

SPORT SCIENCE

SPT315118

Section **A** Exercise Physiology

Pages	20
Questions	7

Suggested working time: 60 minutes

Instructions

- Attempt **all** questions and **all** parts within each question.
- Answers must be written in the spaces provided in this exam paper.
- All answers must be written in **English**.
- You **must** make sure your answers address:
 - Criterion 1 describe and analyse physiological aspects of exercise.
 - Criterion 2 analyse and explain physiological responses to training and recovery.
 - Criterion 5 analyse and interpret sport science data and information.

Marker use	
C1	25
C2	25
C5	10

Guide to Exam Structure

		Questions available	How many questions to answer	Suggested working time	Marks available
Section	A	7	7	60 minutes	60
Section	B	4	4	45 minutes	45
Section	C	4	4	45 minutes	45
Section	D	3	2	30 minutes	30
Total		18	17	180 minutes (3 hours)	180

Question 1

This question assesses **Criterion 1**.

Marker use



Source: <https://slate.com/culture/2012/06/long-distance-running-and-evolution-why-humans-can-outrun-horses-but-cant-jump-higher-than-cats.html>

Endurance athletes usually work at a sub-maximal intensity and require energy over an extended period of time. Occasionally they may have to increase their intensity of effort to increase their speed or to work up a gradient.

- a) Identify the energy system used predominantly by endurance athletes during an event.

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- b) Briefly describe how adenosine triphosphate (ATP) is resynthesised by using carbohydrates as a fuel in the energy system, used predominantly in endurance events.

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Question 1 continues

c) Which energy systems may be called on to assist an endurance athlete when they are working above a sub-maximal intensity? Identify one characteristic of each of these systems.

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d) Endurance athletes may 'hit the wall'. What is meant by this term and what is one way they could delay or avoid reaching this point?

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Question 2

This question assesses **Criterion 1**.

Marker use



Source: <https://runningmagazine.ca/the-scene/finding-motivation-to-train-through-strava-and-other-apps/>

- a) Define oxygen deficit and provide an example of when it is likely to occur.

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- b) Well conditioned athletes are more likely to experience a smaller oxygen deficit than less conditioned athletes at the same exercise intensity. Explain this by using the concepts of aerobic steady state and oxygen uptake (VO_2).

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Question 2 continues

c) Define Lactate Inflection Point (LIP). Discuss the likely difference in LIP for a well conditioned endurance athlete compared to a less conditioned athlete and provide a reason for this difference.

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Question 3

This question assesses **Criterion 1**.

Marker use



Source: <https://www.shutterstock.com/search/cross+training>

A regular gym attendee (A) encouraged a friend (B) to begin training with them as a means to improve their general physical condition, including their aerobic capacity.

- a) Use the following information to calculate the relative VO₂ max. of each of A and B. Use the correct units.

2

A. Absolute VO₂ max. = 3.8 L/min Weight = 70 kg

Relative VOC max. =

B. Absolute VO₂ max. = 2.8 L/min Weight = 72 kg

Relative VOC max. =

- b) Identify **two (2)** differences between the two subjects which may explain their different VO₂ max. results.

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Question 3 continues

c) What would you expect the difference to be at rest, between the subjects' heart rates and stroke volumes? Provide reasons for these differences.

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d) If subject B decided to include **two (2)** muscular endurance resistance training sessions per week to further enhance their aerobic capacity which muscular adaptations would they be training to achieve?
[Circle your choice]

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|---------------------------------------|-----------|---------------------------------------|
| Increased muscle capillary density | OR | Decreased muscle capillary density |
| Decreased myoglobin concentration | OR | Increased myoglobin concentration |
| Increased oxidation of fats | OR | Decreased oxidation of fats |
| Increased use of anaerobic glycolysis | OR | Decreased use of anaerobic glycolysis |

e) If subject B included some strength training into their schedule briefly outline **two (2)** chronic muscular adaptations they could expect.

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Total C1

25

Question 4

This question assesses **Criterion 2**.

