to clearly explain how a tennis player could then gain an advantage over their opponent.

g) Overall this question was quite well answered, with better answers clearly identifying how each aspect of the information processing model was impacted, plus the negative effect this then had on skill performance.

Question 11

Candidates generally did very well in this question. Part f) was the section that gave better candidates the opportunity to identify themselves. Careful consideration of the stimulus was important as the candidate was required to base their decision on data that specifically reflected the amount of court area within which each player had to move.

Examiner’s Report on Section C – Sport Psychology

Question 12

a) i) Many candidates were confusing physiological symptoms with psychological ones, and in particular, behavioural ones.

ii) The main issues here were that candidates did not always explain the strategy as being one the coach could suggest the athlete use; or show how that strategy would decrease arousal. Other candidates just listed the strategy rather than explaining it.

b) Despite having been given potential answers to this question in an ensuing question, many candidates failed to detect this hint and/or failed to use the correct terms for the antecedents.
c) In addition, many candidates did not relate their examples to the scenario of a 100m sprinter and mentioned other sports. Those who were unsure of the answer often just gave a definition of self-efficacy, or outlined characteristics/traits of those with high/low self-efficacy. Better answers with regard to vicarious experiences made mention of the concept that the athlete believed they were just as good as the other person they witnessed performing the action.
d) Many candidates answered this question well, although some did better on one of the aspects more so than the other. Some focussed too much on the impact on intrinsic motivation rather than extrinsic. Better answers expressly stated how the coach could utilise each aspect rather than simply explaining what each aspect was. Quite a few candidates gave explanations relating to Positive Motivation rather than Extrinsic Motivation.
e) This question was answered quite poorly with many candidates not even attempting it. Some candidates correctly named the terms but could not give an accurate description for it, while others had the correct explanations, but mixed up which innate need it was describing; this was especially the case for “autonomy”.

**Question 13**

a) There was much confusion with this question as many candidates suggested that process goals were short term or stepping stones on the way to longer term or outcome goals. While this may be a consequence, it is not the main focus of a process goal, which is to draw attention to the action required to achieve peak performance; is within the control of the athlete, and; can be achieved independently of the outcome. Better answers related this concept to Anna’s coach using such process goals to address the aspects of the dance with which Anna was experiencing difficulty.
b) Many candidates did not give the required examples to reinforce their understanding of these aspects, or relate their use to how they may improve Anna’s performance. Better answers connected the aspects as being related to the antecedents for self-efficacy, which improved Anna’s situational self-confidence, thus improving performance; rather than simply being for motivational purposes.
c) Generally answered well, although many candidates simply gave a definition of a coping strategy which did not actually address what the question was asking. Better answers made it clear what the primary strategy was in order to relate the coping strategy, although many candidates simply mentioned situations which were normal aspects of pre-competition or competition strategies and not situations where a coping strategy would be required.
d) Better answers recognised that the question was asking about the Guidelines for conducting a debrief and explained, rather than simply listing, the need to involve Anna in the process; do it ASAP after the performance, and consider what may have been omitted. Many candidates simply re-wrote ideas which were suggesting elements related to the positive and negative aspects, which had already been mentioned in the question itself.
e) Many candidates were unable to clearly differentiate between KPI’s and TRF and used the same terms to describe each, or mixed up the descriptions of each. The better answers could also clearly explain why Anna’s coach would refer to these aspects in order to help improve Anna’s scores. Better answers also demonstrated that they clearly understood the terms rather than just re-writing the terms with vague explanations.
**Question 14**

**General Comment**

Candidates seemed to do either quite well or rather poorly on this question. There were opportunities for marks to be scored without the need to supply more detailed information.

a) i) This was poorly answered by most candidates as they failed to realise that it is actually a form of visualisation and they claimed it was actual practice of the skill, where you try to replicate the performance environment.

ii) Answered a little better than i) with most realising it was a form of visualisation, however, many mixed it up with instant replay and stated it was done immediately after the execution of the skill, rather than before. Some thought it involved the use of video footage to watch yourself.

b) i) Most recognised the correct attentional style as being Narrow Internal, although many failed to justify why. Some candidates used the terms intrinsic and extrinsic, which are not applicable in this context while others referred to open and closed dimensions, which seemed to be confusing it with a Skill Acquisition concept.

ii) Generally answered well, although some candidates gave characteristics of the attentional style rather than its specific strengths; while others gave benefits of visualisation in general, that were not necessarily related to the style chosen.

iii) Generally answered well.

c) Most answers to this question were quite vague, with many focussing their answers on the concept of over arousal and relating it to the various theories, or to aspects of Skill Acquisition, such as cues/noise and selective attention; rather than focussing on attentional styles and possibly being stuck in their dominant style which may be inappropriate for the event. Better answers recognised that when over aroused, Adam was likely to focus on more external factors which were not helpful for his dives.

d) Well answered by most although a number of candidates gave a list which did not provide sufficient details for full marks.

e) Well answered although a number of candidates did confuse tangible with intangible rewards, or confused them with intrinsic motivation.

**Question 15**

Generally answered well by most candidates, however, there are some concerning issues with regard to poor exam technique that all candidates should have been aware of as they are mentioned every year. The first is the poor accuracy of the graph reading for many candidates, where they gave evidence along the lines of “approximately 74”, when the value was clearly below the gridline for that value. This happened in a number of questions and cost many candidates more marks than it should have. The second issue is the failure to provide supporting data to accompany answers; which was particularly an issue in b). Finally, the failure to use the appropriate units to accompany data, where relevant; in this case, bpm.

a) Generally answered well, although many candidates clearly do not understand what a “trend” is and simply gave points from the graph, or mentioned the variables.

b) While most candidates correctly identified the right answer, too many failed to state the value in support of their answers, and a surprising number misread NM as URM.

c) Generally good, although common errors included poor accuracy in reading the correct values and many candidates misreading the starting value in Session 12 as being 71.9 bpm and not 72.9 bpm.

d) Answered well, with almost everyone recognising the decrease in heart rate as time elapsed. Better answers also provided suitable data in support of their observations.
e) Most answered this question reasonably well, but gaining full marks was not common. Marks were often lost due to poor accuracy with data; often that which had been used incorrectly in previous questions. In addition, many candidates only gave data from either Session 1 OR Session 12, not both, as required. Some candidates actually thought the purpose was to increase arousal rather than lower heart rate.

Examiner’s Report on Section D — Cross Disciplinary Links (CDL)

General Comments on CDL
Responses to Question 16 tended to be less successful than those to Questions 17 and 18. The main reason for this was that many candidates misinterpreted the question pre-amble and focused on the negative elements mentioned, such as the injury, change of coach or increasing age when the answer should have been addressed from a positive perspective based around how ND could return to his previous winning form, as expressed in the Question itself. The resultant answers, expressed from the wrong perspective, limits the candidates’ ability to score more highly.

Some candidates that succeeded in expressing their answers in the correct direction stated a suitable link, wrote relevant theory, but then did not actually provide any linking or connection between the theory in the application, which is what the criterion being assessed is primarily about.

This same inadequacy of not providing sufficient application of the theory to the context of the question specifics was also evident in Questions 17 and 18.

For some candidates, when attempting to provide the necessary application in their responses, included irrelevant core examples not connected to the situation or not connected to the sport. For example, suggesting that Ariarne Titmus undertake cross training with cricket or varying her training by swimming in the ocean, takes away from the creditability of the response. Another inappropriate example saw a very large portion of responses include a link related to reaction time. However, rather than focussing on the Skill Acquisition aspect of it being part of the Information Processing Model, instead focussed on it being in connection to the Exercise Physiology concept of muscle fibre training in order to reduce reaction time.

