



# **PHYSICAL EDUCATION STUDIES**

## **ATAR course examination 2022**

### **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	c
3	d
4	b
5	a
6	b
7	d
8	c
9	c
10	b
11	b
12	a
13	d
14	b
15	c
16	a
17	b
18	d
19	c
20	d

Section Two: Short answer

50% (56 Marks)

Question 21

(8 marks)

- (a) Complete the diagram below by describing each stage of the qualitative analysis process the teacher would use to improve a student's technique in throwing a ball.

Description	Marks
For each stage of the process (4 x 2 marks)	
Describes the stage of the process the teacher would use to improve a student's technique related to throwing a ball.	2
Outlines the stage of the process the teacher would use to improve a student's ball-throwing technique.	1
<b>Total</b>	<b>8</b>
<p>Answers could include:</p> <pre> graph TD     S1[Step One: • The teacher establishes the pre-requisite knowledge of the skill. • Teaching cues of throwing a ball are noted or teacher creates a checklist of the teaching cues for throwing a ball.] --&gt; S2[Step Two: • Teacher decides how to analyse their student's ball-throwing technique. • Teacher decides how many times, from what angles, direct or indirect (video) observation and under what conditions.]     S2 --&gt; S3[Step Three: • Teacher identifies student strengths and weaknesses. • Teacher identifies methods to improve/correct weaknesses.]     S3 --&gt; S4[Step Four: • Teacher provides feedback to student on skill. • Teacher introduces new drills to improve their throwing technique.]     S4 --&gt; S1                     </pre>	

## Question 22

(9 marks)

- (a) (i) Identify the predominant leadership style Batch used in this situation. (1 mark)

Description	Marks
Identifies Authoritarian/Autocratic.	1
<b>Total</b>	<b>1</b>

- (ii) Outline **three** advantages and **one** disadvantage that the above leadership style can have on a team or athletes. (4 marks)

Description	Marks
<b>Any three of the following advantages</b>	
<ul style="list-style-type: none"> <li>• when there is a lack of time (need for quick decisions) so coach makes the choice</li> <li>• athlete/team is at risk or there is a need for safety</li> <li>• coach needs to implement strict guidelines due to undisciplined/misbehaviour of athlete/team/reduces conflict</li> <li>• when a high-pressure situation or performance outcome is major, the coach can assume responsibility for the decision made</li> <li>• used with beginners as coach is highly knowledgeable so can teach athletes/team</li> <li>• when athletes/team are inspired by external/extrinsic motivation.</li> </ul>	1–3
<b>Subtotal</b>	<b>3</b>
<b>Any one of the following disadvantages</b>	
<ul style="list-style-type: none"> <li>• athlete/team don't have a say in decisions so feel undervalued</li> <li>• coaching style may intimidate less confident players</li> <li>• does not allow athletes to have input or show innovation</li> <li>• can breed resentment/lack of enjoyment in athletes as they feel the coach is bossy and controlling.</li> </ul>	1
<b>Subtotal</b>	<b>1</b>
<b>Total</b>	<b>4</b>
Accept other relevant answers.	

- (b) (i) Define the term 'social loafing' and provide an example. (2 marks)

Description	Marks
<b>Definition</b>	
Social loafing is the tendency of individuals in a team to lessen/reduce their effort.	1
<b>Subtotal</b>	<b>1</b>
<b>Any one of the following examples</b>	
<ul style="list-style-type: none"> <li>• the athlete perceives other athletes to be working at a lower intensity which in turn gives them an excuse to put in less effort themselves</li> <li>• the athlete believes their effort won't make a difference to the team and will have little if any effect on the outcome/the desired outcome will still be reached</li> <li>• the athlete avoids the hard work and assumes no one will notice in a large group – easier to hide in the pack.</li> </ul>	1
<b>Subtotal</b>	<b>1</b>
<b>Total</b>	<b>2</b>
Accept other relevant answers.	

