



PHYSICAL EDUCATION STUDIES

ATAR course examination 2020

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.

Section One: Multiple-choice

20% (20 Marks)

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

Section Two: Short answer

50% (58 Marks)

Question 21

(6 marks)

- (a) Explain a physiological benefit to Novak of using this chamber as a recovery strategy. (3 marks)

Description	Marks
Identifies that the chamber increases the amount of O ₂ in blood/body	1
Identifies more O ₂ being breathed in means more O ₂ delivered to muscles	1
Identifies an increase in recovery rate of the muscles or Identifies a decrease in muscle inflammation or Identifies increase ability for removal of waste products.	1
Total	3

- (b) Novak is renowned for using a performance routine of bouncing the tennis ball a number of times before he serves to his opponent. Outline another mental skill strategy he could use during his matches, identifying the benefit of using the strategy and provide an example of how Novak would apply this during a match. (3 marks)

Description	Marks
Outlines the mental skill strategy in general terms	1
Identifies the benefit	1
Provides an example of Novak using the strategy	1
Total	3
<p>Answers could include: Mental skill strategies:</p> <ul style="list-style-type: none"> • self-talk • relaxation • goal setting • imagery/visualisation. <p>Example: Self-talk is when an athlete talks to themselves in their head or out loud. The benefits are to increase confidence/motivation/focus/concentration. Novak would say to himself, 'Come on!' after he hits a winning shot in a rally.</p>	

Question 22

(10 marks)

(a) What is the predominant muscle fibre type Eliud would have in his legs? (1 mark)

Description	Marks
Names Type 1 as muscle fibre type or slow twitch	1
Total	1

(b) Outline **two** characteristics of the muscle fibre type to support your answer in part (a). (4 marks)

Description	Marks
Two marks for each characteristic	
Identifies the characteristic	1
Outlines how the characteristic helps a marathon runner	1
Subtotal	2
Total	4
Answers could include: Characteristics (outline): <ul style="list-style-type: none"> • increase capillary density (helps transfer more oxygen to the muscles to meet energy demands/produce more ATP) • fatigue resistant (helps a marathon runner run continuously for the race and prevents them from tiring too quickly) • increased mitochondria (greater use of oxygen to produce more ATP) • increased myoglobin (allows more oxygen to be stored in muscles to be used to produce more ATP) • increased aerobic enzymes (this means more energy will be supplied to the athlete) • high oxidative capacity (increase aerobic ATP production/greater oxygen diffusion to working muscles) • uses aerobic energy system (increase ATP production allows the athlete to continually run) • low force production/contractions (allows muscles to contract repeatedly for continuous activity). Accept other relevant answers.	

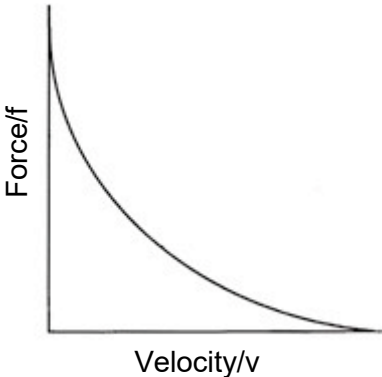
(c) Name and explain the biomechanical principle behind having foam in the sole of running shoes and identify the benefit to a runner. (5 marks)

Description	Marks
Names the biomechanical principle as Force-Time (Impulse)	1
Biomechanical principle	
Explains the principle referring to one of the following: <ul style="list-style-type: none"> • impulse is a measure of force applied over time or • identifies the equation for impulse (Force x Time) or • identifies impulse is the change in momentum. 	1
<ul style="list-style-type: none"> • foam increases the time the force is applied by the foot (1 mark) • cushions/absorbs impact forces/decreases peak force (1 mark) 	1-2
Subtotal	3
Identifies the benefit to a runner is to prevent injury	1
Total	5
Accept other relevant answers.	

