Government of **Western Australia**
School Curriculum and Standards Authority

PHYSICAL EDUCATION STUDIES

ATAR course examination 2017

Marking Key

Marking keys are an explicit statement about what the examining panel expect of candidates when they respond to particular examination items. They help ensure a consistent interpretation of the criteria that guide the awarding of marks.

2017/69542

Section One: Multiple–choice **20% (20 Marks)**

Question	Answer
1	b
2	d
3	b
4	a
5	c
6	d
7	c
8	d
9	c
10	c
11	b
12	b
13	d
14	a
15	c
16	c
17	b
18	b
19	a
20	d

Section Two: Short answer **50% (86 Marks)**

Question 21 **(12 marks)**

(a) Name and outline **two** activities that Curtis' coach would have used to teach him how to swing and hit the ball correctly when he first started to play golf. (4 marks)

Description	Marks
One mark for naming, **one** mark for outlining	
Chaining	1
The breaking down into parts of a complex skill or activity and teaching the skill part by part.	1
Shaping	1
The process of simplifying a complex skill or using an incomplete version of the skill.	1
Total	**4**

(b) Complete the model below by naming and outlining each stage of qualitative analysis Curtis' coach would use to improve his golf swing. (8 marks)

Description	Marks
Preparation (1 mark) – Coach gains the knowledge of the skills. (1 mark) **Observation** (1 mark) – The Coach determines the appropriate viewing angles. Or the coach watches a number of times/uses video/gathers data (1 mark) **Intervention** (1 mark) – The coach provides feedback or gives Curtis drills to help improve his swing. (1 mark) **Evaluation** (1 mark) – Identification of errors/strengths/weaknesses and plans ways to correct them. (1 mark)	1–8
Total	**8**

Question 22 **(7 marks)**

(a) Identify the category and name of the drug that Serena ingested during the match. (2 marks)

Description	Marks
Identifies category of drug: – Stimulant	1
Names drug: – Caffeine	1
Total	**2**

(b) Identify **two** physiological effects on Serena's body of drinking the coffee during her match. (2 marks)

Description	Marks
Any **two** of the following:	
• increased heart rate/cardiovascular activity • increased Central Nervous System activity/alertness/awareness (or improved/decreased reaction time – *not increased*) • increased metabolism/glycogen sparing • increased muscle shakes/tremors	1–2
Total	**2**

(c) In preparing to receive her opponent's serve, Serena sets herself in the position depicted in the above image. Name the biomechanical principle she is applying and identify **two** aspects of the principle that she is demonstrating. (3 marks)

Description	Marks
Names biomechanical principle as Balance	1
Any **two** of the following:	
• widens her base of support by standing with feet outside shoulder width (feet spread apart). • Increase surface area to the ground (point of contact) by standing flat footed. • lowers her centre of gravity by bending/crouching. • maintains her line of gravity in the middle of the base of support by marking on photo/puts butt out puts head in middle.	1–2
Total	**3**

Question 23 **(10 marks)**

(a) Identify which mental skill strategy the team is using in the photograph above and state a benefit for the All Blacks performing this dance. (2 marks)

Description	Marks
Identifies mental skill strategy - *Performance Routine*	1
Any **one** of the following	
States benefit for the All Blacks performing Haka. • purpose of a performance routine (Haka) is to get athletes into the right mindset (get 'in the zone') or optimises the player's **arousal** level. • the performance routine (Haka) increases an athlete's **confidence** – athlete is able to relate back to past successes with the routine and see and feel future successes making them feel more in control and confident. • The performance routine (haka) narrows an athlete's focus to improve **concentration** – once the haka starts it helps to direct the player's attention towards game.	1
Total	**2**

(b) A high level of group cohesion is a major part of the All Blacks' ability to win so many consecutive games. Name and outline **four** factors from Carron's model of group cohesion that could contribute to their success. (8 marks)