- (ii) Outline **two** strategies Batch could use to restore the Kookaburras' group cohesion. (2 marks)

Description	Marks
<b>Any two of the following</b>	
<ul style="list-style-type: none"> <li>• encouraging social interaction away from hockey</li> <li>• debrief/discuss the decision he made so players are aware of why he pulled the goalkeeper and selected the five players he did to do the shoot out</li> <li>• resolve the issue/conflict by allowing players to ask questions about the decisions he made</li> <li>• maintain open and honest communication moving forward</li> <li>• do team building activities to restore the connection between the players and/or coaching staff</li> <li>• develop trust and respect within the group by taking full ownership of his decisions and take on players' feedback for next time</li> <li>• set individual/team goals to enhance performance</li> <li>• change up the informal/formal roles within the group/change leadership style to democratic.</li> </ul>	1–2
<b>Total</b>	<b>2</b>
Accept other relevant answers.	

Question 23

(9 marks)

- (a) Identify the parts of the lever labelled: (2 marks)

Description	Marks
X: force/effort	1
Y: resistance/load	1
<b>Total</b>	<b>1</b>

- (b) Describe why a second-class lever system has a high mechanical advantage. (2 marks)

Description	Marks
Force/effort arm is longer than resistance arm/it has a short resistance arm.	1
Allows a heavy load to be lifted more efficiently/easily or less force required to move the load.	1
<b>Total</b>	<b>2</b>
Accept other relevant answers.	

- (c) Brooke’s coach often uses a tablet device to record her jumps during training and competition. Outline **five** benefits of using video analysis. (5 marks)

Description	Marks
Any five of the following	
<ul style="list-style-type: none"> <li>• the performance of Brooke/athlete can be compared side by side against an exemplar</li> <li>• the coach can replay the video footage many times in case anything was missed on the first viewing</li> <li>• track progress – the footage can be stored and referred to to measure improvement</li> <li>• the coach can use visual feedback to support their written and verbal feedback</li> <li>• Brooke/athlete can view their performance during training and make corrections immediately</li> <li>• Brooke/athlete can be more involved in detecting and correcting their own errors</li> <li>• video can be zoomed in to pick up on greater detail</li> <li>• video can be slowed down frame by frame making it easier to notice errors</li> <li>• more than one athlete can be filmed in the one shot making the process more efficient</li> <li>• Brooke/athlete learns faster because they can be shown where they need to improve</li> <li>• coach can see and correct injury prone behaviours, teaching new techniques to correct bad habits</li> <li>• is a form of visual feedback for the athlete</li> <li>• easier to use an observational checklist.</li> </ul>	1–5
<b>Total</b>	<b>5</b>
Accept other relevant answers.	

## Question 24

(5 marks)

(a) Define 'coefficient of restitution'.

(2 marks)

Description	Marks
Any two of the following	
<ul style="list-style-type: none"> <li>• the measure of elasticity/bounciness of a ball</li> <li>• the ratio of relative velocity (or height) after impact to the relative velocity (or height) before the collision</li> <li>• the measure of conservation of momentum/energy</li> <li>• a number which indicates how much kinetic energy remains after the collision of two objects</li> <li>• the measure between zero and one with zero being inelastic and one being perfectly elastic.</li> </ul>	1 – 2
<b>Total</b>	<b>2</b>

(b) Define what shaping is and outline how it differs from chaining.

(3 marks)

Description	Marks
Shaping is the performance of a (whole/incomplete) skill but in a simplified/modified version.	1
Complexity/difficulty is increased (through modified conditions).	1
Chaining is the breaking down of a skill into its components.	1
<b>Total</b>	<b>3</b>

## Question 25

(9 marks)

Complete the table by matching each food to the most appropriate time that it should be ingested. Justify your selection.

Description		Marks
Correct matches		
1 to 2 hours before competition → salad sandwich		1
During competition → gel shot		1
Shortly after competition → chocolate flavoured milk		1
<b>Subtotal</b>		<b>3</b>
Justification of selection (3 x 2 marks)		
Justifies a relevant and valid feature of the food and links it to the nutritional need of the athlete at that time.		2
Outlines a relevant and valid feature of the food or outlines the nutritional need of the athlete at that time.		1
<b>Subtotal</b>		<b>6</b>
<b>Total</b>		<b>9</b>
Answers could include:		
1 to 2 hours before competition	Salad sandwich	Low GI which releases glucose slowly into the blood stream to be used during the race/competition/event and delays the use of stored glycogen.
During competition	Gel shot	High GI and is easily digested and absorbed quickly, resulting in a rapid release of glucose into the bloodstream for immediate use/delays the use of stored glycogen.
Shortly after competition	Chocolate milk	High GI and gives an immediate increase in glucose and therefore allows the body to use it immediately to start the recovery process (replenish glycogen stores). or Milk contains protein which aids in the repair of muscle tissue.
Accept other relevant answers.		