Question 23

(5 marks)

In the space provided draw a graph of the force – velocity relationship for muscle contraction and explain how Dylan applied this relationship to his power lifting events. (5 marks)

Description	Marks
<p>Graph</p> 	
Correct labels	1
Correct curved line	1
Subtotal	2
Explanation of force	
<p>Explains the force – velocity relationship referring to the following:</p> <ul style="list-style-type: none"> • Dylan wants to produce maximum force for his lifts • he needs to contract his muscles slowly • this allows time for the sarcomere/muscle to form maximum number of cross bridges. 	1–3
Subtotal	3
Total	5

Question 24

(12 marks)

- (a) From among the three events, for which one could Emma use altitude training to enhance her performance. Justify your answer. (5 marks)

Description	Marks
Event	
800m	1
Justification	
Justification should include: <ul style="list-style-type: none"> • identifies the 800 m event uses aerobic energy system (1 mark) • states athlete gains adaptations due to not getting enough O₂ into her body or hypoxic conditions or lower air pressure (1 mark) • identifies how the body has physiological adaptations occur due to altitude training such as increase in; <ul style="list-style-type: none"> ◦ red blood cell count / erythrocyte count ◦ blood viscosity ◦ EPO ◦ capillary density around muscles ◦ haemoglobin volume/concentration ◦ aerobic enzymes ◦ mitochondria ◦ myoglobin (1 mark) • how the physiological adaptations allow the athlete to enhance performance. (1 mark) 	1-4
Subtotal	4
Total	5
Accept other relevant answers.	

- (b) Describe the predominant leadership style Alex Parnov would use as the coach of these elite Australian athletes and provide a reason why he would use this style. (3 marks)

Description	Marks
Democratic leadership style (1 mark) is where the coach involves the athletes in the decision making. (1 mark)	1-2
Reason could be: <ul style="list-style-type: none"> • these athletes are experienced and have excellent knowledge of the sport so they can provide input themselves • these athletes are elite so are intrinsically motivated • pole vault is an individual sport, so the coach has lots of one on one time with the athlete. 	1
Total	3
Accept other relevant answers.	

- (c) Describe **two** methods Alex Parnov would use during a training session for pole vaulting to analyse Emma Philippe's movement skills to identify errors and provide corrections to improve her performance. (4 marks)

Description	Marks
Any two of the following	
Video analysis: <ul style="list-style-type: none"> • where the coach films Emma doing her jump then shows her the footage to identify errors or Coach feedback: <ul style="list-style-type: none"> • when the coach verbally explains key aspects, she did well in the jump and tells her areas to focus on for her next jump to improve or Checklist: <ul style="list-style-type: none"> • when the coach rates performance against a set criteria to establish areas of strength and weaknesses or Peer/mentor feedback: <ul style="list-style-type: none"> • Alex organised an expert coach/mentor/peer to come in and provide feedback to Emma. 	1-2
Subtotal	2
Total	4

Question 25

(8 marks)

- (a) Identify the class of lever used in the image below. (1 mark)

Description	Marks
Third/3 rd class	1
Total	1

- (b) Using the labels in the image, identify the components of the lever. (3 marks)

Description	Marks
Force = B	1
Axis = A	1
Resistance = C	1
Total	3

- (c) Define 'wave drag' and provide **two** features of the stand-up paddle board that would reduce wave drag. (4 marks)

Description	Marks
Definition	
Defines 'wave drag' <ul style="list-style-type: none"> • wave drag occurs where water and air meet • when a body moves through the water it causes waves to be generated causing resistance to movement. 	1-2
Subtotal	2
Any two of the following	
Provides features of the stand-up paddle board that would reduce wave drag as: <ul style="list-style-type: none"> • curved shape of the board raises the front/nose out of the water (side-view) • the nose/front of board reduces waves due to its streamline shape • the board has high buoyancy. 	1-2
Subtotal	2
Total	4

Question 26

(8 marks)

- (a) Define 'transfer of learning' and describe why Olivia was successful switching from gymnastics to becoming a Ninja Warrior by applying transfer of learning. (4 marks)

