

# Markscheme

November 2023

**Sports, exercise and health science**

**Standard level**

**Paper 3**

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**Subject details: Sports, exercise and health science SL paper 3 markscheme**

**Mark Allocation**

Candidates are required to answer **ALL** questions from two of the options [**2×20 marks**].  
Maximum total = [**40 marks**].

**Markscheme format example:**

Question			Answers	Notes	Total
5.	c	ii	this refers to the timing of the movements <b>OR</b> the extent to which the performer has control over the timing of the movement ✓ external paced skills are sailing/windsurfing/receiving a serve ✓ internal paced skills are javelin throw/gymnastics routine ✓		2 max

1. Each row in the “Question” column relates to the smallest subpart of the question.
2. The maximum mark for each question subpart is indicated in the “Total” column.
3. Each marking point in the “Answers” column is shown by means of a tick (✓) at the end of the marking point.
4. A question subpart may have more marking points than the total allows. This will be indicated by “**max**” written after the mark in the “Total” column. The related rubric, if necessary, will be outlined in the “Notes” column.
5. An alternative word is indicated in the “Answers” column by a slash (/). Either word can be accepted.
6. An alternative answer is indicated in the “Answers” column by “**OR**”. Either answer can be accepted.
7. An alternative markscheme is indicated in the “Answers” column under heading **ALTERNATIVE 1** etc. Either alternative can be accepted.

8. Words inside chevrons « » in the “Answers” column are not necessary to gain the mark.
9. Words that are underlined are essential for the mark.
10. The order of marking points does not have to be as in the “Answers” column, unless stated otherwise in the “Notes” column.
11. If the candidate’s answer has the same “meaning” or can be clearly interpreted as being of equivalent significance, detail and validity as that in the “Answers” column then award the mark. Where this point is considered to be particularly relevant in a question it is emphasized by **OWTTE** (or words to that effect) in the “Notes” column.
12. Remember that many candidates are writing in a second language. Effective communication is more important than grammatical accuracy.
13. Occasionally, a part of a question may require an answer that is required for subsequent marking points. If an error is made in the first marking point then it should be penalized. However, if the incorrect answer is used correctly in subsequent marking points then **follow through** marks should be awarded. When marking, indicate this by adding **ECF** (error carried forward) on the script. “ECF acceptable” will be displayed in the “Notes” column.
14. Do **not** penalize candidates for errors in units or significant figures, **unless** it is specifically referred to in the “Notes” column.

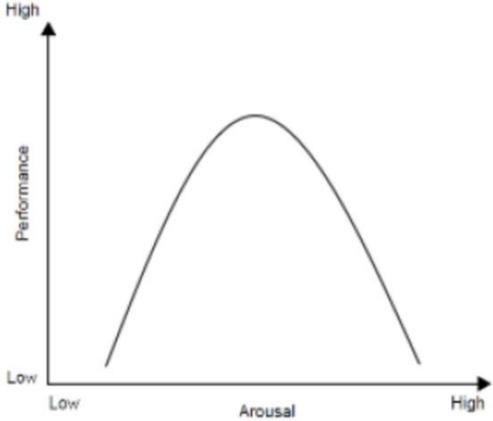
**Option A — Optimizing physiological performance**

Question			Answers	Notes	Total
1.	a	i	group 1/ overtrained athletes ✓		1
1.	a	ii	14 – 4 ✓ = 10 ✓	<i>Accept calculation in different order</i>	2
1.	a	iii	overtraining reduces growth hormone production compared to healthy athletes <b>OR</b> healthy athletes have a higher growth hormone production compared to athletes with overtraining syndrome ✓ overtrained athletes produce a similar amount of growth hormone to sedentary individuals ✓	<i>Accept the inverse statement related to healthy athletes and sedentary individuals but mention overtraining and group 1</i>	2
1.	b		increase to resting heart rate/ higher blood pressure ✓ chronic muscle soreness/ bone tenderness ✓ reduced immune function/ increased susceptibility to infections ✓ sleep disturbance ✓ chronic fatigue ✓ hormonal system overload/ menstrual dysfunction ✓ decreased appetite/ weight loss ✓ sudden and unexplained decrease in performance/ motivation ✓		2
1.	c		an athlete should break their training year/ macro cycle to focus on different types of fitness ✓ within a macrocycle there are smaller mesocycles/ microcycles/ phases such as transition, preparation, competition/ post season, pre-season, in-season ✓ an athlete can gradually build up their training load <b>OR</b> overload by ensuring their frequency, intensity, duration are appropriate <b>OR</b> to promote adequate recovery during each period ✓ training load may peak before an event (competition phase) then gradually drop away/ taper away as the day of the event arrives ✓		3