## Question 26

(7 marks)

- (a) Identify which gear set requires the least effort to ride with. (1 mark)

Description	Marks
Identifies Gear set A.	1
<b>Total</b>	<b>1</b>

- (b) Identify and explain the biomechanical principle that justifies your choice of gear set. (3 marks)

Description	Marks
Identifies torque	1
Torque = Force x perpendicular distance from axis or description of torque or Turning effect created by force being applied around a pivot or axis	1
Large gear/gear set A has greater radius (force/moment arm) therefore less effort required (than small gear/gear set B).	1
<b>Total</b>	<b>3</b>

- (c) Cyclists need to have good balance. Define this biomechanical principle and outline the key factor someone learning to ride needs to consider to avoid falling over. (3 marks)

Description	Marks
<b>Definition</b>	
Balance is the ability to remain steady or stable or upright.	1
Gained by achieving an even equilibrium/distribution of forces (weight) around the base of support.	1
<b>Subtotal</b>	<b>2</b>
<b>Key factor – any one of the following</b>	
<ul style="list-style-type: none"> <li>• cyclist line of gravity needs to be close to the centre of the base of support</li> <li>• increased points of contact on the ground e.g. training wheels.</li> </ul>	1
<b>Subtotal</b>	<b>1</b>
<b>Total</b>	<b>3</b>

Question 27

(9 marks)

- (a) Outline **five** key factors of segmental interaction that influence a bowler’s ability to bowl a fast delivery. (5 marks)

Description	Marks
Any five of the following	
<ul style="list-style-type: none"> <li>• the bowler uses as many body segments as possible</li> <li>• the bowler needs to have a stable base of support to allow for optimal transfer of momentum between body parts</li> <li>• the bowler commences bowling action with larger body parts first and moving through to smallest last</li> <li>• the bowler effectively times their movements to progressively build momentum of each body segment used i.e. each body part being at peak velocity</li> <li>• the athlete has a follow through to prevent deceleration of ball</li> <li>• directing all forces towards the target.</li> </ul>	1 – 5
<b>Total</b>	<b>5</b>

- (b) Describe the relative flight path and bounce of a delivery with top spin and one with back spin. (4 marks)

Description	Marks
<b>Describes top spin</b>	
Delivery will have a flight path that sees the ball dip early.	1
Ball will bounce low/kick off the ground.	1
<b>Subtotal</b>	<b>2</b>
<b>Describes back spin</b>	
Delivery will have a flight path that sees the ball hold in air longer.	1
Ball will bounce/sit up/high on landing.	1
<b>Subtotal</b>	<b>2</b>
<b>Total</b>	<b>4</b>

## Section Three: Extended answer

30% (30 Marks)

## Question 28

(15 marks)

- (a) Describe the characteristics of each part of the Diamonds' training program and identify an objective Lisa may have had. (9 marks)