Description	Marks
Definition of 'transfer of learning'	
<ul style="list-style-type: none"> Defines 'transfer of learning' as the influence of past experiences on the learning/performance of new experience/skills. (2 marks) Defines 'transfer of learning' as the use of previously acquired skills in the learning of a new skill. (1 mark) 	1-2
Subtotal	2
Describes why Olivia was successful switching from gymnastics to becoming a Ninja Warrior by applying transfer of learning	
<ul style="list-style-type: none"> identifies positive transfer of learning would be occurring with Olivia provides an example of how gymnastics transfers to Ninja Warrior. E.g. balance, strength, coordination, timing, jumping, swinging, grip strength etc. 	1-2
Subtotal	2
Total	4
Accept other relevant answers.	

- (b) Define the 'All or None' principle and describe its relevance to Olivia producing maximum force in her muscles. (4 marks)


Description	Marks
Definition of 'All or None'	
<ul style="list-style-type: none"> when a motor unit receives stimulation/impulses/action potential to threshold all the muscle fibres associated with that motor unit will contract to their maximum level (all at the same time). 	1-2
Subtotal	2
Any two of the following relevant to producing maximum force	
<ul style="list-style-type: none"> more/greater number of motor units are used activating larger motor units recruits appropriate muscle Type II. 	1-2
Subtotal	2
Total	4
Accept other relevant answers.	

Question 27

(9 marks)

- (a) The following image shows flight path for Hannah’s tee shot. On **Ball X** draw the direction of the spin of the ball and in the space below explain why the ball’s flight path curves.

(5 marks)

Description	Marks
Correct spin drawn 	1
Explains the ball’s curved flight path	
<ul style="list-style-type: none"> hit off centre/eccentric force 	1
<ul style="list-style-type: none"> low-pressure area occurs where airflow of spin (boundary layer) goes in the same direction as oncoming air/high velocity high-pressure area occurs where airflow of spin (boundary layer) goes against direction of oncoming air/low velocity air/object moves from area of high pressure to area of low pressure or lift/magnus force is created from air moving from area of high pressure to area of low pressure. 	1–3
Subtotal	4
Total	5
Accept other relevant answers.	

- (b) Explain why golf balls with dimples travel further than smooth golf balls.

(4 marks)

Description	Marks
Explanation includes: <ul style="list-style-type: none"> smooth balls have laminar flow moving over the ball laminar flow separates early from ball causing greater pressure differential/larger low-pressure system behind the ball increasing drag dimpled ball has turbulent flow moving over the ball turbulent flow separates later from ball causing smaller pressure differential/smaller low-pressure system behind the ball decreasing drag. 	1–4
Total	4
Accept other relevant answers.	

Section Three: Extended answer

30% (30 Marks)

Question 28

(15 marks)

Analyse Kelsey’s javelin throw in relation to the following biomechanical principles:

- Bernoulli’s principle
- optimal projection
- segmental interaction.

Description	Marks
1 mark for each dot point identified (Answer must have minimum of 3 dot points for each section)	
<p>Bernoulli principle</p> <ul style="list-style-type: none"> • provides a definition: <i>‘Bernoulli’s Principle relates to the pressure created from a moving fluid over an object. Whereby fast flowing fluid produces a low pressure area and slow moving fluid produces a high pressure area.’</i> • javelin is thrown on a tilt/angle of attack which creates pressure differential • air flow below the javelin creates low velocity and high pressure • air flow over/above the javelin creates fast velocity and low pressure • a lift force is created with the air/object moving from high to low pressure. 	1–15
<p>Optimal projection</p> <ul style="list-style-type: none"> • provides a definition: <i>‘Optimal projection is the relationship between the angle, velocity and height of release/landing height to attain the goal of the athlete. E.g. distance, goal in basketball/netball.’</i> • velocity of release is dependent on the force applied or greatest velocity is achieved with maximum force • Kelsey can run with more velocity to transfer this to her throw or increase the force she applies to the throw • height of release, if released too low, decrease in distance or increasing release height the flight time is greater = longer distance • Kelsey can optimise the height of release by releasing the javelin at her highest point • angle of release considers the vertical and horizontal trajectories • Kelsey should throw the javelin at approximately 35–45° to ensure greatest distance is achieved. 	
<p>Segmental interaction</p> <ul style="list-style-type: none"> • provides a definition: <i>‘Forces acting between the segments of a body can transfer energy between segments. OR How body segments interact to meet demands.’</i> • <i>Sequential movement so body parts transfer momentum</i> • timing of body part movements/kinematic chain • sequentially accelerate each body part so that optimal momentum passes from one body part to the next one • size of body parts moved are from largest to smallest • moves from the slowest to the fastest body parts • maximising the number of body parts used in action • stabilise each body part before the next body part moves • follow through to prevent deceleration • ensure all forces are directed towards the direction Kelsey is throwing • Kelsey applies these factors to her throw by using a run up and transfers the force from her: legs→ hips→ torso→ shoulder→ arm→ wrist. 	
Total	15
Accept other relevant answers.	

