



PHYSICAL EDUCATION STUDIES

ATAR course examination 2016

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.



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

Section One: Multiple-choice

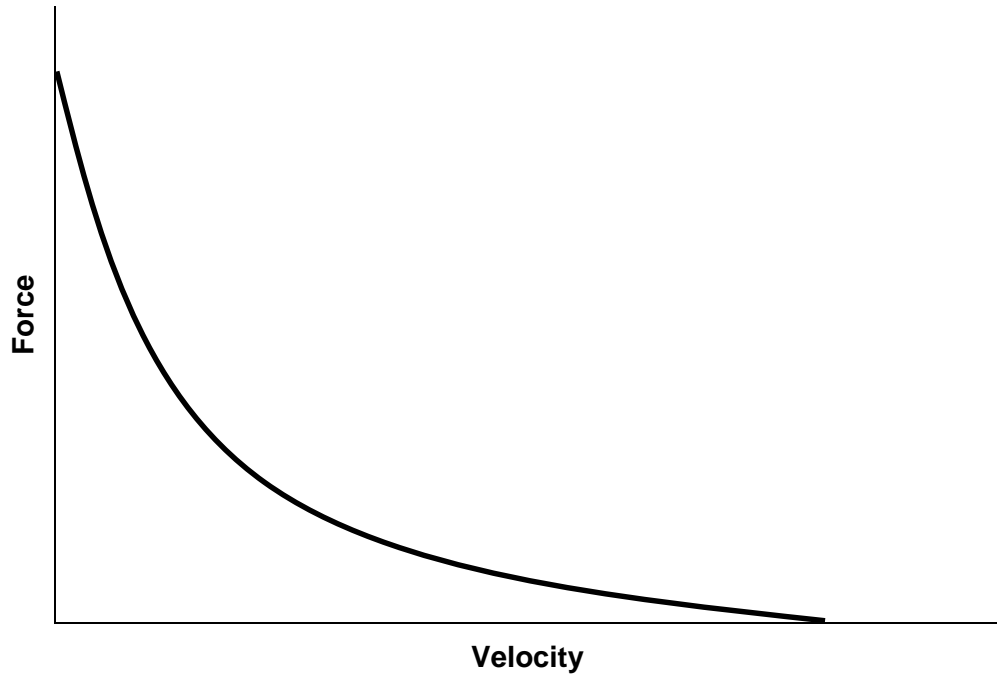
20% (20 Marks)

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

Question 21

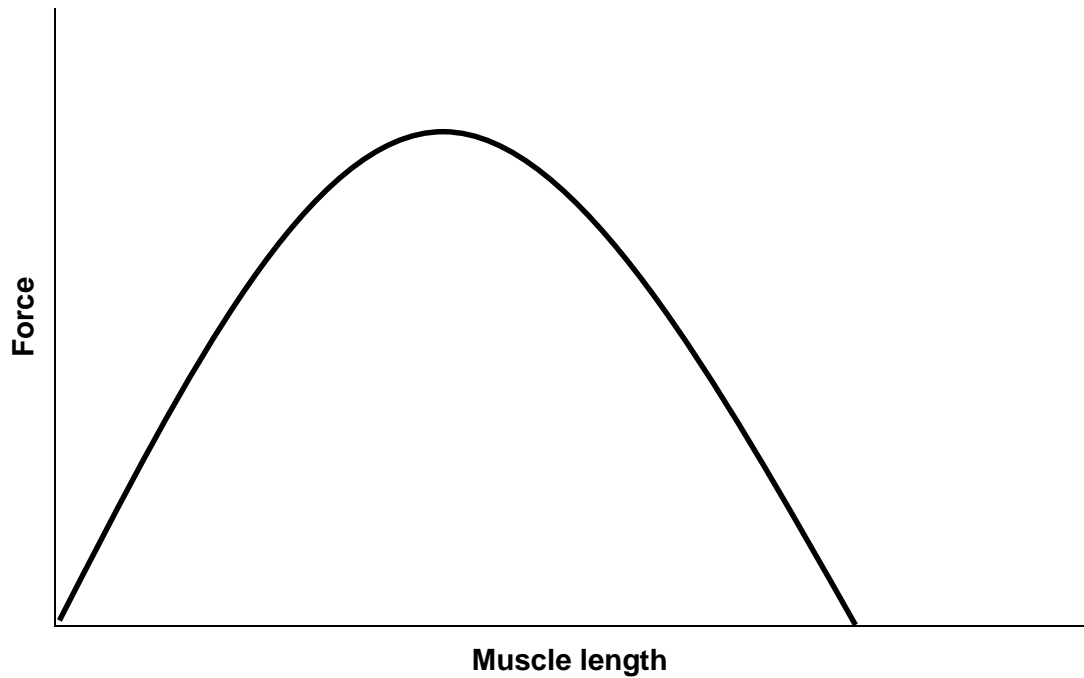
(10 marks)