Question			Answers	Notes	Total
2.	a		36–38 degrees Celsius/ 97–99 Fahrenheit ✓	<i>Accept any value within the range</i>	1
2.	b		shivering produces heat as a by-product ✓ non-shivering thermogenesis uses adipose tissue to produce heat without ATP ✓ vasoconstriction to reduce blood supply to the skin ✓ therefore, reducing heat loss through conduction/convection ✓		2
2.	c		they have a large body surface: small body mass/ratio ✓ body easily loses heat through radiation/convection ✓ they are very lean, so poor insulation against heat loss ✓ improved sweat response ✓		2

Question			Answers	Notes	Total
3.	a		<b><i>increased removal of water from the body:</i></b> allows athletes greater control overweight as rapid weight loss is possible ✓ masks illegal substances by creating dilute urine ✓ increased muscle definition/ physical appearance in sports like body building ✓	<b><i>[1 max]</i></b> for list <i>Accept valid sporting example max 1 mark</i>	2
3.	b		it is wrong to allow athletes to harm themselves in this way/ athlete safety ✓ it is wrong to break the law/ rules ✓ sport must be fair/ to use pharmacological substances makes it unfair/ level playing field ✓ athletes could serve as poor role models and possibly negatively influence kids ✓	<b><i>[1 max]</i></b> for list <i>Accept valid examples max 1 mark</i>	3

Option B — Psychology of sports

Question			Answers	Notes	Total
4.	a	i	group 2/ high mental toughness ✓		1
4.	a	ii	3.4 – 2.7 ✓ = 0.7 ✓	Accept calculation in different order	2
4.	a	iii	no difference between high and low mental toughness groups in times of low stress ✓ meaningful difference between high and low mental toughness groups at times of high stress ✓ low mental toughness individuals experience similar/ minimal burnout in high or low stress ✓ high mental toughness individuals experience less burnout in times of high stress ✓		2
4.	b		performance is increased with increased arousal until a certain point ✓ there is an optimal arousal level for performance ✓ performance decreases with increased arousal beyond the optimal point ✓ the arousal–performance relationship is curvilinear ✓ there will be individual differences in optimal arousal depending on skill & sport level ✓	<i>[1 max] for appropriate example</i> <i>Accept a suitably annotated diagram [1 max]</i> 	2

4.	c	emotions significantly influence performance ✓ positive emotions (e.g., excitement, pride) positively impact and increase our confidence/ motivation to perform ✓ negative emotions (e.g., fear, anger) negatively impact and reduce our feelings of confidence/ motivation to perform ✓ therefore, if an athlete experiences regular changes in emotion, their performance will also change regularly ✓ individuals with high trait anxiety are more likely to be highly emotional ✓	<i>Accept appropriate sporting examples [1 max]</i>	<b>3</b>
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Question		Answers	Notes	Total
5.	a	“those relatively stable and enduring aspects of individuals which distinguish them from other people making them unique but at the same time permit a comparison between individuals” (Gross, 1992) ✓	<i>Accept other valid definitions</i>	1
5.	b	nature refers to genetics and nurture/upbringing refers to environment ✓ both nature and nurture significantly contribute to an individual’s personality ✓ personality can be modified as a response to environmental situations/nurture ✓ the interaction of cognitive factors with environmental situations results in the expression of personality ✓	<i>Award max 2 if no comparison is made between nature and nurture</i>	3

Question		Answers	Notes	Total
6.	a	<b>Extrinsic rewards:</b> can be used to control behaviour ✓ can undermine/ reduce intrinsic motivation ✓ may have a positive effect on intrinsic motivation but only if they are informational with regard to competence ✓ can reduce motivation through over-justification/ cognitive evaluation ✓	<i>Award max 2 if no example given</i>	3
6.	b	<i>i.</i> <b>outcome goal:</b> winning a race/ trophy/ medal ✓ <i>ii.</i> <b>performance goal:</b> beating a personal best ✓ <i>iii.</i> <b>process goal:</b> mastering a technique/ strategy ✓	<i>Accept other valid examples</i>	3

**Option C — Physical activity and health**

Question			Answers	Notes	Total
7.	a	i	group 1/ exercise ✓		1
7.	a	ii	9.4 – 7.8 ✓ = 1.6 ✓	<i>Accept calculation in different order</i>	2
7.	a	iii	group 1/ exercise significantly reduced depression/ had a significant effect <relative to a placebo/ group 3> ✓ group 2/ medication significantly reduced depression/ had significant effect <relative to a placebo/ group 3> ✓ exercise and medication both similarly effective in reducing depression ✓ Placebo effect was minimal ✓		2
7.	b		increase in <u>cerebral</u> blood flow/ increased delivery of oxygen to the <u>brain</u> ✓ exercising regularly can manage stress/ which lower cortisol levels ✓ weight loss/ increase in energy expenditure/ metabolic leads to increases in self-esteem/ positive body image ✓ increase in neurotransmitter activity/ norepinephrine/ dopamine/ endorphins/ serotonin ✓ reduction in muscular tension ✓ increase the size of the hippocampus and connection between neurons ✓	<i>Cerebral or brain should be mentioned for the 1<sup>st</sup> mark point</i>	2
7.	c		exercise can be enjoyable/ releases endorphins/ dopamine/ serotonin/ reduce cortisol ✓ recreational exercise/ lack of interpersonal competition to reduce stress ✓ 20 minutes plus/ moderate intensity several times per week ✓ aerobic/ rhythmic exercises are preferable ✓ closed, predictable environment ✓ social interaction and promote social support ✓ environmental connection with nature ✓ exercise groups convey a sense of mastery and increased self-esteem ✓		3