Description	Marks
For each part of the training program (3 x 2 marks)	
Describes the characteristics of the part of the Diamonds' training program.	2
Outlines the characteristics of the part of the Diamonds' training program.	1
<b>Subtotal</b>	<b>6</b>
For each part of the training program (3 x 1 mark)	
Identifies an objective.	1
<b>Subtotal</b>	<b>3</b>
<b>Total</b>	<b>9</b>
<p>Answers could include:</p> <p><b>Pre-season</b></p> <ul style="list-style-type: none"> <li>• Characteristics that may be described (any two of the following): <ul style="list-style-type: none"> <li>▪ improve aerobic conditioning with high volume/low-medium intensity</li> <li>▪ general fitness to skill-based activities</li> <li>▪ methods of training e.g. continuous, fartlek, long-interval</li> <li>▪ principles of training e.g. progressive overload.</li> </ul> </li> <li>• Objective of pre-season is to focus on improving aerobic conditioning to prepare athletes for the physical demands of the upcoming season so they can play out games without fatiguing and helps to prevent injury.</li> </ul> <p><b>In-season</b></p> <ul style="list-style-type: none"> <li>• Characteristics that may be described (any two of the following): <ul style="list-style-type: none"> <li>▪ maintain fitness levels through low-medium volume/high intensity</li> <li>▪ methods of training e.g. refining strategies, tactics and game plans</li> <li>▪ principles of training e.g. maintenance, peaking, recovery, taper (at the right time).</li> </ul> </li> <li>• Objective of in-season is to ensure that every player is performing optimally for competitions.</li> </ul> <p><b>Off-season</b></p> <ul style="list-style-type: none"> <li>• Characteristics that may be described (any two of the following): <ul style="list-style-type: none"> <li>▪ Maintain aerobic fitness through low-medium volume/low-medium intensity</li> <li>▪ methods of training e.g. cross training, continuous training</li> <li>▪ principles of training e.g. focus on recovery/rehabilitation (possible surgery)</li> <li>▪ specific programs for weaknesses.</li> </ul> </li> <li>• Objective of off-season is to provide the athlete with a rest from the rigors of competition and training.</li> </ul> <p>Accept other relevant answers.</p>	

**Question 28** (continued)

- (b) Another of Lisa's responsibilities was ensuring her squad did not suffer from overtraining. Describe what is meant by 'overtraining' and outline **four** symptoms the Diamonds' players may experience if they are overtraining. (6 marks)

Description	Marks
Overtraining is a persistent/ongoing condition	1
occurring when exercise (increase in volume and intensity) exceeds recovery capacity (imbalance between work and rest).	1
<b>Subtotal</b>	<b>2</b>
<b>Any four of the following</b>	
<ul style="list-style-type: none"> <li>• persistent (prolonged) muscle soreness</li> <li>• heaviness and weakness in muscles</li> <li>• nausea</li> <li>• increased incidence of injury</li> <li>• prolonged fatigue and delayed recovery</li> <li>• loss of appetite and weight loss</li> <li>• elevated resting heart rate</li> <li>• dehydration and insatiable thirst and excessive sweating</li> <li>• moodiness and easily irritated</li> <li>• increased anxiety/depression</li> <li>• loss of competitive drive/motivation</li> <li>• feeling tired and inability to relax</li> <li>• altered sleep patterns/insomnia</li> <li>• decreased concentration/confidence/self-esteem</li> <li>• menstrual cycle stops/irregular.</li> </ul>	1–4
<b>Subtotal</b>	<b>4</b>
<b>Total</b>	<b>6</b>
Accept other relevant answers.	

## Question 29

(15 marks)

- (a) Identify **two** mental skill strategies Ash may have used prior to serving the ball to maintain her focus and concentration, and outline how she would have applied each of them. (6 marks)

Description	Marks
Any two of the following strategies	
<ul style="list-style-type: none"> <li>• self-talk</li> <li>• performance routines</li> <li>• imagery</li> <li>• relaxation</li> </ul>	1–2
<b>Subtotal</b>	<b>2</b>
Application of strategy (2 x 2 marks)	
Outlines how the mental skill strategy is applied.	1
States an example of the application, prior to serving the ball.	1
<b>Subtotal</b>	<b>4</b>
<b>Total</b>	<b>6</b>
<p>Answers could include:</p> <p>Self-talk</p> <ul style="list-style-type: none"> <li>• words spoken out loud or in the head/she may have said to herself</li> <li>• e.g. Ash may have said or thought to herself 'throw the ball up high' or 'follow through'.</li> </ul> <p>Performance routines</p> <ul style="list-style-type: none"> <li>• completing a pre-determined set of activities</li> <li>• e.g. she may have bounced the ball three times before serving.</li> </ul> <p>Imagery</p> <ul style="list-style-type: none"> <li>• visualising a previous serve that was successful</li> <li>• e.g. Ash visualises the placement of the ball, serving an ace/previous ace.</li> </ul> <p>Relaxation</p> <ul style="list-style-type: none"> <li>• technique used to reduce stress or tension/regain focus</li> <li>• e.g. Ash may have used breathing techniques, like taking a deep breath in and then out, before her serve.</li> </ul>	
Accept other relevant answers.	