Question 29

(15 marks)

Analyse the effectiveness of each training program with reference to the following concepts:

- periodisation
- tapering
- recovery.

Description	Marks
Periodisation	
<p>One of the following:</p> <ul style="list-style-type: none"> • periodisation is the design of a training program that involves specific training phases based upon increasing and decreasing (varying) volume or frequency or intensity • training programs are designed in phases; micro and macro cycles and pre-season, in-season or off-season • relationship between periodisation and the prevention of overtraining • relationship between micro or macro cycles in achieving short- or long-term goals • relationships between periodisation and achieving peak condition at the optimal time <p>and Mihar’s program effectiveness (1–2 marks):</p> <ul style="list-style-type: none"> • applied appropriate micro and macro cycles within his program • provides specific example from the program <p>and Jamieson’s program effectiveness (1–2 marks):</p> <ul style="list-style-type: none"> • program contains incorrect/inappropriate use of microcycles • provides specific example from the program. 	1–5
Tapering	
<p>One of the following:</p> <ul style="list-style-type: none"> • tapering should ensure the athlete is recovered fully and injury free by reducing the volume and increasing the intensity at the appropriate times during the program • tapering leads to athletes peaking with their body in optimal condition to perform <p>and Mihar’s program effectiveness (1–2 marks):</p> <ul style="list-style-type: none"> • applied appropriate tapering by reducing his volume • provides specific example from the program – week 10 <p>and Jamieson’s program effectiveness (1–2 marks):</p> <ul style="list-style-type: none"> • has applied tapering ineffectively • provides specific example from the program – week 10. 	1–5
Recovery	
<p>One of the following:</p> <ul style="list-style-type: none"> • recovery in a training program is important because it allows the body time to adapt to the stress of training or replenish energy stores or repairs damaged tissues • allows athlete to return to training sooner with better quality compared to no recovery practices implemented • recovery is applied in a training program by decreasing volume • relationship between use of recovery in the prevention of overtraining <p>and Mihar’s program effectiveness (1–2 marks):</p> <ul style="list-style-type: none"> • utilises appropriate recovery sessions throughout his program • provides specific example from the program <p>and Jamieson’s program effectiveness (1–2 marks):</p> <ul style="list-style-type: none"> • identifies he has overtrained due to no recovery sessions or does not allow for adaptations to occur due to no recovery days • provides specific example from the program – week 1-9 block period. 	1–5
Total	15

Question 30

(15 marks)

Discuss the nutritional strategies Kurt would have employed pre-competition (training period and prior to race), during and after a marathon event that allowed him to perform at his best and assist in his post-race recovery.