Marker use



Source: <https://www.zimbio.com/photos/Daisy+Pearce/JWbY0ID-28C/AFLW+Rd+7+Western+Bulldogs+vs+Melbourne>

Melbourne AFLW player Daisy Pearce continues to be a dominant player in the competition, even since returning from giving birth to twins. Her performances in 2021 have been as good as ever and she attributes this to ensuring she was as thorough as possible in her physical preparation.

1

- a) Identify **two (2)** reasons why Daisy would warm up thoroughly before training and competition.

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- b) Provide **one (1)** practical example of how conditioning and skill development could be combined in a training session.

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Question 4 continues

c) Briefly outline **two (2)** reasons why Daisy should cool down following training and competition.

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d) Define the training principle of progressive overload and demonstrate, with an example, how Daisy could have applied this principle to her training.

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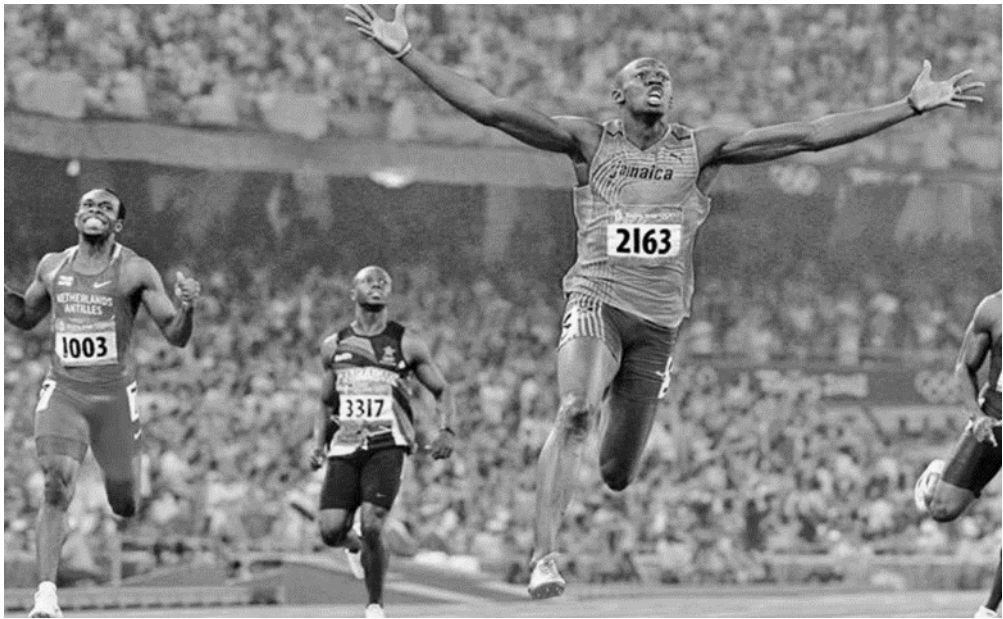
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Question 5

This question assesses **Criterion 2**.

Marker use



Source: <https://www.sundayobserver.lk/2020/12/13/sports/30-greatest-olympic-athletes-all-time28C/AFLW+Rd+7+Western+Bulldogs+vs+Melbourne>

The postponement of the Tokyo Olympic Games has severely impacted the training programs of athletes around the world. In fact, a number have retired, explaining that it will be too difficult to prepare as they would wish to.

- a) Briefly discuss the focus of each of the **three (3)** main components of an athlete’s training year.

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- b) What changes to an athlete’s training program would usually occur in a successful taper?

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Question 5 continues

Question 5 continued

Marker use

c) Discuss the training principle of variety and how it may apply to athletes preparing for the Tokyo Olympic Games. Provide an example of cross-training which demonstrates this principle in action.

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Question 6

This question assesses **Criterion 2**.

Marker use



Source: <https://www.bbc.co.uk/sport/football/55607090>

European soccer teams are often playing in multiple competitions in the one season. They often have to play three games in one week. Their players have to be able to recover quickly in order to maintain their quality of play within this schedule.

- a) At half time in a match players can at least recover partially through the process of EPOC. What does this acronym stand for?

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- b) Much of EPOC is involved with oxygen debt. Identify and outline the purpose of each of the **two (2)** components of oxygen debt.

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Question 6 continues

b) To assist recovery, players will often use water-based strategies. Name **two (2)** of these strategies and, for **one (1)** of these, outline when it is best used.