**Question 29** (continued)

(b) Explain **three** nutritional strategies Ash may have employed at each of the following times to ensure she played at her best and recovered well.

- 2 to 4 hours before the match
- During the match
- After the match

(9 marks)

Description	Marks
<b>Nutritional strategy (3 x 3 marks)</b>	
<b>2 to 4 hours before the match – any three of the following</b>	
<ul style="list-style-type: none"> <li>• medium – low GI carbohydrates/foods as they release glucose slowly into the blood stream/delay the use of stored glycogen</li> <li>• emphasis on eating carbohydrates as they are the primary energy source during exercise</li> <li>• increase fluid/water intake as it delays the effects of dehydration/it is essential in the body’s natural cooling mechanism (sweat)</li> <li>• avoid high fibre foods as they can cause stomach cramps/upset stomach</li> <li>• avoid foods high in fats and proteins as they are not the primary fuel source during exercise.</li> </ul>	1–3
<b>Subtotal</b>	<b>3</b>
<b>During the match – any three of the following</b>	
<ul style="list-style-type: none"> <li>• consume high GI carbohydrates/foods, which result in a rapid release of glucose into the bloodstream for immediate use/delays the use of stored glycogen</li> <li>• fluid/water intake delays the effect of dehydration/it is essential in the body’s natural cooling mechanism (sweat)/helps to replenish the water lost via sweating</li> <li>• consume sports/electrolyte drinks which contain both water and carbohydrates; this meets the carbohydrate refuelling requirements and replenishes water lost by sweating/replaces minerals/salts lost during event</li> <li>• easily digestible foods so that energy isn’t lost through gastro-intestinal problems.</li> </ul>	1–3
<b>Subtotal</b>	<b>3</b>
<b>After the match – any three of the following</b>	
<ul style="list-style-type: none"> <li>• consume high GI carbohydrates/foods shortly after to start the body’s recovery with supply of glucose in the blood</li> <li>• consume low GI carbohydrate/food/meal to restock glycogen stores in the muscle and liver</li> <li>• consume high-protein meals to aid in the repair of muscle tissue</li> <li>• increase fluid/water intake to replenish the water lost via sweating.</li> </ul>	1–3
<b>Subtotal</b>	<b>3</b>
<b>Total</b>	<b>9</b>
Accept other relevant answers.	

## Question 30

(15 marks)

- (a) Identify the predominant muscle fibre type Bree would have, and describe **three** characteristics of this fibre type to support your answer. (7 marks)

Description	Marks
Muscle fibre type	
Identifies Type IIb.	1
<b>Subtotal</b>	<b>1</b>
For each characteristic (3 x 2 marks)	
Describes the characteristic to justify response.	2
Outlines the characteristic.	1
<b>Subtotal</b>	<b>6</b>
<b>Total</b>	<b>7</b>
Answers could include:	
Characteristics:	
<ul style="list-style-type: none"> <li>• large diameter, allowing greater force to be produced in muscle contraction e.g. pushing the weight of the sleigh</li> <li>• large motor neurons that innervate larger motor units, ensuring greater force is produced in pushing the weight of the sleigh</li> <li>• fast contraction speed, increases velocity over the 50 m run-up</li> <li>• high glycolytic capacity/uses anaerobic glycolysis/ATP-PC energy system, which means that there is quick availability of energy for the duration of the 50 m run-up.</li> </ul>	
Accept other relevant answers.	

- (b) Identify and define **two** types of drag. Describe how each influences the design of a sleigh. (8 marks)

Description	Marks
Form/pressure drag	
Identifies form/pressure drag.	1
The drag created by a pressure difference between the front and rear of an object moving through fluid.	1
The streamline shape of the sleigh/its design to contain the athlete reduces the cross-sectional area, decreasing the pressure differential between the front and rear of the sleigh.	1-2
<b>Subtotal</b>	<b>4</b>
Surface/friction drag	
Identifies surface/friction 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
The sleigh is smooth, this allows the sleigh to move faster through the air due to decrease in friction with air and sleigh. or The sleigh is streamlined/designed to contain the athlete, this allows the sleigh to move faster through the air as there is less surface area in contact with the air.	1-2
<b>Subtotal</b>	<b>4</b>
<b>Total</b>	<b>8</b>