Across all questions, a small percentage of candidates linked either the same core area (intra link) or linked the wrong core areas altogether.

Further errors which limited the success of candidates was the inability to complete the correct number of links. For example, some candidates answered 2 questions but only completed 1 link in each question; through to the situation where some candidates answered all 3 questions, when the instructions for the booklet clearly states answer TWO questions only.

Finally, time management continues to be an area of concern as a more significant portion of candidates only completed 3 out of the required 4 links, across the two chosen questions.
2019 Solutions

Section A – Exercise Physiology A

Question 1 - Criterion 1

a) 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 by the body. OR O₂ supply is equal to O₂ demand. OR characterised by a plateau/constant HR, BP, RR, etc.

b) O₂ deficit is the amount of energy which has to be supplied by anaerobic metabolic processes in the early minutes following the start of exercise due to the slow increase in O₂ uptake. When Kate begins her fun run or increases intensity she will experience an inability to utilise O₂ in the first few minutes depending on her fitness level OR when O₂ demand is greater than O₂ supply and therefore anaerobic systems supply energy.

c) Myoglobin is a protein that binds oxygen. It aids delivery of oxygen to the mitochondria or muscles where it is utilized OR myoglobin is a protein that is stored in the muscles available to be used when required.

d) Low GI foods such as (lentils, pasta, all bran cereal, apples, and milk) are important for Kate to consume before a 10km fun run as they provide a sustained glucose/energy release, providing energy over a longer period of time OR this may prevent Kate from hitting the wall due to a sustained release of energy over a longer time period.

e) Either Glycolysis or Lipolysis accepted.

Due to the fact that Kate does minimal training, eats a diet high in CHO’s and participates in short distance fun runs then it is most likely that she produces ATP via glycolysis. It is possible for metabolic adaptation to occur through manipulation of diet. Specifically, athletes who consume a diet high in fats and low in carbohydrates (as opposed to a traditional high carbohydrate/low fat diet) are able to attain significantly higher rates of fat oxidation during submaximal exercise and they have a greater capacity to oxidize fats at a higher exercise intensity and therefore become more fat adapted. However, based on Kate’s diet, she did not have enough stores of glycogen to be broken down for the length of her 10km fun runs and it would be unlikely at her low/submaximal intensity that she would hit the wall and begin using her fat stores. However, it is not impossible. Given that the predominant fuel for intensities up to approximately 70% MHR is fats, you would expect the low intensity of Kate’s effort means she relies primarily on lipolysis; even more so if it is taking her anything up to 2 hours to complete, as the longer the duration, the greater reliance on lipolysis over glycolysis.

Question 2 - Criterion 1

a) Based on the 2 adaptations chosen an explanation of their benefit is required:

- Increased oxygen extraction by increased concentrations of myoglobin
- Increased oxygen delivery to the muscles
- Increased capillarisation of the muscles
- Increased numbers of energy production sites i.e. size and number of Mitochondria
- Increased oxidation of fats (glycogen sparing)
- Increased fuel stores of muscle glycogen & triglycerides
- Increased size of slow twitch muscle fibres
- Decreased utilisation of anaerobic glycolysis system.
b) During any maximum intensity exercise:
   - Cardiac Hypertrophy
   - Increased Capillarisation of heart muscle
   - Increased Capillarisation of skeletal muscle
   - Increased BP
   - Increased Stroke Volume (SV)
   - Increased cardiac Output (Q)
   - Increased VO₂ Max
   - Improved heart rate recovery rates (is this evident at “maximum exercise”?)
   - Increased a-v O₂ diff
   - Increased musclebloodflow
   - Increased Minute Ventilation
   - Increased TV.
   - Increased LIP (resulting in decreased lactic acid production)

c) i) Cardiac Output (Q) = Stroke Volume (SV) × Heart Rate (HR)

   ii) Both SV and HR increase as a result of going from a resting state to exercising.

   iii) Increase in one of these factors will see an increase in the other. Cardiac Output is the amount of blood pumped out of the left ventricle of the heart per minute. VO₂ or O₂ uptake is the body’s ability to consume and utilize oxygen for the production of energy. When Amy is exercising, intensity increases and the amount of blood pumped out of the left ventricle per minute increases therefore a greater volume of O₂ will be delivered to the working muscles.

d) VO₂ MAX is the highest rate of oxygen consumption attainable during maximal or exhaustive exercise.
However, such a figure does not take into account the differences in body size. Relative VO₂ Max figure takes body size into account by simply dividing the person’s absolute reading by their weight and by using millilitres (ml/kg/min) instead of litres. Therefore, Amy and another cyclist could have the same absolute VO₂ MAX readings but Amy might weigh more or less and therefore based on her body size might have a greater or lesser VO₂ max when compared to other cyclists.

Question 3 - Criterion I

a) There is an ongoing and continual interplay between ALL three energy systems, based upon a range of factors including intensity and duration of the activity. A 100m freestyle swim is of high intensity and short duration, therefore will predominately utilise the ATP-PC system from 0-10 seconds while transitioning to the LA system. This transition might be sooner or later depending on the athlete and the training undertaken. Whereas the 800m freestyle swim is notes high intensity as the 100m swim and longer in duration. Therefore, it will utilise the ATP-PC system from 0-10 secs, before transitioning to the LA system from approximately 30 secs - 2 mins before transitioning to the aerobic system for the duration of the swim unless intensity is increased. It is difficult to suggest when the aerobic system kicks in though because for aerobically fit athletes it can be the predominant energy source from as early as 30 seconds into activity.
b) The 100m swim is high intensity and therefore ATP is produced through the incomplete breakdown of glucose (anaerobic glycolysis). The breakdown of glycogen and glucose into Pyruvic acid is used to produce ATP. From approx. 10-30 seconds, the contribution of the ATP-PC system diminishes to at most nothing and glycolysis has taken over as the predominant energy system. When energy demands are high or oxygen is not available more Pyruvic Acid is produced than can be used by the aerobic system. The excess pyruvic acid is converted into Lactic Acid. Then, Lactic acid and hydrogen ions accumulate in the muscle cells and blood causing an increase in acidity. The end result of this is muscle fatigue.

c) Buffering is the body's process of limiting the build-up of acidity in the muscles and/or blood stream. By buffering more effectively, the athlete should be able to tolerate higher levels of lactic acid production and continue swimming at a higher intensity for longer whilst delaying the onset of fatigue for longer.

d) Characteristics

<table>
<thead>
<tr>
<th>Characteristics (Aerobic/Anaerobic)</th>
<th>Fast-Twitch, Type IIb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Force production</td>
<td>Possess purely anaerobic characteristics</td>
</tr>
<tr>
<td>Resistance to fatigue</td>
<td>High</td>
</tr>
<tr>
<td>Fibre diameter</td>
<td>Low</td>
</tr>
<tr>
<td>Capillary supply</td>
<td>Large</td>
</tr>
<tr>
<td>Number of Mitochondria</td>
<td>Low</td>
</tr>
<tr>
<td>Glycolytic Capacity</td>
<td>High</td>
</tr>
<tr>
<td>(ability to use LA system)</td>
<td></td>
</tr>
<tr>
<td>Oxidative Capacity</td>
<td>Low</td>
</tr>
<tr>
<td>(ability to use aerobic system)</td>
<td></td>
</tr>
<tr>
<td>Size of motor nerve</td>
<td>Very Large</td>
</tr>
<tr>
<td>Major storage fuel</td>
<td>CP, Glycogen</td>
</tr>
<tr>
<td>Location where fibres are abundant</td>
<td>Arm muscles</td>
</tr>
<tr>
<td>Primary functions of fibres</td>
<td>Rapid intense movements of short duration</td>
</tr>
</tbody>
</table>

e) LIP is the last point where blood lactate entry and removal are equal. Beyond this point lactic acid and H+ begin to accumulate at a faster rate than they can be removed, causing muscle fatigue. LIPT training would be beneficial to both swimmers because the LIP establishes the exercise intensity beyond which a given exercise intensity or power output cannot be maintained. Exercise intensities beyond the LIP are associated with a shortened time to exhaustion - the higher the exercise intensity beyond the LIP, the more rapid the onset of fatigue. If an athlete can extend their time to fatigue whilst working at a high intensity then this can only be beneficial to both swimmers.
Section A – Exercise Physiology B