- (a) In the space below, draw a fully-labelled graph to represent the relationship between the velocity of muscle contraction and the amount of force produced in a concentric contraction. Provide a description of the relationship. (5 marks)



Description	Marks
Force labeled on Y axis	1
Velocity labeled on X axis	1
Correct curve drawn (no marks for straight line)	1
Any two of: <ul style="list-style-type: none"> • States the amount of force produced by a muscle depends upon the velocity of muscle contraction • Saying either - High velocity = low force / Slow velocity = high force • Discusses myosin-actin cross bridges 	1-2
Total	5

- (b) In the space below, draw a fully-labelled graph to represent the relationship between the length of a muscle and the amount of force exerted in a concentric contraction. Provide a description of this relationship. (5 marks)



Description	Marks
Force labeled on Y axis	1
Muscle length labeled on X axis	1
Correct curve drawn	1
Any two of: <ul style="list-style-type: none"> • States how muscle force depends upon the length of a muscle • Identifies that maximum force is produced when there is optimal overlap of actin and myosin. • A muscle is able to generate greatest force at a starting length that is closest to the resting/midrange/optimal length • less force is generated by a muscle that has a starting length that is stretched (long) or contracted (short) 	1-2
Total	5

Question 22

(8 marks)

- (a) Name and define **two** coaching activities the Carlton coaches could use to teach Matt the skill of kicking an AFL ball. (4 marks)

Description	Marks
Any 2 of the following coaching activities (maximum of 4 marks):	
Names:–Chaining	1
Defines Chaining:–the breaking down into parts a complex skill or activity and teaching the skill part by part.	1
or	
Names:–Shaping	1
Defines Shaping:–the process of simplifying a complex skill or using an incomplete version of the skill.	1
or	
Names:–Static to dynamic	1
Defines Static to Dynamic:–the process of beginning with the skill without moving and progressing to performing the skill while moving or performing additional tasks	1
or	
Names:–Simple to complex	1
Defines Simple to Complex:–starting with a simplified or basic version of the skill and then progressing to a more complicated or advanced version of the skill	1
Total	4