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c) Following training and matches, each of which take about 90 minutes, a major focus for players will be their nutritional intake. Write a team guide for this aspect of recovery which addresses the consumption of carbohydrates and protein, and the restoration of muscle glycogen. Consider any required timeframes in your guide.

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d) What does DOMS stand for? Provide **one (1)** action a player can take to avoid or minimise it.

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Total C2

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Question 7

Marker use

This question assesses **Criterion 5**.

Six teenage rowers (S1 – S6) undergo five field tests to determine their physiological condition after 16 weeks of training prior to their first regatta. They will be compared with each other and against an accepted minimum standard for each test in order to be selected in a crew of four.

Table 1: Physiological testing data from teenage rowers following 16 weeks of training.

Test	S1	S2	S3	S4	S5	S6	Minimum standard
Multistage Fitness Test 1 (Beep Test) (Level)	10.7	13.4	12.6	11.8	14.2	9.5	12.5
Sit and Reach Test 2 Centimetres (cm)	25cm	19cm	27cm	31cm	19cm	14cm	20cm
20RM Squat Test 3 Kilograms (kg)	14kg	17kg	16kg	15kg	19kg	12kg	15kg
Box Jump Test 4 Centimetres (cm)	55cm	52cm	63cm	48cm	60cm	46cm	50cm
Plank Test 5 Minutes (m) & Seconds (s)	1m33s	1m37s	1m50s	1m31s	1m45s	2m10s	1m30s

Note: 1 is a test of aerobic capacity, 2 is a test of flexibility, 3 is a test of muscular endurance, 4 is a test of power and 5 is a test of core stability.

All responses to this question must make reference to the table above.

a) In which test did all subjects exceed the minimum standard?

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b) Rank the subjects from lowest to highest for their flexibility. Include data in your answer.

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Question 7 continues

Question 7 continued

Marker use

c) What is the obvious anomaly in the results for S6 when compared to the minimum standards? Include data in your answer.

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d) Describe the relationship between the results for the multiusage fitness test and the 20RM squats. Include data for **three (3)** subjects in your answer.

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e) If selecting the crew, which rower do you consider should be the first selected? Justify your answer by including data in your answer.

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Total C5

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End of Section A

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Section **B** Skill Acquisition

Pages	16
Questions	4

Suggested working time: 45 minutes

Instructions

- Attempt **all** questions and **all** parts within each question.
- Answers must be written in the spaces provided in this exam paper.
- All answers must be written in **English**.
- You **must** make sure your answers address:
 - Criterion 3 analyse and discuss concepts of skill acquisition in sport.
 - Criterion 5 analyse and interpret sport science data and information.

Marker use	
C3	35
C5	10

Guide to Exam Structure

	Questions available	How many questions to answer	Suggested working time	Marks available
Section A	7	7	60 minutes	60
Section B	4	4	45 minutes	45
Section C	4	4	45 minutes	45
Section D	3	2	30 minutes	30
Total	18	17	180 minutes (3 hours)	180

Question 8

Marker use

This question assesses **Criterion 3**.

Volleyball is always a spectacular and popular sport at the Olympic Games. It is fast, presents lots of information to the players and involves a projectile.



Source: <https://www.britannica.com/story/olympics-volleyball>

Refer to the image above to assist you with the following questions.

- a) Identify **two (2)** cues available to the players to help them plan their response as the ball crosses the net onto their side of the court.

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- b) Define orienting and selective attention and use an example from the image above to demonstrate their use in volleyball.

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Question 8 continues

c) Identify **two (2)** things player Number 8 is doing to improve her stability.

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d) Is volleyball played in a closed or open environment? Justify your answer.

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e) A ball often changes direction by deflecting off a player or the net. Name and explain the concept that leads to players often not reacting quickly enough to this change.

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Question 9

This question assesses **Criterion 3**.

Australian World Champion Javelin thrower Kelsey-Lee Barber is consistently performing at the elite level in this throwing event. She is considered a strong Olympic medal chance in 2021.