Description	Marks
One mark for naming factor and **one** mark for outlining specifically to the All Blacks connected to the ***SUCCESS OF THE TEAM***	
Environmental – factors binding members to a team such as – contracts (strict selection process), location (pride associated with Rugby in NZ), eligibility (National competitor), provided opportunities for socialising (team camps and social events).	1–2
Personal – individual characteristics of team members such as – motives for participating (pride for national game of NZ), satisfaction of being a part of a team (kudos for being an All Black), individual differences (abilities to play certain positions to fulfill roles and responsibility), self-motivation, affiliation and task motivation.	1–2
Leadership – The style of leadership and leaders and coaches' behaviour plus relationships with the team influence the development of group cohesion. (players respect coaches and captain and leadership style meets need of team, relationships are valued), formal leadership group.	1–2
Team – the characteristics or factors relating to the group, e.g. creation of short and long term goals for the team, • team identity, desire for group success, • member ability and roles, • rewarding of individual and team efforts, • how long the team has been together to allow team stability, • Rugby is an interactive rather than co-active sport • shared vision and goals, • shared understanding of strategies and tactics being used, • placing team goals before personal, • working together complementing each other's strength.	1–2
Total	**8**

Question 24 **(9 marks)**

(a) Identify and outline **two** mechanisms of heat loss and for each provide an example of how athletes could have counteracted the mechanism, allowing them to compete successfully during the game. (6 marks)

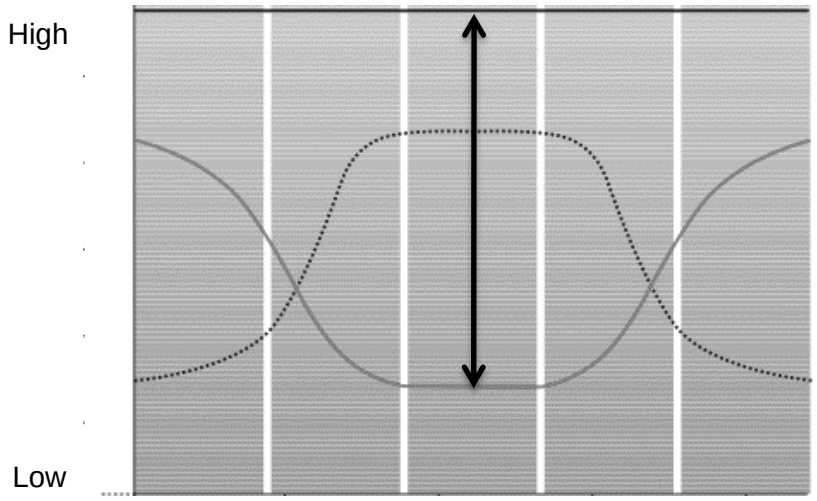
Description	Marks
One mark for identifying mechanism, **one** mark for outlining mechanism and **one** mark for example to counteract. Any **two** of the following:	
Conduction – heat is lost via contact with another object Eg. avoid touching cold objects eg. sitting on the ground/metal benches at breaks	1–3
Convection – heat is lost via transfer to surrounding air (flowing air over surface of body removing heat) Eg. minimise exposed skin such as wearing long sleeve undershirt and pants or bandana under helmet, keeping helmet on during breaks, wearing gloves.	1–3
Radiation – heat is transferred via electromagnetic waves when the body is warmer than the surrounding environment **OR** heat loss from the body to colder external environment. Eg. wear insulating clothing under uniform that keeps heat in/avoids heat loss.	1–3
Total	**6**

(b) Identify **one** immediate physiological effect of competing in the extreme cold and describe how it could hinder the performance of a participant. (3 marks)

Description	Marks
(i) Identifies a physiological effect (1 mark) (ii) Describes how the effect negatively impacts performance. (1- 2 mark)	
(i) **Peripheral vasoconstriction** (or the narrowing of the blood vessels to the periphery to limit blood flow to the extremities) (ii) because it causes a loss of feeling in extremities and reduces blood to muscles **AND** impacts on catching/throwing ability or ability to move optimally (decrease fine motor control/dexterity/coordination)	1–3
or	
(i) **Shivering** (ii) because it creates involuntary muscle contractions/movements to produce heat **AND** uses up (depletes) energy stores **OR** impacts on catching/throwing ability or ability to move optimally (decrease fine motor control/ dexterity/coordination)	1–3
Total	**3**