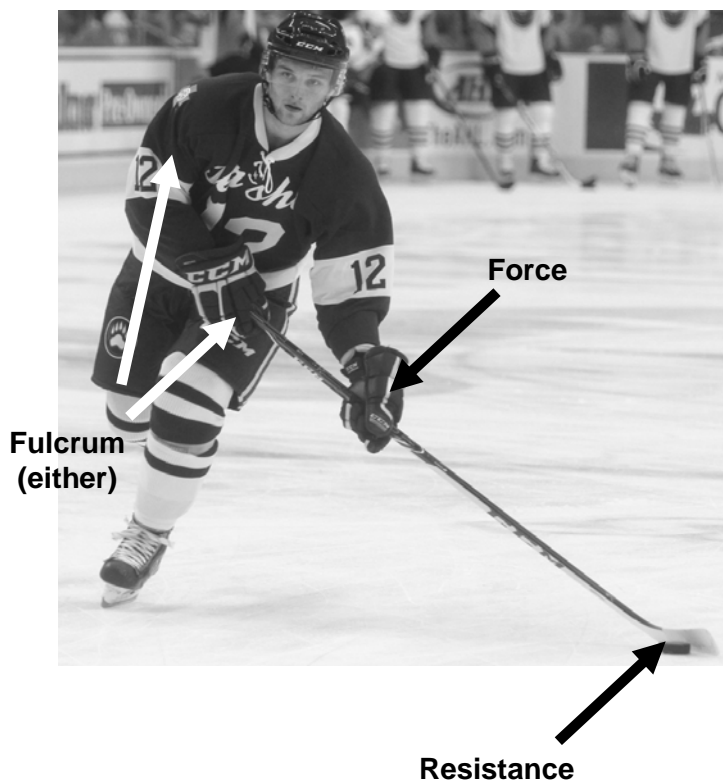
- (b) Name and outline **two** different methods the coaching staff could use to correct and improve Matt's skill of kicking an AFL ball. (4 marks)

Description	Marks
Any 2 of the following: - One mark for naming method - One mark for outlining method	
Video analysis	1
Video analysis involves coaches filming Matt's kicking action and playing it back for him, providing him with feedback.	1
Peer or mentor or coach feedback	1
Peer/mentor/coach feedback involves coaches watching Matt's kicking action and providing him with verbal feedback about his technique.	1
Checklist	1
Coach uses checklist to provide Matt feedback on correct technique	1
Total	4

Question 23

(7 marks)

- (a) On the photograph below of Nathan Walker, mark where the fulcrum, force and resistance would be in the action of hitting the puck. (3 marks)



Description	Marks
Fulcrum (full word)	1
Force (full word)	1
Resistance (full word)	1
Total	3

- (b) Name the type of lever system that is used in the action of hitting the puck. (1 mark)

Description	Marks
Third (3 rd) class lever	1
Total	1

- (c) In playing ice hockey, Nathan requires good balance. Identify **three** ways in which he can increase his stability. (3 marks)

Description	Marks	
Any three of:	1-3	
<ul style="list-style-type: none"> • Lower his centre of gravity • Widen his base of support • Line of gravity needs to be closer to his midline • Increase points of contact to ground 		
Total		3

Question 24

(10 marks)

- (a) For her first lesson, the surfing instructor had Stephanie lay on her board while it was stationary on the sand and had her pretend to paddle and then push up into the correct standing position for surfing. Identify the coaching activity the instructor used and justify your answer. (3 marks)

Description	Marks
Identifies:–Shaping or Simple to Complex	1
Justification: <ul style="list-style-type: none"> Shaping (Simple to complex) is the process of simplifying a complex skill into its main component. She learns with a stationary board on land then moves into the water. 	1–2
Total	3

- (b) The physics of fluid mechanics can be applied to surfing. Identify and define **two** types of drag that surfboard manufacturers need to consider and how they are applied in the design of a surfboard. (6 marks)

Description	Marks
Identifies any two the following types of drag.	
Identifies Form/Pressure Drag	1
Defines Form/Pressure Drag: – the drag created by a pressure difference between the front and rear of an object moving through fluid	1
Identifies how it applies to the design of surfboards: – the nose of the surfboard is pointed rather than flat or similar words; or fins are used to create maneuverability due to pressure differences on the side of the fins or discusses streamline shape of board	1
Identifies Surface Drag	1
Defines Surface Drag: – the drag created due to a fluid moving over an object resulting in friction between the surface of the body and the fluid.	1
Identifies how it applies to the design of surfboards: – the underside of the surfboard is smooth to allow it to move faster through the water.	1
Identifies Wave Drag	1
Defines Wave Drag: – the drag created by the body at the interface of two fluids interacting whereby waves are created.	1
Identifies how it applies to the design of surfboards: – the surfboard is curved (rocker), volume of board to increase buoyancy.	1
Total	6