Source: <https://www.reuters.com/news/picture/barber-wins-australias-first-javelin-wor-idUSKBN1WG4XB>

- a) Javelin throwing has both fine and gross skill elements. Demonstrate your understanding of these skill classifications by identifying an aspect of throwing the javelin that is fine and one that is gross.

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- b) Kelsey-Lee has spent many years learning and refining her throw. Identify the **three (3)** stages of learning and, for each, provide a practical example of how her coach may have applied them to Kelsey-Lee’s skill development.

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c) What is schema? Explain how it could apply to throwing the javelin.

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d) There are a number of factors which influence projectile motion. Identify **three (3)** and explain how changes in each could have a positive and/or negative influence on how far the javelin can be thrown.

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e) What is a sub-routine? Discuss why it is important for Kelsey-Lee and her coach to have a good understanding of the sub-routines necessary to throw a javelin.

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Question 10

This question assesses **Criterion 3**.

Marker use



Source: <https://thebridge.in/featured/what-are-the-benefits-of-learning-taekwondo>

Taekwondo is a highly physical and technical combative sport. Points are awarded for accurate contact with different parts of an opponent’s body. Avoiding contact is as important as making contact.

- a) When learning the necessary skills of taekwondo, practice is essential. Outline **two (2)** reasons why distributed practice may better suit a beginner in this sport than massed practice?

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- b) Once an athlete has acquired the necessary skills to compete, explain how their competitive performance could be improved through varied practice.

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Question 10 continues

c) Identify **two (2)** main roles of feedback. For **one (1)**, briefly discuss how it could be applied to a taekwondo athlete.

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d) What is short term memory? In providing feedback to athletes why should a coach avoid providing them with too much information?

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e) Elite taekwondo athletes kick and punch with great speed. Identify **two (2)** factors that will influence their opponent’s ability to avoid contact.

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f) Using **two (2)** anatomical terms to describe movement, how did **athlete 1** move his left leg to its position and how did he bend his right leg?

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Question 10 continued

Marker use

g) Discuss **two (2)** benefits of the athlete’s coach using video analysis following competition to review the performance with the athlete.

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Total C3

35

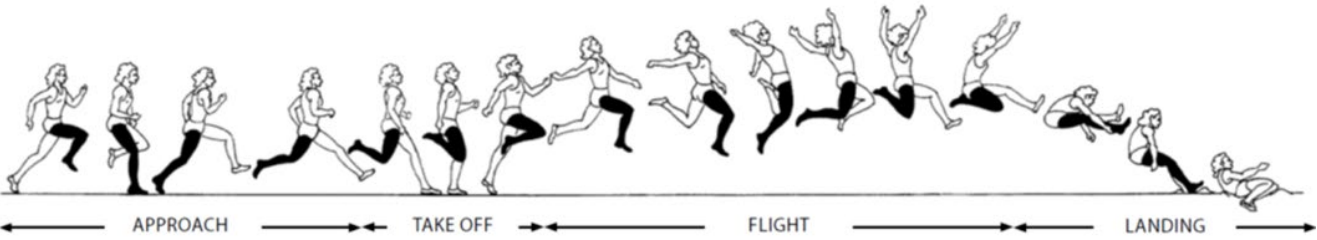
Question 11

Marker use

This question assesses **Criterion 5**.

Long jump is an athletic event in which participants become a projectile.

Figure 1: Components of a long jump.



Source: <https://www.aths.coach/resources/long-jump-the-technical-model>

Table 1: Average performance data for five competent long jumpers.

Jumper	Approach speed (metres/second)	Angle of take-off (degrees)	Height of centre of gravity during flight (metres)	Distance jumped (metres)
1	7.5	27.8	1.37	7.58
2	8.2	25.0	1.39	7.83
3	9.6	22.1	1.36	8.30
4	8.7	23.6	1.38	8.15
5	9.6	22.4	1.35	8.28

a) Discuss the impact of approach speed on distance jumped for jumpers 2 and 4. Include data in your answer.

2

b) What effect does approach speed have on angle of take-off? Include data in your answer.

2

c) Describe what the jumper (Figure 1) is doing during the landing phase to increase distance jumped. Use the appropriate term for the movement you have described.