Question 25 **(7 marks)**

(a) Draw a clearly-labelled graph in the space below to represent the effect that her body's position of rotation had on her moment of inertia, angular velocity and angular momentum. (3 marks)



(b) Name **two** mental skill strategies Rhiannan could have used immediately before her winning dive to maximise her performance, and provide an example of each. (4 marks)

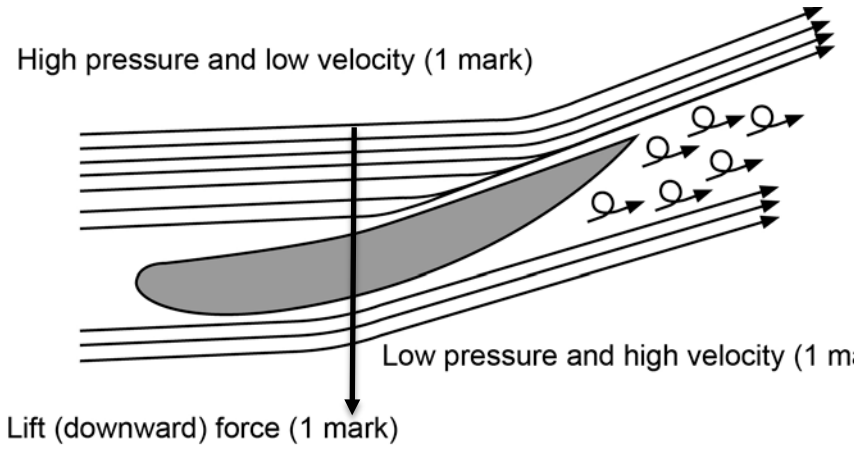
Description	Marks
One mark for naming mental skill strategy and **one** mark for example. Any **two** of the following:	
Relaxation –	1
Rhiannan can try to remove tension from her body by using centered breathing or Progressive Muscle Relaxation (PMR)	1
Self–talk –	1
Rhiannan can talk to herself positively (eg. breathe, relax, I can do this, tuck tight, etc) reminding herself of relaxation techniques or cues for execution of the dive.	1
Imagery –	1
Rhiannan can go over her routine in her mind without making any physical movements, imagining her performance.	1
Performance Routine –	1
Rhiannan can do something like clap her hands three times or raise her arms up and down at the side of her body.	1
Total	**4**

Question 26 **(9 marks)**

(a) Identify and define **two** types of drag that the engineers consider. How do they apply this knowledge to the design of a car to reduce each type of drag? (6 marks)

Description	Marks
One mark for identifying type of drag, **one** mark for definition and **one** mark for application:	
Form/Pressure Drag	1
The drag created by a pressure difference between the front and rear of an object moving through fluid.	1
Application to the design of the car	1
The nose of the car is pointed rather than flat or similar words; or discusses streamline shape of car/reduces cross sectional area	1
Surface Drag	1
The drag created due to a fluid moving over an object resulting in friction between the surface of the body and the fluid.	1
Application to the design of the car	1
The surface of the car is smooth to allow it to move faster through the air.	1
Total	6

(b) The engineers also apply their understanding of Bernoulli's Principle by placing front and rear wings on the car to generate a force to help it maintain traction with the road. Label the diagram of the car wing below to explain how Bernoulli's Principle works in improving the car's traction and identify the lift force. (3 marks)