Question		Answers	Notes	Total
8.	a	cigarette smoking ✓ high blood pressure/ hypertension ✓ high cholesterol and LDL-cholesterol ✓ low HDL cholesterol ✓ type 2 diabetes ✓ obesity ✓ physical inactivity ✓		2
8.	b	accumulative effects are important ✓ some factors can be clustered/ paired leading to metabolic syndrome ✓ there is not necessarily a causal link ✓ only some risk factors are modifiable/ genetics are not modifiable ✓ there is often comorbidity/ treatment for existing illnesses that might be affected ✓		3

Question		Answers	Notes	Total
9.	a	<b>BMI:</b> calculated by dividing weight in kilograms by height in metres squared ✓ indirect estimate of body fat/ bioelectrical impedance/ underwater weighing ✓ <b>Waist circumference/girth:</b> measurement compared to norm <102 cm/ 40 in men, 88 cm/ 35 in women> ✓		2
9.	b	poor management of disease state preventing participation in exercise (unstable angina, poorly controlled diabetes, uncontrolled hypertension) ✓ <fear of> musculoskeletal injuries ✓ <fear of> triggering other health issues (e.g., heart attack, respiratory tract infections) ✓ hazards of exercise (e.g., cycle and swimming accidents, trips and falls, personal safety) ✓ social environment/ demographic variables/ time/ social and cultural norms within various ethnic groups ✓ characteristics of physical activity offered/ physical environment/ leader qualities ✓ lack of self-esteem/ motivation ✓	<i>Award 1 max for a list</i>	3

**Option D — Nutrition for sports, exercise and health**

Question			Answers	Notes	Total
10.	a	i	12:00/ lunch ✓	<i>Accept 11.30– 12.30</i>	1
10.	a	ii	2.2 – 1.0 ✓ = 1.2 ✓	<i>Accept calculation in different order. Allow ± 0.1 on each reading</i>	2
10.	a	iii	blood glucose is significantly raised in high GI diet at mealtime ✓ low GI diet leads to more stable/ high GI leads to less stable blood glucose over the 24-hour period ✓ both diets lead to similar blood glucose between meals ✓ a high GI diet leads to a negative blood glucose value at night ✓	<i>Accept specific readings/ examples from the graph</i>	2
10.	b		<b>High:</b> glucose/ sweets/ candies/ mashed potatoes/ white bread/ white rice/ watermelon ✓ <b>Low:</b> green vegetables/ beans/ soy products/ lentils/ pasta ✓	<i>Accept other valid examples</i>	2
10.	c		<b>Before:</b> low GI foods might be beneficial prior to exercise/ competition due to slow release of energy during performance/ avoid premature fatigue ✓ <b>During:</b> high GI foods are beneficial during exercise/ competition to boost glucose availability ✓ <b>After:</b> high GI foods are beneficial post exercise/ competition to replenish glycogen stores <more rapidly> ✓ research is unclear on some strategies/ there appears to be significant individual difference in this area ✓	<i>Award [1 Max] for each time period</i>  <i>Justification must be provided in each time period for a mark</i>	3

Question		Answers	Notes	Total
11.	a	pepsin ✓ protease ✓ trypsin ✓	<i>Accept other correct enzymes</i>	2
11.	b	<salivary> amylase assists in carbohydrate breakdown ✓ lipase assists in fat breakdown ✓ act as a catalyst/ speed up the process of digestion ✓ breakdown large food molecules into smaller ones/ in preparation for absorption ✓ by lowering the activation energy for the reaction ✓		3

Question		Answers	Notes	Total
12.	a	blood plasma and lymph ✓ saliva ✓ fluid in the eyes ✓ fluid secreted by glands and the digestive tract ✓ fluid surrounding the nerves and spinal cord ✓ fluid secreted from the skin and kidneys ✓	<i>Accept other valid locations</i>  <i>Ensure the response includes any discussion of fluid or denotes a fluid type</i>	2
12.	b	fat present in fat storage cells (adipocytes) contains little water ✓ sedentary people more likely to have a larger proportion of body mass made up of tissue containing little water ✓ rower has more muscle and less fat and therefore a greater percentage of body water ✓ fat-free tissue comprises 60–80 % water ✓ rower will have a higher percentage of intracellular water than extracellular water in comparison to sedentary individual ✓		3