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d) With reference to **three (3)** jumpers, which **two (2)** components of the jump appear to be most important to maximise distance jumped? Include data in your answer.

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Total C5

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SPORT SCIENCE

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Section **C** Sport Psychology

Pages	16
Questions	4

Suggested working time: 45 minutes

Instructions

- Attempt **all** questions and **all** parts within each question.
- Answers must be written in the spaces provided in this exam paper.
- All answers must be written in **English**.
- You **must** make sure your answers address:
 - Criterion 4 examine and discuss how sport psychology influences athletic performance.
 - Criterion 5 analyse and interpret sport science data and information.

Marker use	
C4	35
C5	10

Guide to Exam Structure

		Questions available	How many questions to answer	Suggested working time	Marks available
Section	A	7	7	60 minutes	60
Section	B	4	4	45 minutes	45
Section	C	4	4	45 minutes	45
Section	D	3	2	30 minutes	30
Total		18	17	180 minutes (3 hours)	180

Question 12

This question assesses **Criterion 4**.

Marker use



Source: <https://newsbust.in/australian-captain-meg-lanning-delivers-virtual-batting-class-for-ireland-womens-team/>

The Australian Women’s Cricket team, led by Meg Lanning, is now the most successful one day cricket team in history, men or women, after winning 23 matches in succession.

- a) Define self-confidence and use an example to demonstrate how this definition applies to this Australian team.

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- b) Identify **two (2)** self-efficacy traits Meg Lanning may demonstrate to assist her to lead this team.

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Question 12 continues

c) What type of goal is winning 23 matches in succession? Provide an example of a team process goal and a team performance goal which would have assisted them to win these matches.

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d) Each player would have set their own goals in order to contribute to the team’s performance. Provide an example of an individual goal which meets the requirements of the S and the M in the SMARTER acronym.

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e) Briefly discuss how the team may apply **three (3)** pre-competition strategies at the venue to assist players be as prepared as they can for each match.

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Question 13

This question assesses **Criterion 4**.

Marker use



Source: <https://www.reuters.com/news/picture/barber-wins-australias-first-javelin-wor-idUSKBN1WG4XB>

100 metre sprinter, Rohan Browning, qualified for the 2021 Olympic Games. Although he was running well he had been struggling to run the time he needed to qualify.

- a) Sprinting is an individual sport. Briefly discuss how Browning's self determination needs of competence and autonomy are satisfied.

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- b) Discuss the differences between extrinsic and intrinsic motivation and provide **one (1)** example of each that Browning may experience in his sport.

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Question 13 continues

c) When Rohan Browning was struggling to achieve his qualification time goal, what were **two (2)** motivational techniques he may have used?

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d) A 100m race is over in about ten seconds. Provide **four (4)** mood or cue words that may help Browning focus on the necessary effort.

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e) Identify the **four (4)** necessary aspects of de-briefing. Provide an example for each that Rohan Browning may experience with his coach following a race.

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Question 14

This question assesses **Criterion 4**.

Marker use



Source: <https://www.shutterstock.com/search/ashleigh+barty>

Tennis player Ash Barty went from being one of the best junior tennis players in the world, to a cricketer in the Big Bash, to now being the number one women’s tennis player in the world.

- a) After success as a younger player, Barty has said that she often felt anxious coping with expectation. Define trait anxiety and state anxiety. Provide **two (2)** examples of cognitive/psychological symptoms Barty may have experienced as a consequence of her anxiety.

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Question 14 continues

b) Explain the inverted U hypothesis and discuss how it may have applied to Ash Barty as a younger tennis player.

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c) As a senior tennis player Barty works with a psychologist. Identify **four (4)** methods they may have identified as a means for her to lower her arousal levels.

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d) Ash Barty’s attention needs to shift between different attentional dimensions throughout a match. Identify the most appropriate dimension for her to be in for each of the following situations.

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Attentional Dimension

Focusing on her grip on the racquet:

Tossing the ball and serving:

Tracking the ball and her opponent’s position:

Considering her options to return the ball:

Question 14 continued

Marker use

e) Define mental rehearsal. Discuss **two (2)** guidelines Barty can use to improve the quality of her mental rehearsal.