Description	Marks
	1–3
Total	3

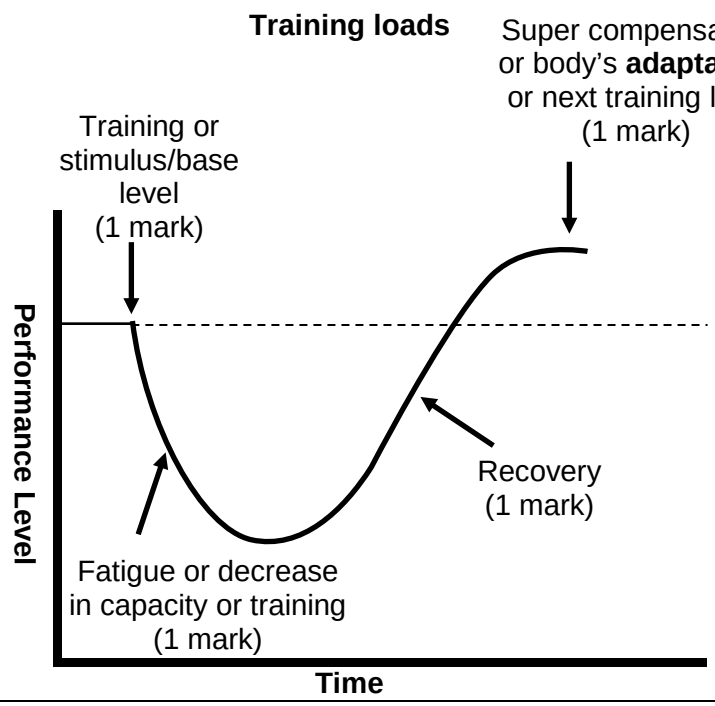
Question 27 **(10 marks)**

(a) State what is meant by 'overtraining'. Identify **five** symptoms of overtraining Stephanie may have experienced. (6 marks)

Description	Marks
Overtraining is a physical, behavioural and emotional condition when ***exercise*** *(volume & intensity) exceeds their* ***recovery*** *capacity* (imbalance between work & rest) or similar definition.	1
Any **five** of the following:	
• Persistent (prolonged) muscle soreness • Heaviness and weakness in muscles • Nausea • Increased incidence of injury • Prolonged fatigue and delayed recovery • Loss of appetite and weight loss • Elevated resting heart rate • Dehydration and insatiable thirst and excessive sweating • Moodiness and easily irritated • Increased anxiety/depression • Loss of competitive drive/motivation • Feeling tired and inability to relax • Altered sleep patterns/insomnia • Decreased concentration/confidence/self-esteem • Menstrual cycle stops • Plataue or decrease in performance levels	1–5
Total	**6**

(b) Coaches and athletes use their understanding of the diagram below to design training programs that produce better performances and prevent overtraining.

Label the **four** arrows. (4 marks)

Description	Marks
	1–4
Total	**4**

Question 28 **(10 marks)**

(a) Name and outline **three** effects of the transfer of learning. Identify which effect **most** likely occurs when he is playing tennis and basketball, without considering the control of the wheelchair. (7 marks)

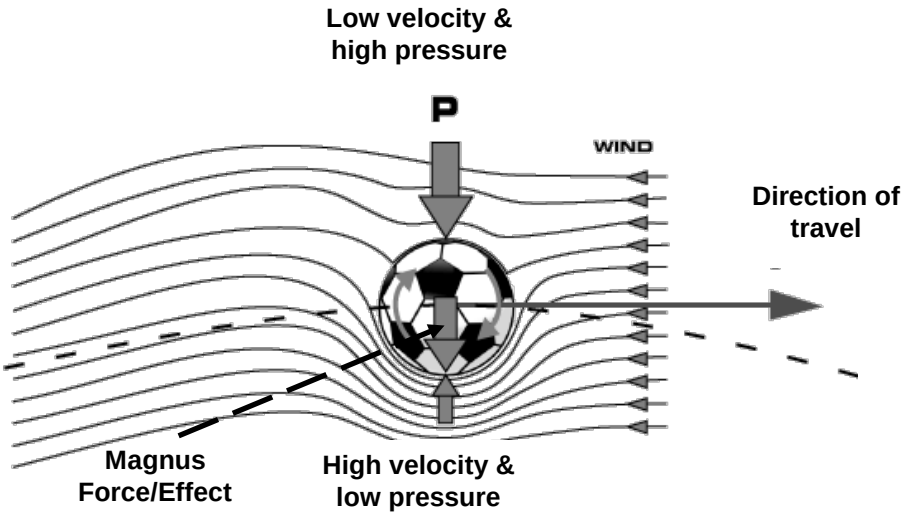
Description	Marks
One mark for naming, **one** mark for outlining	
Negative	1
A skill developed in one sport hinders/inhibits the performance of a skill in another sport.	1
Zero	1
A skill in one sport has no impact on the learning of a new skill in another sport.	1
Positive	1
A skill developed in one sport helps/enhances/benefits the performance of a skill in another sport.	1
Identifies zero effect as most likely to occur between Dylan playing tennis and basketball.	1
Total	**7**