- (c) Bernoulli’s Principle can also be applied in the design of surfboards. Define this principle. (1 mark)

Description	Marks
Defines Bernoulli’s principle as: <ul style="list-style-type: none"> An increase in velocity for a fluid moving over an object creates a decrease in pressure and a decrease in velocity of a fluid over an object creates an increase in pressure. or The velocity of a fluid moving over an object is inversely proportional to the pressure on the object. 	1
Total	1

Question 25

(9 marks)

- (a) Cyclists do this to prevent their body from overheating. Explain the body's cooling mechanisms and state why this is an effective strategy. (5 marks)

Description	Marks
Physiological responses: Vasodilation of the blood vessels near the skin surface occurs.	1
The body increases sweating	1
Cooling Mechanisms Vasodilation allows heat to be dissipated via convection	1
Sweating allows heat to be dissipated via evaporation.	1
States why the unzipped jersey is a good strategy: Unzipped jersey increases surface area of skin exposed to the moving air thus allowing greater heat loss from the body.	1
Total	5

- (b) Within the first hour after completing a 100 km stage in the Tour De France, a cyclist eats food to speed up their recovery. Identify the type of nutritional content and its effect for a cyclist consuming the following: (4 marks)

Description	Marks
Two slices of toast/bread with jam:	
Identifies these as high GI carbohydrates	1
Either: An immediate source of glucose for immediate use in the body to avoid depletion of muscle glycogen.	1
or	
Aids in replenishing glycogen stores	
95 gram can of tuna:	
Identifies this as protein	1
Assist in muscle repair	1
Total	4

Question 26

(7 marks)

- (a) Melissa's success as a goalkeeper depended on her rapid detection of the ball and the fast reflexes of her central nervous system (CNS) to produce movements to intercept the ball. Identify the function of the following components of the neuromuscular system that are involved in producing a successful save of goal. (4 marks)

Description	Marks
Dendrite of sensory neurons: Pass information from the sensory receptors to the cell body of the sensory neuron.	1
Axons of motor neurons: Transmit electrical information/signals away from cell body to the muscle fibres.	1
Spinal cord: Transmit electrical messages from the brain to parts of the body.	1
Motor unit: Causes contraction of the associated muscle fibres.	1
Total	4

- (b) Melissa's success as a goalkeeper can also be attributed to the coaching she received as a junior athlete. Her first coach used a checklist to analyse her performance. Identify the **three** steps in the process for a coach using a checklist to assist an athlete to improve. (3 marks)

Description	Marks
Coach identifies the key components/criteria of the performance/skill.	1
Coach observes the athlete and compares their performance (identifies strength and weaknesses) against the key components on the checklist.	1
Coach provides feedback based on the errors observed.	1
Total	3

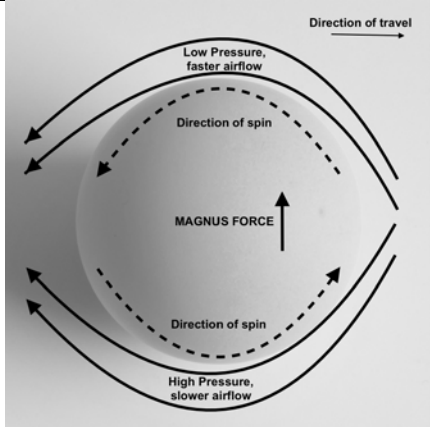
Question 27

(8 marks)

- (a) Identify the flight path of a table tennis ball hit with backspin. (1 mark)

Description	Marks
Identifies flight path: Backspin on a ball causes it to rise higher in the air and travel further.	1
Total	1

- (b) In the space below, draw a fully-labelled diagram that illustrates how backspin affects the ball's flight path. (5 marks)