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Total C4

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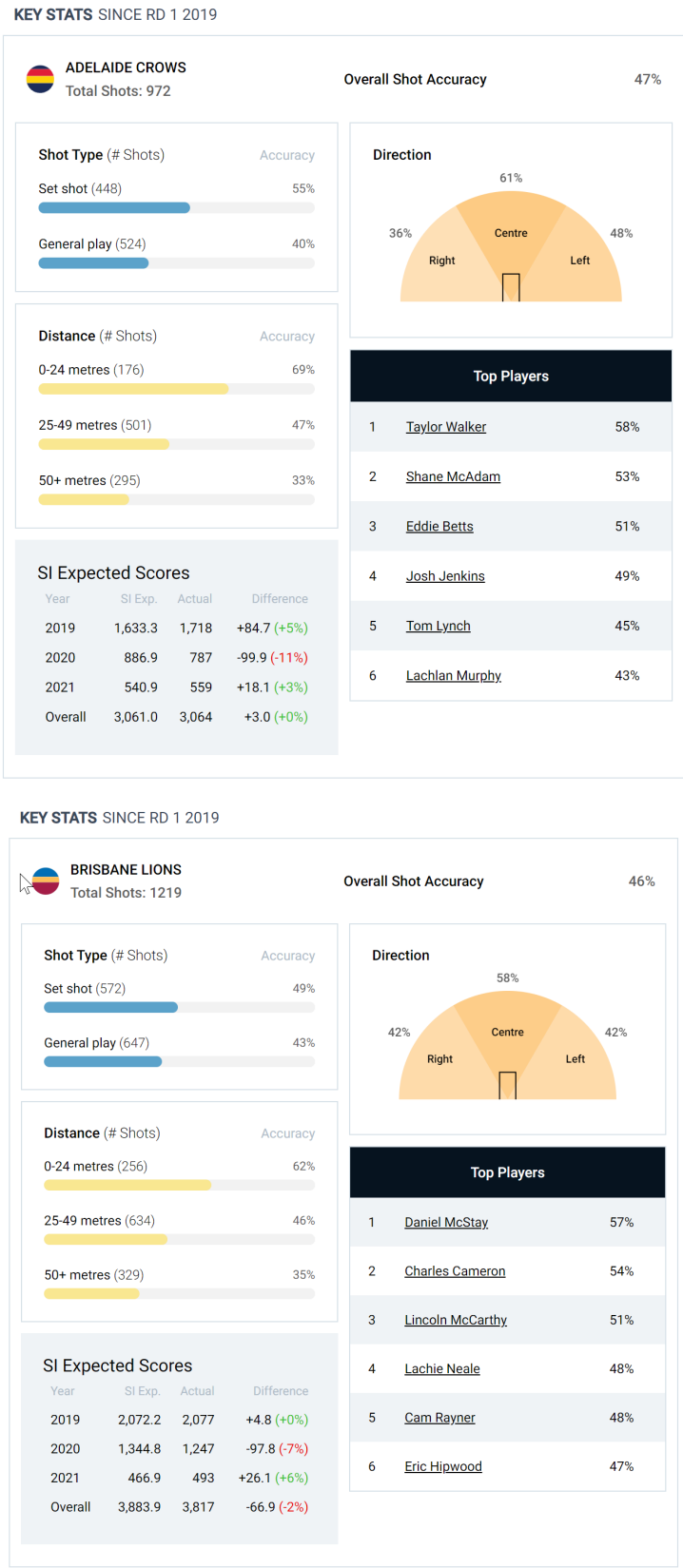
Question 15

Marker use

This question assesses **Criterion 5**.

The AFL is a sporting organisation which now includes the provision and analysis of a significant amount of data related to Key Performance Indicators for goal scoring.

Table 1: Comparative performance data for the Adelaide Crows ad the Brisbane Lions since 2019.



Note: SI is the data provider.
Source: <https://www.statsinsider.com.au/afl/shot-charting>

Question 15 continues

Responses to this question must refer to Table 1.

a) Which team should attack more from the left than the right? Include data to support your answer.

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b) In 2019 which team achieved the highest total score? Include data to support your answer.

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c) In 2020 both teams scored less than expected. What was the score for each team?