(b) The International Tennis Federation uses a system called Court Pace Rating to measure the effect the surface has on the tennis ball. This process takes into consideration the 'coefficient of restitution'. Describe what coefficient of restitution is and identify the coefficient of a ball that bounces to the same height as that from which it has been dropped. (3 marks)

Description	Marks
Coefficient of restitution is the **ratio** of relative velocity (or height) after impact to the relative velocity (or height) before the collision.	2
OR	
Identifies any of the following points:	
• Coefficient of restitution is the measure of bounciness of a ball • Coefficient of restitution is a measure of conservation of momentum/energy • Coefficient of restitution is a measure of the elasticity of collision. • Coefficient of restitution is a number which indicates how much kinetic energy remains after collision of two objects.	1
Coefficient of restitution = 1 (Identifies 1 as being the measure of a ball that would bounce to the same height it was dropped from.)	1
Total	**3**

Question 29 **(5 marks)**

During his debut for Melbourne City in the professional soccer A League, Tim Cahill kicked a ball from 40 metres out that went low and flat curling away from the goalkeeper into the top right-hand corner of the goal. In the space below, draw a bird's eye view of the ball's path to explain the deviation as the ball travels towards the intended target. (5 marks)



Description	Marks
The diagram shows any **five** of:	
Arrows of ball spin direction correctly labelled OR eccentric force identified	1
Wind flow lines or direction of travel arrow	1
High and Low pressure zones correctly labelled	1
High and Low velocity areas correctly labelled	1
Magnus force/effect indicated with arrow through the middle of the ball left to right in relation to goals	1
Total	**5**

Question 30 **(7 marks)**

(a) In relation to the biomechanical principle of force–time, explain why high jumpers land on a large, soft mat. (4 marks)

Description	Marks
An explanation that includes any **three** of:	
• Biomechanical principle of Impulse is force over time OR equation of Impulse = Force x Time • Impulse is change in momentum • The mat increases contact time with jumper • More contact time with mat means less force on landing OR maximum time of force application/absorbtion	1–3
Less force on landing prevents injury/pain to athlete	1
Total	**4**

(b) Why would Brandon **not** carbohydrate load for his event? Name an event that would require athletes to carbohydrate load. (3 marks)

Description	Marks
Explanation includes:	
Carbohydrate loading is used to increase body's stores of glycogen	1
High jump is an **anaerobic** (ATP-PC Energy System) requires phosphocreatine (PC) to produce energy (not glycogen)	1
Carbohydrate loading is used for **aerobic** events such as a marathon (or event longer than 90 mins).	1
Total	**3**

Section Three: Extended answer **30% (30 Marks)**

Question 31 **(15 marks)**

(a) Identify which muscle fibre type the bobsled athletes would have predominantly and list **six** characteristics of this type. (7 mark)

Description	Marks
Identifies: Type IIb muscle fibre	1
Any **six** of the following:	
• Larger diameter/bigger fibre • Larger motor neuron • Low capillary density/oxidative density • Greater force can be generated • Fast contraction speed • Low number of mitochondria • Low resistance to fatigue/fatigues quickly • Uses the anaerobic energy system • White in colour/low myoglobin content • Fast glycolytic (anaerobic glycolysis)/ATP-PC Energy system • Fuel source is phosphocreatine	1–6
Total	**7**

(b) Identify the components of the neuromuscular system and their function in enabling the athletes to produce a fast start. (8 marks)