Question 4 - Criterion 2

a) During the specific preparatory sub phase, there is a shift in training towards more specific game-related fitness work. The intensity of training should increase while the volume slowly decreases. This sub phase usually lasts 2–6 weeks. This phase follows the general conditioning aspect of the preparatory phase and is followed by the competitive season. The main focus is specific sport skill and continued fitness work.

Example from chosen sport to support answer.

b) There are a wide range of responses which would be suitable – as long as they suit the sport, and are relevant to the competitive phase of the year. The following table includes some examples.

<table>
<thead>
<tr>
<th>Example sport</th>
<th>Method of training</th>
<th>How it may be utilised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athletics - Sprinting</td>
<td>Plyometrics</td>
<td>Plyometric exercises invoke a rapid eccentric (lengthening) contraction followed immediately by a forceful concentric (shortening) contraction. In this type of training it is the speed of the contraction that is essential, as it aims to increase power, which is a combination of speed and strength. This is particularly useful to the sprinter as they are attempting to maximise explosiveness.</td>
</tr>
<tr>
<td>Netball</td>
<td>Circuit training</td>
<td>Targeting current skills focus with a maintenance of energy systems required for the sport. Rotate around a number of stations</td>
</tr>
<tr>
<td>Gymnastics</td>
<td>Flexibility – dynamic stretching</td>
<td>Flexibility training is used to improve joint and muscle flexibility. Dynamic stretching involves the gymnasts performing a gradually intensifying series of movements which replicate those specific to their particular sports/activities. This is the best form of stretching prior to training/competition ie to be used in a warm-up, and should follow a whole body, low intensity aerobic activity (eg – light jog).</td>
</tr>
</tbody>
</table>

During the competitive season, the emphasis is on maintaining pre-season fitness. Because of the heavy demands of competition, not every training session during this phase should be long and intense. Training should work on a hard-easy cycle. Sessions early in the training week should be longer and more intense. Sessions later in the week should be lighter and less intense so that players are not still recovering from fatigue on competition day. Often characterised by low volume, high intensity training, and focus on team tactical plays or refinement of skills. Greater allowances made for recovery to ensure players do not suffer fatigue on game day.

c) Fitness testing. Mention an actual test related to the sport or fitness component to be developed.

d) Individuality is where training programs take into account an individual’s skill and fitness level and modifications that need to be made to their training programs so that optimal performance can be achieved. Individual variations in fitness/skill level/ injuries/rehabilitation/strength, etc would be taken into account when programming specifically for an individual athlete.
**Question 5 - Criterion 2**

a) An active recovery should be undertaken after any exercise that relies primarily on the LA or O₂ systems, such as for Porte. From a recovery perspective, an active recovery can speed up the removal of LA by as much as 50%. It should be followed by a stretching regime. It can help reduce DOMS, which Porte would be trying to do as much as possible.

The cool down is needed to prevent venous pooling (i.e. pooling of blood in the veins). After strenuous exercise, the heart keeps pumping blood at a rapid rate. If you end your workout abruptly, the muscles are no longer contracting-helping to propel the blood back to the heart-so blood may pool in the veins and tissue.

b) Porte would be recommended to eat/drink the following immediately post performance:

- Carbohydrate rich snack or meal (or high GI) (that provides 1-1.2 g of carbohydrate per kg body weight) *within the first hour of finishing*, as this is when rates of glycogen synthesis are greatest. This is especially important if the time between prolonged training sessions is less than 8 hrs.
- Endurance athletes such as Porte will benefit from consuming 15-25g of high quality protein in the first hour after exercise. Adding a source of carbohydrate to this post exercise snack will further enhance the training adaptation by reducing the degree of muscle protein breakdown.
- To tell if he is fully rehydrated, Porte should weigh himself before and after exercise and rehydrate appropriately. For Porte, commercial rehydration drinks may be appropriate.
- As glycogen has been depleted from the body, these stores need to be replenished. Replenished glycogen stores will enable maximal efforts in the next stage of the race. As a general guideline, replenishment of glycogen is most effective within the first hour but also in the first 5 hours after the race / stage.

c) Any two of the following:

- **Cold Water Immersion (CWI) (Plunge)/Cryotherapy**
  Primarily used post training sessions, training in the heat or during the acute phases of muscle injury, soreness or bruising. Try to accumulate up to 10 minutes in the plunge pool to shoulder level in a single immersion or multiple shorter immersions.
- **Hot-water immersion (HWI)**
  This is usually done in a temperature of about 37-40°C, and can be done in a spa to use the jets as a form of massage therapy as well
- **Massage**
  There is conflicting views on the effectiveness of the use of massage as a form of recovery, some suggest that it has no scientific basis as a means of recovery.
- **Compression**
  In recent times, one of the simplest and most commonly used forms of recovery has become the use of *compression garments*. They do not seem to have any adverse effects and *may* have some positive effects from a physiological perspective (studies show a mixed bag of outcomes). It is from a perceived psychological perspective, they seem to be considered most effective by those who use them.
- **Low intensity pool sessions**
  “Pool recovery sessions are a great way to get the body moving again following a match and/or hard training session - the water minimizes bodyweight and is a therapeutic way to recover with a combination of swimming, mobility, deep water running and shallow water wading. It’s a perfect way to get bruised and fatigued bodies moving again with very minimal risk of injury.
• **Low intensity activity**
  Low intensity activity eg. Bike ride, walk, jog, dynamic stretching would assist in the recovery of the body and minimization of DOMS.

• **Sleep**
  6-8 hrs, which allows the body to undertake a range of regenerative processes to help restore his body to the best condition it can be in.

d) The main fate of the remaining Lactic Acid is oxidisation OR forms H₂O and CO₂ in the mitochondria.

**Question 6 - Criterion 2**

a) **LT training** is faster race-type work at about 85% MHR. Lactic acid accumulates throughout this training, making it very fatiguing but essential since it duplicates competition conditions. Either 3-3 x 10 high effort intervals @ 95-105% of LIP or a 1 x continuous; high intensity effort at 95-105% of LIP or 85% of MHR.

b) i) **Delayed Onset of Muscle Soreness – DOMS.**

  ii) Ensuring you are fully warmed up prior to the exercise; doing nothing and letting it recover on its own, usually within 5-7 days; perform an active recovery after the exercise; stretching/yoga; massage; CWI or contrast therapy; for some people, more of the same exercise that caused the DOMS in the first place, but done at a gentler intensity has been beneficial; or low intensity, non-load-bearing activity such as swimming or cycling.

c) **Fitness Component 1** eg. Cardiovascular endurance / aerobic capacity - Is the ability to exercise continuously for extended periods of time without tiring OR the ability of the circulatory & respiratory systems to make ATP (energy) using oxygen.