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d) Of the least accurate players for each team which would you prefer to kick at goal? Include data in your answer.

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Question 15 continued

e) With reference to Shot Type and Distance describe the best way for the Adelaide Crows to score goals. Are they better or worse than the Brisbane Lions with these methods? Include data to support your answer.

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Marker use	
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Total C5	
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Section **D** Cross-Discipline Links

Pages	16
Questions	3

Suggested working time: 30 minutes

Instructions

- Attempt **two (2) questions only** in this section.
- Answers must be written in the spaces provided in this exam paper.
- All written responses must be in **English**.
- You **must** make sure your answers address:
 - Criterion 6 examine and discuss cross-discipline links.

Marker use	
C6	30

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Guide to Exam Structure

	Questions available	How many questions to answer	Suggested working time	Marks available
Section A	7	7	60 minutes	60
Section B	4	4	45 minutes	45
Section C	4	4	45 minutes	45
Section D	3	2	30 minutes	30
Total	18	17	180 minutes (3 hours)	180

Answer **two (2)** questions from this section.

This question assesses **Criterion 6**.

Question 16



Source: <https://www.tennis365.com/grand-slam/former-top-10-player-explains-why-roger-federer-needs-to-brush-up-on-his-baseline-game-for-wimbledon/>

Tennis player, Roger Federer, has recently returned to playing competitively following a disrupted 2020. This included surgery on both of his knees followed by a long period of rehabilitation.

Use **two (2)** cross-discipline links between **Sports Psychology** and **Exercise Physiology** that indicate how Federer has been able to recover and return to competition relatively quickly

15

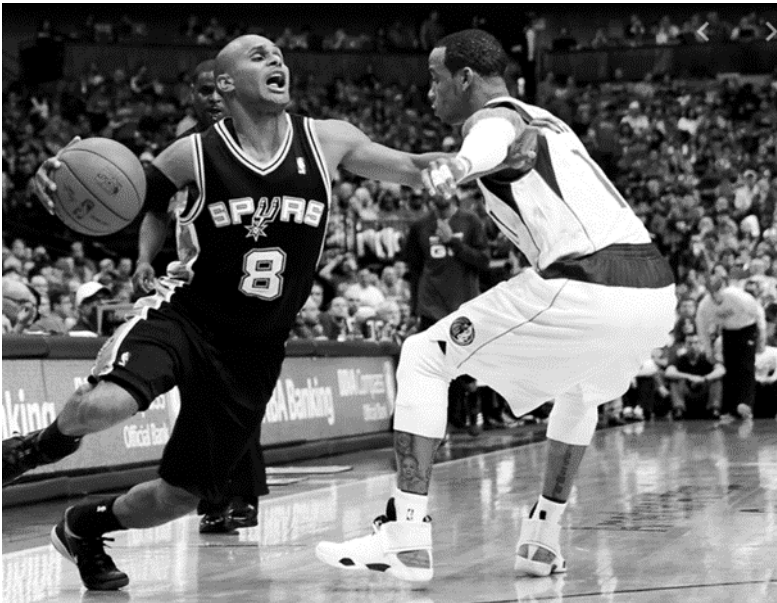
Question 16 continues

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Question 16 continued

Marker use

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Source: <https://hoopshabit.com/2014/06/16/3-teams-sign-patrick-mills/2/>

Australian basketballer, Patrick (Paddy) Mills, has maintained a long and successful career with the San Antonio Spurs in the NBA, the world’s strongest basketball league.

Use **two (2)** cross-discipline links between **Sport Psychology** and **Skill Acquisition** that have assisted Mills to maintain his very high playing standard.

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Question 17 continued

Marker use

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Question 18

No matter which sport they compete in, athletes will always try to gain an advantage over their opponents by improving their physical condition and their skill execution.

Select an athlete or team, specify their sport and use **two (2)** cross-discipline links between **Exercise Physiology** and **Skill Acquisition** to demonstrate how they can improve their performance.

My sport is: _____ My athlete and/or team is: _____

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

[illegible]

Marker use

15

Question 18 continues

[illegible]

Question 18 continued

Marker use

[illegible]

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End of Section D

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