Description	Marks
Any **four** of the following:	
Sensory neuron	1
Ears receive sound and pass information from the sensory receptors to the cell body of the sensory neuron/brain.	1
Brain	1
Interprets/decides on the information and sends signals/impulse/action potential for movement to occur	1
Motor neuron	1
Transmit electrical information/signals away from cell body to the muscle fibres.	1
Spinal cord	1
Transmits electrical messages from the brain to parts of the body.	1
Motor unit	1
The motor neuron receives signal to cause contraction (innervation/stimulation) of the associated muscle fibres.	1
Total	**8**

Question 32 **(15 marks)**

(a) Identify **four** physiological effects the players will experience immediately upon their arrival in La Paz and describe the main reason for these effects. (6 marks)

Description	Marks
Any **four** of the following:	
• Decrease of O_2 in blood (hypoxemia) • Increase in respiratory rate (breathing/ventilation/pulmonary ventilation) • Increase tidal volume • Increased heart rate • Giddiness/ nausea/ headache/sleepiness/altitude sickness • Increase in blood pressure • Decrease in VO_2 max	1–4
At altitude, the air pressure/density decreases **or** decreased partial pressure **or** decrease pressure gradient	1
Decreased partial pressure in alveoli **meaning less O_2 diffused**. **OR** Air pressure (partial pressure) **thins** the air meaning O_2 is more widely dispersed in the atmosphere meaning less O_2 is diffused by people.	1
Total	**6**

(b) Describe **two** types of regimes the teams could have used to acclimatise for the tournament and identify how **five** physiological changes from effective acclimatisation would allow athletes to perform better at a high altitude. (9 marks)

Description	Marks
Any **two** of the following:	
• Live High – Train High (1). Athlete lives at altitude to achieve physiological benefits of decrease in concentration of O_2 and trains at altitude to obtain adaptations **OR** identifies intensity is compromised compared to training at sea level. (1) • Live Low – Train High (1). Application: athlete lives at sea level to have access to higher concentration of O_2 whilst training at altitude (altitude chamber or hypobaric) to obtain adaptations (1) • Live High – Train low (1). Application: athlete lives at altitude (sleeps in hypoxic tent) to achieve physiological benefits of decrease in concentration of O_2 and trains at sea level to work at higher intensities due to increase in O_2 concentration. (1)	1–4
Any **five** of the following:	
• Increased capillarisation – increased ability to supply oxygen, increased blood to the muscles • Increased haemoglobin volume and concentration – increases amount of oxygen carried by the blood • Increased red blood cell/erythrocyte volume/haematocrit – more red blood cells to carry oxygen • Increased blood viscosity – more nutrients and oxygen in the body's blood to aid metabolism • Increased aerobic enzymes – improves body's use of oxygen to produce energy/ATP faster • Increased mitochondria – allows higher intensity aerobic respiration • Increased myoglobin – allows more oxygen to be stored in muscles	1–5
Total	**9**

Question 33 **(15 marks)**

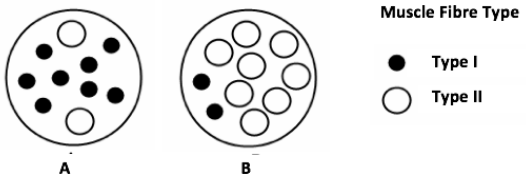
(a) On the basis of his planned weekly training loads, in which weeks did the minor competition and the State Championships occur. Justify your response by making reference to **two** of the following principles:

- peaking
- tapering
- periodisation. (7 marks)