Description	Marks
1 mark for each dot point identified with reasons why (Answer must have minimum of 3 dot points for each section)	
<p>Pre-competition (training period and prior to race)</p> <ul style="list-style-type: none"> • increased amount of carbohydrates as it is the primary fuel source during exercise • balanced diet – increase in percentage of carbohydrates and proteins and reducing fats • increase protein intake/high protein foods/meals to assist in muscle growth and repair during high training periods • low GI foods/meals to fuel high training periods, release glucose slowly into blood stream (prior to training) • during training ensure hydration • high GI food/meals during training as it releases energy into the bloodstream for immediate use/delays the use of stored glycogen • carbohydrate loading – the stocking up of glycogen prior to exercise to ensure enough carb stores for the body to use in the production of energy 24–48 hrs before event • 10–12 g carbohydrates per kg of body mass to carbohydrate load effectively • medium – low GI carbohydrate foods 2–4 hours – glucose released into the blood stream during the event to delay the use of the stored glycogen stores of the muscle • immediately before event – high GI foods/low fibre snack to top up blood glucose • avoid high fibre/fat/proteins foods prior to event • hydrate prior to event/hyper hydration. 	1–15
<p>During event</p> <ul style="list-style-type: none"> • carbohydrates are the primary energy source • consume 30–60g carbohydrate per hour to prevent muscle fatigue • high GI snacks/food during – i.e. gel, sports drinks, energy chews, easily digested and absorbed quickly, resulting in a rapid release of glucose for immediate energy source or use / delays use of stored glycogen stores • use electrolyte drinks to replace minerals/salts lost during event • fluid replacement (water) – to replenish water lost by sweating (carbohydration) • fluid replacement/maintain hydration 200–300 ml every 15–20 mins • carbohydration/use of sports drinks as it contains carbohydrate and water • avoid high fibre/fats foods because they are hard to digest and may cause stomach upsets 	
<p>After race</p> <ul style="list-style-type: none"> • immediately consume carbohydrates as this is the primary energy source for energy production during exercise, within 30 mins • high GI food/meal – aids in recovery of the athlete as it gives an immediate source of energy. Therefore, allows the body to use the immediate source of energy to continue working and start the recovery process. • low GI food/meal – replenishes loss glycogen. Restocks the glycogen stores in the muscle and liver, 4–6 hours after finishing • protein meal/snack ~20–25 g to aid in the repair of muscle tissue, 4–6 hours after finishing • fluid replacement (water) – to replenish water lost by sweating and from the use in the aerobic energy system to rehydrate. 	
Total	15

Question 31

(15 marks)

- (a) Explain how the other factors of Carron's model would apply to the players representing Australia in table tennis at the Olympics. (9 marks)

Description	Marks
Environmental: <ul style="list-style-type: none"> • eligibility to represent Australia • opportunities for socialising (team training camps and social events) • selection process, e.g. best players in Australia • code of conduct contract – signed by each player to adhere to expectations of representing Australia • pride in representing Australia. 	1–3
Leadership: <ul style="list-style-type: none"> • mutual respect/positive relationships between athletes and leadership • leadership style meets need of the Australian team/players • high-level communication skills between the athletes and leadership • the Australian Olympic team would have a formal leadership group (captain and leadership group) that represents the playing group. 	1–3
Team: <ul style="list-style-type: none"> • collective identity players understand what it means or takes to represent Australia • desire for team success (goals or aims) • expected behaviours (norms or standards) • use of team roles to complement each other, e.g. responsible for the equipment • stability of players being a part of the team for a number of years. 	1–3
Total	9
Accept other relevant answers.	

- (b) Identify **three** types of spin a player could place on the ball during a rally and give a reason why the player would choose to use each type of spin. (6 marks)

Description	Marks
Any three of the following types of spin	
Identifies: Topspin and one of the following: <ul style="list-style-type: none"> • causes the ball to drop/dip and travel shorter in flight which allows for greater margin of error or <ul style="list-style-type: none"> • as the ball bounces, it skids off the table reducing the opponent's time to return the shot or <ul style="list-style-type: none"> • ball can be hit with more velocity impacting on opponent's time to return the shot. 	1-2
Identifies: Backspin and <ul style="list-style-type: none"> • causes the ball to rise higher in the air and travel further and used to keep the ball in play if the player needs to stay in the rally/gives player time to get back into position. 	1-2
Identifies: Sidespin and <ul style="list-style-type: none"> • causes the ball to curve to the left or right depending on what side of the ball spin is imparted and used to curve the ball away from the opponent's reach. 	1-2
Total	6

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