Description	Marks
 <p>The diagram shows a ball moving to the right, indicated by a solid arrow labeled 'Direction of travel'. The ball is spinning counter-clockwise, indicated by a dashed arrow labeled 'Direction of spin'. On the top side of the ball, the airflow is faster, labeled 'Low Pressure, faster airflow'. On the bottom side, the airflow is slower, labeled 'High Pressure, slower airflow'. An upward-pointing arrow from the center of the ball is labeled 'MAGNUS FORCE'. The overall flight path is shown as a curved arrow that rises above the ball's initial trajectory.</p>	
Diagram correctly includes each of the following elements:	
Direction of travel of ball identified OR lines of airflow identified	1
Direction of spin shows backspin in comparison to direction of travel.	1
Both fast and slow velocity of airflow identified in correct location	1
Both high and low pressure areas identified in correct location	1
Labels 'Magnus Effect' or 'Magnus Force' in correct direction.	1
Total	5

- (c) Identify the flight path of a table tennis ball hit with topspin. (1 mark)

Description	Marks
Topspin causes the ball to drop/dip quickly and travels less distance.	1
Total	1

- (d) Provide a reason why a player would intentionally hit a ball with topspin during a rally. (1 mark)

Description	Marks
Any one of: <ul style="list-style-type: none"> • Greater margin of error – ball can be hit higher over net and will still land on table • Allows ball to be hit with greater velocity yet still land on the table • Topspin allows the ball to bounce off the table at a lower angle • Topspin allows the ball to bounce off the table with greater speed 	1
Total	1

Question 28

(4 marks)

Below is a table that includes key properties for the three types of muscle fibre. Fill in the missing information for the **unshaded** boxes.

<i>Property</i>	Muscle fibre types		
	<i>Type IIb</i>	<i>Type IIa</i>	<i>Type I</i>
Number of mitochondria	<i>Low</i>		
Contractile speed	<i>High/Fast</i>		
Resistance to fatigue		<i>Moderate (moderate/low)</i>	
Force/tension generated			<i>Low</i>

Description	Marks
1 mark for each correct box	
Low, high/fast, moderate(moderate/low), low	1–4
Total	4

Question 29

(6 marks)

Protein powders, anabolic steroids and stimulants are three performance enhancers an AFL player may be encouraged to use. Identify **two** physiological effects for each of these performance enhancers that could have a negative physiological effect on a player's health. Fill in the table below.

Description	Marks
1 mark for each of two negative effects for each category	
Negative effect of protein powder: – <ul style="list-style-type: none"> • May increase the chance of osteoporosis • May increase the chance of colonic cancers • May increase the chance of impaired kidney function • Increase water retention. 	1–2
Negative effect of anabolic steroids: – <ul style="list-style-type: none"> • Reduced sperm count/impotence • High blood pressure • Enlarged prostate • Difficulty urinating • Acne • Increase risk of heart disease/cardiovascular disease/sudden heart attack/death • Hyperinsulinism • Atrophy of the testicles/infertility • Kidney disease/malfunction • Liver disease/liver cancer/liver dysfunction • Risk of stroke • Harmful levels of cholesterol (higher LDL) • Stunted growth in adolescents 	1–2
Negative effect of stimulants: – <ul style="list-style-type: none"> • Highly addictive/dependence • High blood pressure, • Increase chance of stroke, • Increase chance of heart disease/cardiovascular disease/sudden heart attack/death • Increase chance of liver problems. • They can also increase the risk of injury as pain is suppressed. • Restlessness • Insomnia • Ineffective heat regulation and dehydration. 	1–2
Total	6

Question 30

(9 marks)

- (a) Identify **three** physiological adaptations Chelsea would have achieved by living in the altitude house and how they would be of advantage to her performance. (6 marks)