Description	Marks
Identifies minor competition in week 15 and major competition in week 22/23 (or both)	1
Any **two** of the following:	
Peaking	
Defines peaking as planning training in such a way that optimal performance is achieved at the appropriate time (or something similar)	1
States any one of the following: • the athlete will seek to peak for both competitions with the greatest emphasis on the major competition • peaking is achieved by use of tapering in the lead up to competition and/or application of progressive overload and/or periodisation	1
Justifies their answer by providing any of the following evidence that demonstrates the athlete will peak for competition: • Reduction in training load/volume in lead up to comps during week 14 and/or 21/22 • Largest reduction in volume occurs before major comp in block 22 • Steady increase in training load/volume during blocks 1–8, 9–13 and/or 16–20 builds until competition time • Presence of off–season (low intensity and volume) straight after major comp in block 24 • Inclusion of recovery block in block 9	1
Tapering	
Defines tapering as the strategy of reducing volume and increasing or maintaining intensity in order to allow full recovery prior to competition	1
States the athlete will begin tapering approximately 7 days from competition (perhaps slightly less in the lead up to the minor competition)	1
Justifies their answer by providing evidence of tapering. • Intensity is high but volume is low just before competition in blocks 14/15 or 22/23. **OR** • Higher intensity/volume taper for the minor comp as seen in blocks 14/15	1
Periodisation	
Defines periodisation as the process of structuring training into phases/blocks.	1
States any one of the following: • periodisation is important across the program and in the lead up to competition so that performance is not reduced. • periodisation occurs through the application of progressive overload in the lead up to the competitions. • prevents overtraining before competition as it allows recovery periods.	1
Justifies their answer by providing evidence of Periodisation leading into the competition. • the gradual building of volume and intensity (progressive overload) in the lead up to both competitions as seen in blocks 1–8, 9–13 and/or 16–20 • Resumption of training volume after minor competition as seen in block 16	1
Total	**7**

(b) Unfortunately, the laboratory technician has mixed up the samples of Matthew and another WAIS athlete. Both samples can be seen below. Identify the sample, A or B, that belongs to Matthew and justify your answer by discussing the characteristics of Type 1 muscle fibres.

(8 marks)



Description	Marks
Identifies Slide B as Matthew's	1
Justifies selection by discussing the following:	
• Type 1 generate low force production (1 mark) – opposite to what Matthew requires for his event, he needs large force production. (1 mark) • Type 1 have slow contractile speed (1 mark) – Matthew requires speed for his event. (1 mark) • Type 1 are low amount of anaerobic enzymes (1 mark) – Mathew's race needs these as his event is anaerobic. (1 mark) • Type 1 has low amount of phosphocreatine fuel source (1 mark) – Mathew races anaerobically using PC or anaerobic glycolysis (1 mark) • Type 1 have smaller cross sectional area than Type 2 meaning less force production capability (1 mark)	1–7
Total	**8**

Question 34 **(15 marks)**

(a) Name and outline **three** types of leadership style a coach may use and justify the **most** appropriate style for Nick's coach to use. State why this style would be the **best** choice. (8 marks)

Description	Marks
Authoritarian (1 mark) – Coach is solely responsible for the decisions and direction (1 mark)	1–2
Democratic (1 mark) – Coach involves the players in the decision–making process (1 mark)	1–2
Laissez Faire (1 mark) – The coach **makes very few decisions** and the athletes have a greater responsibility for the direction of training and performance (1 mark)	1–2
Identifies Nick's coach should be **Democratic**	1
Any **one** of the following as to why it would be best for Nick:	
Nick is an elite athlete who: • already has a great knowledge of the sport of tennis. • is intrinsically motivated. • can feel he wants to contribute to his preparation/training or allows input from player	1
Total	**8**

(b) Describe segmental interaction and outline **five** of its characteristics that Nick applies to generate the most force when hitting the ball. (7 marks)

Description	Marks
Segmental Interaction– the transfer of energy/momentum (1 mark) across the joints (between body parts) (1 mark) **OR** The way body segments interact to meet demands of the task (1 mark) in the correctly timed sequence (1 mark)	1–2
Outlines **five** of the following:	
• Nick effectively uses a large number of body segments from his legs through core and upper body and limbs • Nick initiates the shot by using his larger body parts first then his smaller body segments. • Nick initiates the shot by first getting balanced, he widens his base of support to gain a stable base of support, this allows for optimal transfer of momentum between body parts. • Nick effectively times his movements to progressively build momentum onto each body segment. • Nick has a follow through in his swing to prevent deceleration of the racquet. • Nick ensures all forces are directed towards the target.	1–5
Total	**7**

ACKNOWLEDGEMENTS

Question 29 Diagram adapted from: *How can you obtain spin shots in soccer?* (n.d.). Retrieved November, 2017, from http://www.globuscorporation.com/sporttechnology/eng/magnus-effect-and-top-spin-2486.asp (see diagram under '2º CASE')

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