  **Justification** required for 12-15km and 100 minutes of game play – of which much will be utilising the aerobic energy system

  **Fitness Component 2** eg. Local muscular endurance – is the muscle(s) capacity to continue contracting for a period of time while experiencing fatigue.

  **Justification** – As an AFL game runs for 100 minutes a player running 12-15 km will need to continually contract muscles for this extended period of time.

  Other examples may include: Flexibility when kicking the ball and striding out when running. Agility to be able to dodge, change direction quickly to evade a player. Reaction time to be able to react quickly to opposition moves and utilise attribute such as the psychological refractory period. Speed to be able to outrun an opposition player. Muscular power to be able to leap high to take a spectacular mark over an opposition player, etc, etc.

d) **Intensity** refers to how HARD the exercise is. It can be measured in a number of ways including:

  • energy expended per unit time, e.g. 37.8 kJ/min percentage of VO₂max (e.g. 85% VO₂max)
  • exercise heart rate, often called target heart rate (THR) or target training zone, is a percentage of maximum heart rate (MHR) (e.g. 80% maximum heart rate)
  • rate of perceived exertion (RPE) developed by Borg
  • most accurate: oxygen consumption and blood lactate levels (but requires expensive equipment: used for elite athletes).
Duration refers to the length of a training program or the length of each session. In this situation, the duration refers to the length of a session during the week with longer sessions at the beginning of the week tapering to shorter sessions approaching game day.

A weekly hard / easy cycle is used during the season with sessions early in the week longer and more intense. In this phase, intensity of skill / fitness work during training sessions is maintained for longer and higher levels than in the second half of the week, where high intensity exercise and drills are reduced, as is training time.
To allow tapering, enough rest days are planned for optimal recovery of the mid fielder. Perhaps midweek and the day before the next game are scheduled as compulsory rest days.

Question 7 – Criterion 5

a) $V_0_2$ MAX is 80ml/kg/min at 24km/hr.

b) Blood lactate reading of 2.8 – 3.1 mmol/L at running speed 14km/hr. Blood lactate reading of 7 mmol/L at running speed 23km/hr, which is an increase of 4.1 - 4.2 mmol/L.
The reason for this change is due to intensity increasing via running speed.

c) At initial running speed of 14km/hr the athlete has a $V_0_2$ of 38ml/kg/min. By running speed 24km/hr the athlete reached their $V_0_2$ MAX of 80ml/kg/min. A total increase of 42ml/kg/min since the beginning of running. At running speed 25km/hr the athletes $V_0_2$ then decreases to 78ml/kg/min.

d) OBLA is reached at a $V_0_2$ of 65ml/kg/min and a running speed of 21.1 – 21.2 km/hr.

e) The running speed of the athlete would suggest an advanced runner.
E.g. their initial speed is 14km/hr and they were exhausted at a final running speed of 25km/hr. These speeds are very quick and intense and would suggest the ability of an advanced runner.
OR
Obtaining a relative $V_0_2$ MAX reading of 80ml/kg/min suggests an advanced runner as this runner can take in and consume a large volume and effectively use it.
OR
Could refer to their LIP/OBLA as their piece of data - for the trained/advanced athlete the range of values for LIP is: 70-95% $V_0_2$ MAX (though usually in the range of 70-80% $V_0_2$ Max) which this athlete does.

Section B – Skill Acquisition

a) Example could include, but not limited to: comments of an instructor, the digital display of a stopwatch, the score of a judge, the film of a game, the videotape replay of a movement etc.

b) KR limits the available feedback by only focusing on the result of the action. This type of feedback does not assist the athlete on how to improve the motor skill. Therefore, they require KP as well which indicates the technical correctness or quality of the movement.
c) Schema are rules which we learn in order to execute skills in differing environments. KP helps to develop schema as it gives information about the movement patterns the athlete has performed either correctly or incorrectly. For example, a football player may miss a shot for goal when kicking with a cross wind. KP given by the coach regarding technical changes to the movement pattern will enable the development of schema for future performances.

d)  

   i) and ii) Two projectile motion factors:
   - **Velocity of release:** The harder a ball is hit or thrown the higher and further it will travel. This is due to the transfer of momentum. Therefore increasing effectiveness.
   - **Angle of release:** When there are equal amounts of force being applied in a vertical & horizontal direction the release angle will be 45°. Therefore increasing effectiveness.
   - **Height of release:** The higher the point of release relative to the ground, the further the projectile will travel. Therefore increasing effectiveness.
   - **Shape:** Streamlined shapes travel more effectively in the air and travel further due to less drag force putting the projectile backwards. Therefore increasing effectiveness.
   - **Air resistance:** When a projectile pushes through the air, it creates a drag force behind it. Being more aerodynamic will increase effectiveness.
   - **Spin:** Top spin, back spin & side spin change the shape of the parabola.

**Dependent on sport these will therefore increase the effectiveness.**

e) **Tennis Serve Subroutines =** Athletes grips racquet in preferred hand. Stance is side on with opposite foot forward to the hand that the racquet is in, Backswing of racquet, Balltoss with other hand, forwardswing of racquet, Point of contact with ball, Follow through of racquet across the body to aid balance and direction of serve.

f) \[ f = ma \] Therefore: 0.45 \times 600 = 270 \text{ kg/m/s}^2 \text{ or 270 Newtons}

**Question 9 – Criterion 3**

a) Speed of the ball, the position of the fielders, the bowler’s grip on the ball, the direction of smooth/rough side of ball, etc.

b) Noise is all the information gathered from the environment that is irrelevant. Hearing comments from the crowd, etc, etc may be classed into this category.

c) i) **Long Term Memory – muscle memory.**
   ii) Longterm memory is the permanent storage area of encoded information. Longterm memory capacity is limitless.

d) i) **Reaction time** is the amount of time between the presentation of a stimulus and the first movement initiated in response to it.

**Whereas response time is the addition of reaction time and movement time to give the total response time.**

In cricket, reaction time would be the time delay between a bowler initiating their bowl and the batter’s first movement, whereas response time in cricket is the time it takes from the bowler’s first movement until the batter completes their shot.
ii) This is the degree of correspondence between a stimulus and its correct response. The greater the compatibility, the quicker the reaction time, and vice versa. That is, if the response is one you expect, you will react more quickly; if not expected, reaction time will be longer.

When a batsman is facing a pace bowler, they are expecting the ball to be delivered at great speed. If the bowler bowls a slower ball out the back of the hand, the batter will play through their shot too quickly as this type of delivery was not expected. Therefore, SR compatibility was reduced.

e) Spatial (or event) anticipation is anticipation that involves prediction about WHAT will happen in the environment such as a tennis player who anticipates that an opponent will hit a lob to get out of a tricky situation and buy some time.

Prediction in this manner will allow the player to organise a response in advance so they are able to initiate a response more quickly.

Temporal anticipation involves predicting WHEN an environmental event will occur, such as anticipating the moment the umpire is going to drop the ball in a netball toss. Although it is advantageous to know when an event will occur; it is probably even more important for people to anticipate what is going to happen so that they can organise their movements in advance.

Question 10—Criterion 3

a) A motor skill is an activity that involves voluntary muscular movement with the correct degree of muscular control to complete a reasonably complex pre-determined task. OR A motor skill is a task that involves sequences of movements that are reasonably complex to the individual performing them.

b) Open skills are performed in an unpredictable environment (in which the object or context is changing) and they are externally paced. This means that their timing is dependent upon a factor which is external to the player.

Closed skills are performed in highly predictable environments where the performer has full control of the timing of the movements. The skill is internally paced.