Description	Marks
Any three of the following adaptations: 1 mark for each correct physiological response 1 mark for how the response helps the acclimatised athlete.	
Increased capillarisation increased ability to supply oxygen/increased blood to the muscles	1–2
Increased haemoglobin volume/concentration increases amount of oxygen carried by the blood	1–2
Increased red blood cell/erythrocyte volume/hematocrit more red blood cells to carry oxygen	1–2
Increased aerobic enzymes (e.g. 2,3 DPG) Improves the bodies use of oxygen	1–2
Increased number of mitochondria allows higher intensity aerobic respiration	1–2
Increased myoglobin concentration increases ability to diffuse oxygen across cells or improves transportation of oxygen	1–2
Total	6

- (b) Chelsea swims with a high elbow recovery in comparison to a recreational swimmer, who swims with an almost straight-arm recovery, as can be seen in the picture below. Identify and explain the biomechanical principle that Chelsea applies when swimming with this technique. (3 marks)

Description	Marks
Identifies: Moment of Inertia	1
Explanation: <ul style="list-style-type: none"> • Higher elbow brings the mass closer to the axis of rotation/reducing radius of rotation thus decreasing moment of inertia. • Chelsea can swim with less effort (more efficiently) required to rotate her arm or recovering her arm at a higher velocity. 	1–2
Total	3

Section Three: Extended answer

30% (30 Marks)

Question 31

(15 marks)

- (a) Define transfer of learning and identify **three** possible effects of transfer of learning. In addition identify **one** category of transfer of learning that can be applied to Jarryd's situation and say why. (6 marks)

Description	Marks
Define Transfer of learning: the influence of a person's previous experience from one setting /skill/practice drill to another situation/skill/competition.	1
Possible Effect: Positive transfer of learning as occurring when previous experience of one skill/sport enhances performance of a new skill/sport.	1
Possible Effect: Negative transfer of learning as occurring when previous experience of one skill/sport inhibits or negatively affects performance of a new skill/sport.	1
Possible Effect: Zero transfer of learning as occurring when previous experience from a sport has no influence on a skill or performance in another sport.	1
Identifies: skill to skill as the case for Jarryd	1
Why: skill to skill because of the movement patterns of play are similar as described in the question e.g. tackling, dodging, catching etc.	1
Total	6

- (b) Both Rugby League and American Football have players colliding in the process of tackling. Identify and define Newton's Law of Motion that applies to this situation, and discuss the biomechanical principle of force-time in relation to tackling. (9 marks)

Description	Marks
Students must have the following two points:	
Identifies Newtons 1 st or 2 nd or 3 rd law of motion	1
Defines Newton's 1st law of motion as Law of Inertia- an object will remain in a state of motion unless acted upon by an external force Defines Newton's 2nd law of motion as the change in velocity is proportional to the size of the applied force. or Identifies Newton's 2nd law as Force = mass x acceleration (F=ma) Defines Newton's 3rd law of motion as Law of Equal and Opposite Reactions – every applied force has an equal and opposite force.	1
• Describes impulse as the application of force applied over time	1
• Provides formula Impulse = FxT	1
• States impulse is equal to the change in momentum	1
• Tackler can increase impulse by maximising the time of impact that the force is applied to the player carrying the ball by: - increasing amount of time tackler holds on for.	1-2
• Tackler can increase the impulse by increasing the force applied by either: - increasing velocity of incoming tackler - increase strength/mass by going to gym - incorporate segmental interaction to produce greater force	1-2
Total	9

Question 32

(15 marks)

- (a) Identify the **two** contractile proteins involved in the contraction of skeletal muscle and describe the sliding filament theory of skeletal muscle contraction. (6 marks)

Description	Marks
Identifies actin	1
Identifies myosin	1
Plus any four of the following points:	
• Motor neuron stimulates muscle fibre with neural impulse	1–4
• Calcium released into the sarcomere	
• Presence of Calcium allows myosin to attach to actin	
• Cross bridges are created between myosin and actin	
• Cross bridges pull with a power stroke (oscillates) causing actin to slide over myosin	
• Muscle/sarcomere shortens /H zone and I band decreases	
• When the neural impulse ends, calcium leaves the sarcomere preventing further cross bridges forming	
Total	6

- (b) Define the following biomechanical principles and explain how they are applied to this skill to shoot for goal with maximum velocity:

- segmental interaction
- balance
- force-motion.