Question 31

(15 marks)

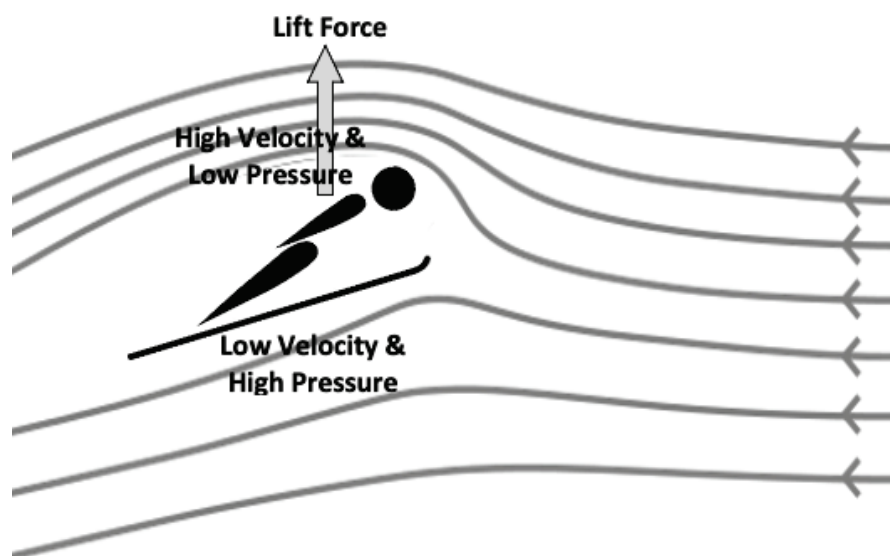
- (a) (i) The biomechanical principle that enhanced Stefan's flight to achieve a world record jump was Bernoulli's principle. Explain Bernoulli's principle and describe how Stefan used it to enhance his jump. (5 marks)

Description	Marks
Explains Bernoulli's principle	
Bernoulli's principle states the velocity of fluid/air flow over a moving object determines the pressure system	1
fluid with fast velocity creates an area of low pressure/fluid with slow velocity creates an area of high pressure	1
area of high pressure moves to the area of low pressure, creating a lift force	1
<b>Subtotal</b>	<b>3</b>
Describes how Stefan can use Bernoulli's principle	
Stefan needs an appropriate angle of attack/alignment of body to maximise lift.	1
By maximising lift, Stefan has more time in the air, thus increasing the distance of the jump.	1
<b>Subtotal</b>	<b>2</b>
<b>Total</b>	<b>5</b>
Accept other relevant answers.	

- (ii) On the diagram below, draw the lines of airflow and label it to demonstrate your understanding of how Bernoulli's principle assists a ski jumper. (4 marks)

Description	Marks
Diagram is labelled with	
airflow lines in appropriate direction around the ski jumper	1
area of high velocity and low pressure above ski jumper	1
area of low velocity and high pressure below ski jumper	1
lift force.	1
<b>Total</b>	<b>4</b>

Answers could include:





- (b) Identify and explain the principle related to muscle contraction and nerve function that allowed Stefan to generate maximum force in his muscles to take off from the ramp.  
(6 marks)

Description	Marks
Identifies the 'All or Nothing/None' principle.	1
Motor unit receives stimulation/impulses/action potential to threshold.	1
All the muscle fibres associated with the motor unit will contract to their maximum level.	1
All the muscle fibres associated with the motor unit will contract at the same time.	1
Any two of the following: <ul style="list-style-type: none"><li>• brain sends a signal to the motor unit</li><li>• increase strength of nerve signal</li><li>• increase frequency of nerve signal</li><li>• stimulate larger motor units/more muscle fibres.</li></ul>	1-2
<b>Total</b>	<b>6</b>

## ACKNOWLEDGEMENTS

**Question 31(a)(ii)** Parutakupiu. (2007). *Ski Jumping Pictogram*. Retrieved October, 2022, from [https://commons.wikimedia.org/wiki/File:Ski\\_jumping\\_pictogram.svg](https://commons.wikimedia.org/wiki/File:Ski_jumping_pictogram.svg)

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