Motor skills fall on a continuum from open to closed; a tennis serve is more of a closed skill than an open skill. The timing of the serve is largely externally paced, although some tournaments now have a 25-second service “shot clock”; however, there are environmental factors such as the weather, the opponent and the surface that do not make the skill completely closed.

c) Massed practice entails practicing a skill consistently and continuously without breaks until the skill has been learned. Distributed practice consists of short, frequent practice sessions interspersed with intervals of rest or intervals of learning some other skill. Massed practice will help an experienced player refine a skill to be more precise. Distributed practice will prevent the experienced player from becoming bored with practicing the same skill over and over and therefore make the practice they do more precise. Example only as any two types can be used.

d) A contrasting ball colour helps with the detection of visual cues or enhances selective attention or increases the intensity of the cue.
e) Newton’s 2nd Law of Motion: F = ma. If a tennis player can accelerate the head of the racquet from the backswing phase through to the downswing and impact of the ball, this will create more force when the racquet hits the ball and the ball will therefore be hit harder and travel faster. **Example only as any relevant concept can be used.**

Other answers may involve:
- Mass and momentum
- Force: Newton’s Laws of Motion 1 and 3
- Levers
- Balance
  - Base of support
  - Centre of gravity
  - Stability

f) Information processing systems can only deal with one cue at a time (Single Channel Hypothesis), which can take up to 0.5 seconds. Therefore, if a second stimulus is presented before the first has been processed, it must wait in line until the previous stimulus has been processed. The reaction to the second stimulus is delayed - this is called the psychological refractory period (PRP).

A tennis player may stand a particular way when preparing to drive a shot across court, to “trick” their opponent into thinking they are going to that way. Instead they may hold the shot a bit longer than expected and play down the line once their opponent has committed to the cross court shot.

g) **Input** - this component uses the senses to pick up on cues/information. A fast serve would mean that the opponent would have to be effective at signal detection using their vision, blocking out noise, knowing where to look (orienting) and knowing what to look for (selective attention) in order to not miss the serve. Otherwise this will negatively affect their performance as they will not detect the ball.

If their input is too slow this will then affect the opponent’s **information processing** as they will be too slow to identify the stimulus, select an appropriate response and program an appropriate response from their LTM.

Due to their input and information processing being affected this will make their **output** (the movement that occurs as a result of the initiation of motor neurons) far too slow and the likely outcome will be a slow response or a swing and miss. Therefore, negatively affecting performance.

**Question 11 – Criterion 5**

a) Athlete C changed direction 301 times.

b) Athlete C, 164 passes + 151 catches or 315 total passes and catches.

c) The shuffle was performed 304 times by player A and player D.

d) Athlete A did the most combined sprinting (95), jogging (378) and shuffling (304) for a total of 777 times.
e) Athlete B completed 11 sprints whereas athlete D completed 100 sprints. Therefore, Athlete D completed 89 more sprints than athlete B.
Athlete B jogged 99 times, whereas athlete D jogged 351 times. Therefore, Athlete D jogged 252 times more than athlete D.

_examples only, any two sets of data could have been compared._

f) i) Athlete C would be best suited to the centre position as they were standing stationary the least amount of times, 115 times.
Athlete C also did the most amount of sprinting, 121 times OR Athlete C did the most amount of jogging, 405 times OR most number of directional changes, 301.

ii) Athlete B would be best suited to the goal keeper position as they are stationary the most amount of times, 450.
Athlete B also does the least amount of jogging, 99 times OR the least amount of sprinting, 111 times OR the least directional changes, 120 times.

Section C – Sport Psychology

Question 12 – Criterion 4

The coach of a 100m athletics track sprinter must cater for varying psychological states in the athlete.

a) i) Any 2 from below:

- Increased blood pressure, Pounding heart, Increased respiration rate, Sweating, Clammy hands and feet, Butterflies in the stomach, Adrenaline surge, Dry mouth, Need to urinate, Muscular tension, Tightness in neck and shoulders, Trembling, Incessant talking, Blushing, Pacing up and down, Distorted vision, Twitching, Yawning, Voice distortion, Nausea, Vomiting, Diarrhoea, Loss of appetite, Sleeplessness, loss of libido, etc, etc.

ii) _Explanation of one of the following strategies. Must be from the perspective that the coach suggests the athlete use the technique:_

- Let athlete know and accept that some tension or anxiety is usual prior to competition
- Encourage athlete to engage in preferred relaxation technique such as controlled breathing, centering, progressive relaxation techniques, imagery, visualisation, massage, meditation and yoga, etc
- Encourage athlete to engage in mental rehearsal
- Ask athlete to focus on task relevant factors. (If over aroused _during_ performance)
- Encourage athlete to seek others who are calm
- Encourage athlete to listen to their favourite music
- Encourage athlete to engage in a preferred distracting activity
- Down play the importance of the contest and the result
- Provide time for relaxation
- Direct athletes’ attention to the process required to perform well
- Present a calm presence themselves
- Remind the athletes of their thorough and appropriate preparation
- Provide a pre-competition strategy which provides the necessary control and direction to limit anxiety
- Encourage athlete to keep sport in perspective.
b) Any TWO of the following

- Performance accomplishments: If we have succeeded in a certain activity in the past, we are confident we can do it again.
- Vicarious experiences (or modeling): This relates to when we see someone succeed and we think ‘if they can do that, I can too’.
- Verbal persuasion: When a coach or external source convinces us we can do something.
- Physiological states (Arousal control): This relates to the way we feel physiologically as an indication of how confident we are, for example if we are aware of having butterflies in our stomach we most lose confidence.

c) Goals are aims or targets which give our efforts direction and purpose. Well-structured goals can often be reference points or check points along the road to greater achievement and longer term, more challenging goals. Could discuss process or performance based goals or SMARTER guidelines.

Extrinsic motivation is usually in the form of reward or recognition for performance. It could be money, a trophy, and a medal or TV interview. Participating to avoid punishment or negative evaluation also constitutes extrinsic motivation.

Eg. The coach may set a goal with the athlete which encourages them to work at a higher intensity during a training session with the extrinsic motivation being personal recognition of their increased efforts and persistence.

d) Explanation of 2 out of 3 needs:

- Competence (seek to control the outcome and experience mastery)
- Relatedness (the universal want to interact, be connected to, and experience caring for others – social)
- Autonomy (the universal urge to be causal agents of one's own life and act in harmony with one's integrated self – master of your own fate)

Question 13 - Criterion 4

a) Process goals focus on actions (such as physical movement in Anna’s case) that Anna must perform during a competition in order to reach peak performance. They can be achieved independently of the outcome.

By setting a process goal, the coach would help give Anna focus, direction and a reference point when trying to achieve a certain goal – such as mastery of the difficult part of her dance performance, rather than focussing on the whole routine and making a mistake. This will help Anna reduce stress and anxiety levels.

b) Performance accomplishments: If Anna had succeeded in a dance in the past, she should be reminded by the coach of this so she can be confident she can perform well again. She could also be reminded that she had completed the difficult part of her dance in rehearsal which can give her self-confidence.