(9 marks)

Description	Marks
<p align="center">Segmental Interaction</p> <p>Definition – the transfer of energy/momentum across the joints of the body due to the degree to which the limbs are moved to produced maximum force.</p>	1
<p>Application – any two of:</p> <ul style="list-style-type: none"> • The athlete is effectively using a large number of segments from their legs through core and upper body and limbs • The athlete initiates the flick by first driving with their leg, then shoulder and arms. • The athlete appears to effectively time his movements to progressively build momentum of each segment used. • The athlete needs to have a follow through to prevent deceleration • The athlete needs to have a stable base of support to allow for optimal transfer of momentum between body parts. 	1–2
<p align="center">Force–Motion</p> <p>Definition – An objects motion is affected by the magnitude and direction of external forces acting on it.</p>	1
<p>Application – any two of</p> <ul style="list-style-type: none"> • Magnitude of force – the more force applied the greater acceleration of the ball/equates to $F=ma$/ impulse = $F \times T$ (range of motion)/ momentum gained • Athlete appears to be pushing with maximum effort which would effectively maximise the magnitude of the force applied • Direction of force applied – push is in the direction of target to increase transfer of momentum through the ball • The ball effectively tracks on the stick in the direction of the desired target for an extended period of time 	1–2

Balance	
Definition – the ability of something to maintain or hold its position	1
Application - any two of <ul style="list-style-type: none"> • Base of Support (BOS) – the larger the BOS the greater the degree of balance which allows more effective transfer of momentum to the ball • Height of Centre of Gravity (COG) – the lower the height of COG the greater the balance (and stability) and ability to transfer momentum into the ball • Line of Gravity inside Base of Support – the closer the line of gravity is to middle of the BOS, the greater the balance and ability to transfer momentum through the ball • Athlete has wide and effective BOS as his feet are wide apart • The athlete has a low and effective COG as he is stooped down low as he hits • The COG is always effectively well within BOS as his feet are either side of his hips 	1–2
Total	9

Question 33

(15 marks)

- (a) With reference to specific examples in the training program, explain the principles of periodisation, recovery, peaking and tapering. (9 marks)

Description	Marks
Defines Periodisation: – the breaking up of a training program into blocks of time (with specific objectives or goals) or something similar.	1
Identifies macro cycle as a training year or A micro cycle as one specific week from the program eg. Week 1	1
Referral to Training Program: Identifies training program is broken up into Transition, preparation and competition training phases.	1
Defines Recovery:–Returning an athlete to a state of performance readiness, mentally and physically (or something similar)	1
Referral to Training Program: Identifies a decrease in the number of training/game sessions during the preparation and competition phases eg. weeks 20, 24, 28, 38, 39,	1
Defines Tapering: –The reduction in training volume and duration or increase/maintain intensity in the week/weeks leading up to the event. (Or something similar)	1
Referral to Training Program: weeks 29 & 30 or 38 & 39 reduced number of training and games sessions, or Decrease in % of time spent on fitness work for weeks 31 & 32 for finals preparation in WA Premier League, or Decrease in workload (reduction in time/fitness as well number of training and games) during weeks 50-52 for finals of Nationals.	1
Defines Peaking: – the final outcome to tapering the athlete is in full physical condition so they can compete at their best. (or something similar)	1
Referral to Training Program: identifies the increase and decrease in workload (training wave) throughout the year makes sure the athlete's body is fully trained and at peak condition for the finals of the WA Premier League and National competition. or Identifies any tapering examples to ensure peaking.	1
Total	9

- (b) With reference to the graphs, identify and outline the biomechanical principle illustrated and state which athlete throws the ball with the greater velocity. Identify **two** aspects of the athlete's throwing technique that could account for the faster throw. (6 marks)