Verbal persuasion: Anna’s coach could convince her that she is more than capable that she can perform the dance well. The coach could talk up Anna’s capabilities to give her more confidence that she can perform to expectations.
c) **Any two of the following, as examples**
   - Anna may use a coping strategy during her performance if something doesn’t go to plan whereby she has an alternate move to make to carry on with the dance.
   - Anna may go into the performance (prior to) with a pre-planned strategy to change performance at the last second if things aren’t going to plan. She may have rehearsed this Plan B performance which may be a little easier than the ‘ideal’ more ‘difficult’ movement that she is having trouble with.
   - Anna may use a psychological strategy should she feel that her anxiety about her performance is getting on top of her (eg, visualisation, relaxation techniques) which may help her accomplish her difficult performance, etc, etc.

d) **Any two of below aspects**
   - As Soon After Performance as Possible – De-briefing should occur when the performance is still fresh in the athlete’s and coach’s minds; unless their judgements are clouded by emotions.
   - Identify Performance Factors Which Were Omitted – A good strategy can prove ineffective if certain elements are not adhered to by athletes. If the strategy is to be persisted with these omissions must become a major focus for inclusion in the next competition. Similarly, well executed elements need to be reinforced for continued inclusion. The coach and Anna should discuss what performance factors were omitted (if any). They should also discuss those elements of the dance that went well for future performances.
   - Involve the Athlete – It is very easy for the coach to ‘tell’ Anna about her performance. This breeds an athlete dependent on a coach, who may not always be there, and an athlete unable to analyse their own performance, a process which will often need to occur during a contest. Anna must be encouraged to become involved in and take responsibility for an effective de-briefing procedure.

e) **Key Performance Indicators (KPIs)** are indicative of successful performance which ultimately defines every athlete or team. The indicators are analysed by coaches and athletes and these can be to measure performance.

   Task Relevant Factors (TRF) enhance performance during competition by identifying those technique/performance components which are essential for quality performance. They serve to reinforce the technique and/or effort required, especially during times of fatigue, anxiety, boredom and/or loss of concentration.

   For example, Anna and her coach may develop KPIs which measure her performance such as a score from the judge, the success and accuracy or not of specific movements throughout the dance routine. These movements could be specifically analysed by Anna and her coach.

   Anna and her coach could develop TRFs which aim to reinforce correct technique and performance requirements of her specific dance movements. These TRF’s could assist Anna to remain focussed and not become distracted by physical or psychological factors which could detract from her performance.
Question 14 - Criterion 4

a) i) Performance Practice involves Adam **visualising** the performance of a specific dive that he wants to develop. It is a technique that can improve confidence, increase the speed of learning new skills and ultimately lead to more consistent performance. It should be completed regularly in order to be most useful. PP can and should still be undertaken in the event that physical participation is not possible due to injury, illness, bad weather, travel, etc. This will allow maintenance of mental coordination and nervous system pathways that will help you to regain form more quickly when physical practice can be resumed.

ii) Instant Preplay should be used as diving is a skill which is predictable, repeated and self-paced (a closed skill). It involves taking a few moments **prior** to executing his dive to rehearse the process of the specific dive about to take place. The rehearsal is generally short and includes all major components of the activity. IP facilitates a shift into a performance mind-set and this transition prepares Adam’s nervous system to coordinate the movement required.

b) i) NARROW INTERNAL dimension whilst performing IP as diving is a closed skill and Adam can easily focus on his one cue at a time (one single dive at a time) and change is slow and predictable.

ii) Strengths of NI:

- Adam is able to effectively concentrate on his dive
- Good for analysis in predictable sports such as diving
- Enhances kinaesthetic awareness
- Assists Adam to stay focussed on specific dives before he attempts them in training, with the ultimate goal of this transferring to competition.

iii) Weaknesses of NI:

- Adam may become over critical of his dive. This may increase tension and anxiety and negatively impact his dive.
- Fails to attend to and incorporate new information. Adam may miss out important information as he is so internally focussed. For example, he may not notice that the diving board is not as flexible as usual
- Not sensitive to what is going on around them. Adam may not be in a dimension where he is aware of what external factors are occurring. He may miss a cue to begin to dive, etc.
- May result in the athlete becoming distracted by internal bodily processes. Adam may be so focussed on how his body is feeling it may distract him from being able to best visualise his dive.

c) Attentional mismatch (due to dominant attentional style) under stressful conditions which may be inappropriate. Thus, the dominant style begins to control the person and they lose their ability to make adjustments needed in their focus of concentration.

During a state of over arousal, Adam may revert to a more external attentional style which would therefore distract him from the task at hand – an inappropriate attentional style at this specific time.

d) Strategies which might help to lower these anxieties may include: (any two)

- Accepting tension is part of the competition
- Using relaxation techniques
- Mental Rehearsal
- Focus on task relevant factors
- Calming music
- Engage in a distracting activity
- Seek others who are calm
e) Intangible extrinsic include: TV interviews or support or attention from fans, praise from others (coach / family / peers), increased motivation, increased self-accomplishment / fulfilment, feeling proud, enhanced goal setting, etc.

**Question 15 – Criterion 5**

a) Any two trends from:
   - UAM always has the highest HR
   - URM always has the lowest HR
   - NM is always the median of the 3 tests
   - As time (seconds) goes by in the session, HR decreases
   - Initial HR’s are lower in Session 12 than in Session 1
   - NM is better for decreasing HR than UAM
   - UAM promotes higher HR than URM or NM

b) i) Session 1: Unfamiliar Relaxing Music – URM at 66 bpm
   ii) Session 12: Unfamiliar Relaxing Music – URM at 65.3 bpm

c) Session 1: initial HR 73.8 bpm & Session 12 initial HR 70.8 bpm
   Therefore, the difference between Session 1 and Session 12 initial HR’s = 3 bpm

d) The correct data for answers to this question are as follows:

<table>
<thead>
<tr>
<th>Session</th>
<th>URM</th>
<th>NM</th>
<th>UAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>73.8 – 66 bpm</td>
<td>73.4 – 68.6 bpm</td>
<td>73.9 – 72.5 bpm</td>
</tr>
<tr>
<td>12</td>
<td>70.9 – 65.3 bpm</td>
<td>72.3 – 67.2 bpm</td>
<td>72.7 – 69.4 bpm</td>
</tr>
</tbody>
</table>

Comment about any of the above relevant examples, focusing on the effect of time on the HR, such as “With greater time spent on imagery, HR lowered in all 3 tests; with the relevant data to support”.

e) Using the same times as stated for d) above, any combination of data could be referred to in support of the effectiveness or otherwise of the three interventions. There should be one observation with data for each intervention method, as well as an overall comment on their relative effectiveness. For example:
   - URM was effective at reducing HR, with it decreasing by 7.8 bpm, (from 73.8-66) during Session 1 and by 5.6 bpm (from 70.9-65.3) during Session 12.
   - NM also proved effective at reducing HR, with it decreasing by 4.8 bpm, (from 73.4-68.6) during Session 1 and by 5.2 bpm (from 72.3-67.1) during Session 12.
   - UAM, while not as effective, still lead to a reduced HR across both sessions, reducing by 1.4 bpm (from 73.9-72.5) during Session 1 and by 3.3 bpm (from 72.7-69.4) during Session 12.
   - Overall, URM was the most effective at lowering HR, with NM being more effective than UAM, which was the least effective.
Question 16
Novak Djokovic (ND)
The two core units for this question were Exercise Physiology and Sport Psychology.

Links could be made in either direction, that is, from Exercise Physiology to Sport Psychology, or from Sport Psychology to Exercise Physiology.

Links must be made from a positive perspective - that is - what physiological strategies did ND use and how did these positively impact on Psychological factors which coupled to enable him to return to his previous form? or what Psychological strategies did ND's use to enable his Physiological capabilities to return to the point where he could return to his previous form?

Possible links:
- The use of reviewable and timed goal setting using the Staircase Model allowed ND to effectively periodise his annual training plan to enable peaking for the Grand Slams.
- The use of specific, realistic and measurable short and long term goals enabled ND to focus on the specific energy systems, fitness components, muscle groups and skills to return to his previous form.
- ND is driven by intrinsic and extrinsic factors to undertake the appropriate recovery after every training session and match so he can return to his previous form.
- ND's high self-efficacy traits, build up from the four antecedents, will allow him to correctly implement the appropriate training methods to help return to his previous.
- Short term process goals helped -> periodise training with new coach
- Using positive performance practice imagery -> Quality of each training session
- Effective debriefing with new coach -> attend methods of training to suit aging body
- Develop coping strategies for pain with new coach -> improve intensity, duration of training sessions
- Used his intrinsic motivation -> training methods/principle sessions
- Progressive overload in his training -> Improved his wavering self-belief
- Adequate regeneration techniques in recovery -> Motivate him to return to his best for the love of sport
- Smarter LT training raises his LIP -> improves self-confidence or efficacy in long rallies and 5 set matches at Grand Slams
- New coach periodises training -> focus more on performance/process goals not results.
- Altering the training session with new coach -> Relieves anxiety surrounding his ageing body/injury.

Exemplars

‘C’ standard
The following is an example of a link that could have been made. If two links of a similar standard were written, the candidate would have received a ‘C’ rating.

Motivation → LIP
Motivation is an internal energy force that determines aspects of our behaviour. ND would be motivated both, intrinsically and extrinsically. Intrinsic is for the love of the game and extrinsic is by trophies, money and recognition.
He would use his intrinsic and extrinsic motivation to train at a higher intensity to increase his LIP.

LIP represents the highest steady state exercise intensity an individual can perform (lactate production = lactate removal). A high LIP is important in a tennis match as it will ensure he can work longer with reduced fatigue. He would be able to perform in long intense rallies and particularly late in the 5th set with less fatigue.

ND motivation to succeed and win another Grand Slam (AO) would have ensured he was training correctly to improve his LIP.

‘B’ standard
The following is an example of a link that could have been made. If two links of a similar standard were written, the candidate would have received a ‘B’ rating.

ND’s motivation would have ensured he had a high LIP
ND has high levels of motivation, both in extrinsic and intrinsic terms. ND was able to return to a high ranking as he is driven extrinsically by the tangible rewards of prize money and trophies. However, ND is also intrinsically motivated as he feels pride in improving and strives to achieve more and for the love of the sport.

These high levels of motivation helped Novak effectively train to increase his LIP.

LIP represents the highest steady state exercise intensity an individual can perform and is the last point where lactate is being removed at the same rate as its accumulation. A high LIP is important for ND in tennis as it involves repeatedly performing short bursts of sprinting and agility; explosive movements such as, running to a drop shot, a serve and ground strokes and rallies from the back of the court; mostly working at or above 85% of MHR. He would be able to maintain intensity throughout the match, particularly late in the 5th set, with less fatigue.

ND’s high levels of motivation, both intrinsically and extrinsically allowed him to effectively train to increase his LIP that could have contributed to him being able to return to previous form and win the AO.

‘A’ standard
The following is an example of a link that could have been made. If two links of a similar standard were written, the candidate would have received an ‘A’ rating.

Novak Djokovic’s (ND) high levels of motivation led to him being able to increase his Lactate Inflection Point (LIP)
ND has high levels of motivation, both in extrinsic and intrinsic terms, to fulfil his three innate needs of competence, autonomy and relatedness (Self Determination theory). ND was able to return to a high ranking as he was driven extrinsically by the tangible rewards of prize money and trophies. This extrinsic motivation also came from rewards of fame and adoration from fans. However, ND is also intrinsically motivated as he feels pride in improving and strives to achieve more, for the love of the sport. This ability to self-motivate would ensure ND was able to return to previous form and particularly relevant after his elbow injury, new coach and disruption to the year.

These high levels of motivation helped Novak effectively train to increase his LIP, particularly important after a substantial lay off with injury as he may have experienced detraining.
LIP represents that highest steady state exercise intensity an individual can perform and is the last point where lactate is being removed at the same rate as its accumulation. A high LIP is important for ND in tennis as it involves repeatedly performing short bursts of sprinting and agility; explosive movements such as, running to a drop shot, a serve and ground strokes, intense rallies; mostly working at or above 85% of MHR. Novak would have raised his LIP to return to his previous form. Therefore, ND completed interval Lactate Threshold Training at least three times a week performing three to five 10 minute high effort intervals at approximately 95%-105% of his LIP HR with three minute rest between intervals. This increased ND’s LIP and was able to compete at higher intensities throughout the match, particularly late in the 5th set with less fatigue.

ND’s high levels of motivation, both intrinsically and extrinsically allowed him to effectively train to increase his LIP that could have contributed to him being able to return to previous form and win the AO.

**Question 17**
Ariane Titmus (AT)

The two core units for this question were Sport Psychology and Skill Acquisition.

Links could be made in either direction, that is, from Sport Psychology to Skill Acquisition, or from Skill Acquisition to Sport Psychology.

Links must be made from a positive perspective - that is - what psychological strategies can Ariane Titmus (AT) use to continue to produce outstanding performances; or how did AT’s attributes from a skill acquisition perspective enhance her psychological strengths?

Possible links:
- AT can use motivation to improve technical aspects of her subroutines.
- AT can use knowledge of performance feedback to set goals.
- AT use of Mental Rehearsal - Improved Timing and Sequencing of Sub-routines.
- AT can set Process Goals which may lead to improved Skill Execution.
- AT can obtain augmented Knowledge of Performance which may increase her self-efficacy.
- AT can use motivation to choose an effective practice method.
- AT can set performance and process goals to improve her movement time.
- AT improving her Reaction time off the starting block will increase her self-confidence/efficacy.
- AT’s autonomous attributes can enhance her self-efficacy.
- AT’s ability to control her arousal/anxiety levels can allow her to better selectively attend and make better decisions.
- As part of biomechanical analysis –> motivated AT to train hard at new techniques.
- Breakdown of strokes into subroutines –> Improved her imagery for competition + training.
- Debrief of competition strategies –> Practice more problem solving/resilience.
- Improved arousal techniques –> Improved response time for races.
- Improved concentration in races –> better signal detection & selective attention.
Exemplars

‘C’ standard
The following is an example of a link that could have been made. If two links of a similar standard were written, the candidate would have received a ‘C’ rating.

Feedback (Skill) → Goal setting (Psych).
The feedback Ariane Titmus (AT) received can improve her future goal setting.

Feedback is any given information about the athlete’s performance, like coming second in the race. As well as helping to motivate and reinforce what she is doing right, the feedback AT receives helps instruct her as to what goals to set to help achieve greater results in her races. AT can identify where to focus her efforts for improvement and set short and long-term, as well as performance, process and outcome goals based on this information from her last training session or race. These goals allow her to achieve better outcomes in her racing techniques and receive confidence in her abilities.

‘B’ standard
The following is an example of a link that could have been made. If two links of a similar standard were written, the candidate would have received a ‘B’ rating.

Feedback (Skill) → Goal setting (Psych).
The different types of feedback Ariane Titmus (AT) receives can improve her focus in training through goal setting.

AT would receive feedback (information about the athlete’s performance); being an elite athlete, she would train daily completing many training sessions in a week. This would allow AT regular opportunities to receive intrinsic feedback about her stroke techniques and extrinsic knowledge of performance (KP) and knowledge of results (KR) from her coach during or after the training/race. This feedback would normally take place in the form of a debrief around the quality of her skill execution, times and strategies.