Description	Marks
Identifies: - Impulse or force-time as biomechanical principle	1
Outlines Impulse:–as the application of a force on an object over a period of time. (or provides the equation – Impulse = $F \times T$) or Refers to impulse being the total shaded area under the graph.	1
Names Sarah as athlete who throws the ball fastest	1
States Sarah throws ball fastest because greater impulse (force is applied over longer period of time) or States bigger shaded area under graph.	1
Provides any two of the following valid reasons for faster velocity throw <ul style="list-style-type: none"> • Sarah has greater Range of Motion • Sarah follows the principle of segmental interaction • Sarah has a later release point • Sarah has greater follow through 	1–2
Total	6

Question 34

(15 marks)

- (a) In regard to sports psychology identify what the team was lacking. Define and apply **four** factors that the coach could focus on to remove the division between the players.

(9 marks)

Description	Marks
Identifies team lacking Group Cohesion	1
Defines Environmental Factors: – as factors binding members to a team such as contracts, location, age, eligibility, provided opportunities for socializing	1
Suggests the coach could: – review contracts to have clauses about not professional expectations. or Provide social opportunities for players to learn acceptable social conduct.	1
Defines Personal Factors: – as individual characteristics of team members e.g. motives for participating-task motivation–affiliation motivation. Self-motivation–develop ownership feelings and social groupings	1
Suggests the coach could: – review preseason to include a training camp with the divided groups split up into smaller groups so that they socialize more with each other improving social cohesion. or Increase task motivation by focusing on teaching the professionalism required to win a premiership.	1
Defines Leadership Factors: – as the style of leadership and the relationships developed e.g. the leaders and coaches' behavior– leadership styles influence different individuals in the development of group cohesion. Coach – team relationship, Coach – athlete relationship	1
Suggests the coach could: – review his own personal style of leadership as well as the leadership of the captain and other senior players. Instigate a leadership course to be developed to enhance the coach's leadership as well as the leadership of the senior players.	1
Defines Team Factors: – as factors relating to the group e.g. – creation of team short and long-term goals, team identity, team members ability and roles, rewarding of individual and team efforts, team stability – how long the team has been together, 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
Suggests the coach could:–review the team's goals with the players, try and have a consistent team playing each week meaning the team is more stable.	1
Total	9

NOTE:

Suggestions for what the coach can do must relate to social values and professional behaviour to reduce players going out and partying to excess.

- (b) An effective coach at an elite level will be able to change their leadership style to suit different situations. Define **three** types of leadership and include a situation to which each leadership style is most suited. (6 marks)

Description	Marks
Style – Authoritarian/Autocratic, where the coach makes all the decisions and the athletes merely do what they are told, they are strong disciplinarians.	1
Situation – any one of the following examples: <ul style="list-style-type: none"> • Safety is an issue or dangerous skills need to be taught • When time is limited and direction is required immediately • During the preseason when the coach wants to make sure athletes meeting fitness goals. • During the preseason when the coach wants to mark his authority. • or similar valid justification 	1
Style – Democratic, where the coach involves the athletes in shared decision-making. This coach will guide performers towards selecting and achieving their goals.	1
Situation – any one of the following examples: <ul style="list-style-type: none"> • Inviting experienced players to give direct input into direction of team • When there is plenty of time to allow for decisions or planning direction of training • Can be used during the competition season as they can incorporate the team in decision-making • or similar valid justification 	1
Style – Laissez-Faire/casual—where the coach makes very few decisions, there are little organised attempts to influence or teach.	1
Situation – any one of the following examples: <ul style="list-style-type: none"> • Giving experienced players opportunity for creativity • Allowing players to work out strategies and patterns of play. • Used during the preseason to see who steps up and demonstrates leadership • or similar valid justification 	1
Total	6

ACKNOWLEDGEMENTS

Question 23

Image: NHL Enterprises. (n. d.). *Walker trying to become first Australian in NHL*. Retrieved May, 2016, from www.russianmachineneverbreaks.com/tag/nathan-walker/page/2/

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