This feedback can then be agreed upon with her coach so AT can review and set specific goals that can focus on improvement areas.

AT would have process goals such as improving her long stretched out arm pull, diving technique or tumble turns. But she would also have performance goals like improved stroke rate and specific time goals to achieve.

The feedback she receives both through KR and KP during her training sessions form the basis of which goals AT can set, and so she is constantly using feedback and developing goals from the feedback to improve her performance both technically and statistically.

‘A’ standard
The following is an example of a link that could have been made. If two links of a similar standard were written, the candidate would have received an ‘A’ rating.

Feedback (Skill) → Goal setting (Psych).
The different types of feedback Ariane Titmus (AT) receives can direct her focus in training through the process and performance goals she is setting to incrementally improve throughout the training year.
As an elite swimmer, AT would receive an immense amount of feedback, or information which would be largely positive, but may also include negative aspects, as well as being highly technical, about her performance. In addition, as an elite athlete she would train daily completing many specifically goal oriented training sessions in a week. This would allow AT regular opportunities to receive intrinsic, kinaesthetic feedback about her process goals, eg – the length of her arm pull in her freestyle stroke technique and angle of entry during her dive from the blocks. This type of process goal is the one she has most control over and is linked to greater self-efficacy and confidence. Setting performance based goals will be important to challenge her ability to continue her improvement i.e. timing of her splits per lap, continuing to improve her times for competition meet. For AT the timing of feedback is important and the coach would give concurrent or delayed KR and KP feedback to AT around the quality of her skill execution, split times and evaluate race strategies. AT can use this extrinsic feedback to instruct the perodisation of the training year, where she can connect her goals to achieve the results motivating her to complete her training sessions.

Using the stepping stone model the feedback she receives both through KR and KP during her training sessions form the basis of which goals AT can set, and so she is constantly using feedback to develop short and long term goals to improve her performance both technically and statistically.

**Question 18**  
Erin Phillips (EP)  
The two core units for this question were *Skill Acquisition* and *Exercise Physiology*.

Links could be made in **either** direction, that is from *Skill Acquisition* to *Exercise Physiology*, OR from *Exercise Physiology* to *Skill Acquisition*.

Links must be made from a **positive** perspective - that is - what aspect/s of skill acquisition enabled EP to train her Physiological attributes to such high levels; or how did aspect/s of EP's *Exercise Physiology* enable her to perform elements of *Skill Acquisition* to such consistently high levels?

Possible links:
- EP’s high LIP/well developed $O_2$ capacity enabled her to effectively utilize her IP system to execute high level skills for longer than others before affected by fatigue.
- EP’s explosive power enabled her to have better response times than those around her, making her a stand out player in the AFLW.
- EP’s strength program enabled her to execute gross motor skills such as making or breaking tackles more effectively than other players.
- EP sought FB from a variety of sources to identify the changes needed to her training program to achieve consistently outstanding performances.

**Exemplars**

*‘C’ standard*  
The following is an example of a link that could have been made. If two links of a similar standard were written, the candidate would have received a ‘C’ rating.
The Training Session (Ex Phys) ➔ Decision-Making (Skill).

EP’s *Training session* can improve her *decision-making*

The training session includes a warm up, conditioning/skill and cool down.

Erin Phillips’s (EP) decision-making is the second part of Information Processing Model.

EP will include some exercises to prepare the body for activity. The skill phase of training can be used for practicing her decision-making choices. Practicing with unpredictable situations allows for improving the open skill choices, like to attempt to break a tackle or to dispose of the ball instead. Because of this EP has learnt what to focus on and how to react in given situations. What to look for in a situation is called a cue/s and forms part of the IP input stage and choosing what to do is part of the IP decision-making stage, which both lead to the skill output. By training in this way EP’s ability to make good choices from the cues is increased, making her performances better.

‘B’ standard
The following is an example of a link that could have been made. If two links of a similar standard were written, the candidate would have received a ‘B’ rating.

The Training Session (Ex Phys) ➔ Decision-Making (Skill).

EP’s *Training session* can include strategy and problem solving drills performed under pressure to improve her *decision-making* processes.

The training session includes 3 phases: the warm up, conditioning/skill and cool down. For EP, the warm up can include a light jog allowing oxygen to circulate and increase muscle temperature. Then she can use a number of training methods for the conditioning phase, like continuous training (following the FITT model). During the skill phase of the training session EP practices decision-making by focusing on stimulus identification and response selection, then receiving feedback allowing her to make more accurate judgements about her responses. For example, problem-solving drills can allow for smaller game like scenarios, having three attackers versus two defensive players where EP could practice her choices and see the knowledge of results.

During the main part of the training session (skill/conditioning), she can alter the skills she wishes to focus on, and the order in which they are completed. As an example, work on goal related improvement areas of disposals, marking in contests and by doing conditioning prior to skills, allows her to practice decision making whilst being fatigued, replicating many game like scenarios. This type of practice helps EP to selectively attending to the relevant cues and block out ‘noise’, so she can improve the decision making part of her Information Processing Model. This improves EP’s schema to formulate successful choices/strategies in her competitions and help contribute to her outstanding performances.

‘A’ standard
The following is an example of a link that could have been made. If two links of a similar standard were written, the candidate would have received an “A” rating.

The Training Session (Ex Phys) ➔ Decision-Making (Skill).

Erin Philip’s (EP) *Training session* can include strategy and problem solving drills to improve her *decision-making* responses under pressure through her practice. Having a better-developed stimulus identification and response is very important for open skills, making EP a more experienced and skilled athlete.
The training session provides the opportunity for EP to include training techniques used in conjunction with training principles, methods and types of practice to improve her overall decision-making abilities in performance for competition.

The training session includes 3 phases: the warm up, conditioning/skill and cool down. For EP, the warm up can include dynamic stretching, a light jog allowing oxygen to circulate and muscle temperature increasing activating the energy system and increasing enzyme activity. Then, she can use a number of training methods for the conditioning phase, like continuous training (following the FITT model) which is an important aspect because skills can be practiced as a single component or under fatigued conditions during/after strenuous exercise. The skill phase of training can be targeted to practice specific decision-making skills as a type of practice, focusing on stimulus identification and response selection, then receiving feedback on her successful responses to the skill under pressure gaining knowledge of results. For example, problem solving drills can allow for smaller, game like scenarios, having 3 attackers versus 2 defensive players, helping her respond to either applying ball pressure or to cover the open player. In this skill phase of training session, she or her coach can manipulate and vary the drills to be performed under ever-increasing open environments, where the skill becomes more externally paced and the external pressure increases the speed at which meaning must be attached to the cues presented.

This type of practice is essential for the decision-making part of Information Processing model to reduce choice reaction time by selectively attending to the relevant cues and blocking out ‘noise’. After a cue has been presented, i.e. a hand pass is executed, the problem solving training allows her to be able to attach correct meaning to the cue and formulate a response to make the initial movement, such as “is their enough time to intercept the hand pass?”; or rather “should I tackle the opponent receiving the hand pass?” By practicing skill based problem solving in the training session EP is able to implement and improve schema to formulate successful choices/strategies.

EP will also complete the cool down phase of the training session with active recovery, a reduced intensity of similar exercises for 20 minutes to help remove any lactate, prevent venous pooling and complete at least 10 minutes static stretching to restore muscle fibres to correct length.

Utilising effective training techniques in her sessions, EP has obtained the skills to give her the ability to formulate ideal responses and have superior decision-making skills on the footy field, which has shown by the awards and titles she has gained, being the best and fairest in 2017/19 and winning the premiership.