Diploma Programme
Programme du diplôme
Programa del Diploma

Markscheme

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Sports, exercise and health science

Standard level

Paper 3

18 pages

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 ***OR*** 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		71 <%> ✓		1
	b		12 – 3 ✓ = 9 <min> ✓	*Accept the subtraction in a different order.*	2
	c		there is an inverse relationship between humidity and the mean time to exhaustion ***OR*** higher levels of humidity result in lower/worse performance on mean time to exhaustion test ✓	*Accept in the converse.*	1
	d		humidity affects efficiency of sweat response/temperature regulation ✓ high humidity decreases capacity to accept more water molecules ***OR*** with high humidity, evaporation decreases ✓ when humidity is high, the vapour pressure gradient between the skin and the air is decreased ✓ sweat must evaporate to provide cooling / sweat remains on the skin in high humidity ✓ cooling is essential in maintaining homeostasis / to perform at an optimal level ✓ exercising for 60 minutes in higher humidity inhibits cooling	***[2 max]*** *if no reference to submaximal or maximal exercise.*	3 max

			OR performing maximal exercise at higher humidity is a thermoregulatory challenge ✓		
	e		performing training sessions in heat and high humidity ✓ environmental simulation <of the heat and humidity> of the competition location ✓ 5 to 10 days of training in similar conditions should allow for full acclimatization ✓ initially, the intensity of training should be reduced to avoid heat-related problems in these conditions ✓ train in an environmental chamber prior to travelling ✓ it is important to maintain a good hydration status ✓		**2 max**

2.	**a**		involves more than one type of activity/sport to exercise different muscle groups ✓ can be applied to training multiple fitness components <*eg* strength, flexibility and endurance> within the same training session ✓		**1 max**
	b		measure <u>resting</u> heart rate ✓ measure blood pressure ✓ assess training volume ✓ check athlete's sleep diary ✓ monitor athlete's food intake ✓		**2 max**

			monitor athlete's general wellbeing ✓ observe body weight loss/muscle loss ✓ track performance data / observe technique ✓		

3.	**a**		37 ± 0.6 °C ✓	*Accept responses within the range provided.*	**1**
	b		skier's foot touches the boot and transfers heat to it ✓	*Accept any appropriate example.*	**1**

4.	**a**		anabolic steroids ✓ hormones and related substances ✓ diuretics and masking agents ✓ beta blockers ✓	*Accept appropriate examples of classes of aids, not specific examples. Full names need to be used eg anabolic steroids not just steroids..*	**2 max**
	b		EPO elevates / regulates red blood cell production <by stimulating bone marrow cells> ***OR*** increases hemoglobin concentration ✓ EPO <ultimately> increases oxygen capacity/VO_2 max ✓ removes carbon dioxide from tissues ✓	***[3 max]*** *if no reference to skier.*	**4 max**

			a cross-country skier predominantly uses aerobic respiration ✓ EPO increases time to exhaustion/endurance capacity ✓		

Option B — Psychology of sports

Question			Answers	Notes	Total
5.	**a**		Group 1 ***OR*** intrinsically motivated ✓		**1**
	b		140 – 55 ✓ =85 <min> ✓	*Accept the subtraction in a different order.*	**2**
	c		the less intrinsically motivated the participants, the lower their mean weekly engagement in physical activity ✓	*Accept in the converse.* *Accept other ways of wording the same association.*	**1**
	d		intrinsically motivated people have a perceived internal locus of causality ***OR*** intrinsically motivated people are driven by interest in/enjoyment for the task itself / extrinsically motivated people have a perceived external locus of causality ***OR*** extrinsically motivated people are driven by an external demand that carries a social value ✓ extrinsic reward can be seen as a way of controlling behaviour the more intrinsic motivation causes more enjoyment and sustainability in engagement in physical activity ✓	*Accept other valid examples from the data.*	**3 max**

			intrinsic motivation is preferable as it is not contingent on a reward ✓ there is a more gradual decrease in weekly minutes spent on walking as motivation becomes more extrinsic ✓ the higher rate of decrease in weekly minutes spent on sports as motivation becomes more extrinsic could be caused by the fact that engagement in sports is supported by more extrinsic motivators ✓		

6.	**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 ✓		**1**
	b		no single personality profile has been found that distinguishes athletes from non-athletes ✓ sports performers are all people and sport is only one facet of their life ✓ personality alone does not account for behaviour in sport and exercise ✓ some researchers believe that personality is closely related to athletic performance, others argue that personality is not related to athletic success ✓		**2 max**

7.	**a**		people learn through observing demonstrations of others / modelling physical activity behaviours ✓		**1**
	b		<SMARTER> is specific, measurable, achievable, realistic, time, evaluate, review goals ***OR***	*Accept reasonable alternatives*	**1**

			is an acronym/tool that promotes effective goal-setting ✓		
	c		concentration enhancement ✓ higher self-confidence ✓ more effective skill acquisition ✓ better emotional control / reduce anxiety / increase relaxation ✓ improved practice strategy ✓ better coping with pain and injury ✓		**2 max**

8.	**a**		drive <reduction> theory ✓ inverted-U hypothesis ✓ catastrophe theory ✓		**2 max**
	b		*Trait anxiety:* measured using Sport Competition Anxiety Test (SCAT) ✓ the test can be performed at any time/before competition ✓ questions refer to how the participant generally feels in competitive sport situations ***OR*** each question has a three-point scale <often, sometimes, hardly ever> ✓ *State anxiety:*	*Award [2] max per measure*	**4 max**

			measured using Competitive State Anxiety Inventory-2 (CSAI-2R) ✓ the test should be performed <immediately> prior to <but sometimes is performed during/after> competition ✓ questions refer to how the participant feels at the particular moment of the test ***OR*** test consists of statements that assess cognitive anxiety/somatic anxiety/self-confidence ✓		

Option C — Physical activity and health

Question			Answers	Notes	Total
9.	**a**		Group 3 / both parents exercise ✓		**1**
	b		46 – 23 ✓ = 23 <%> ✓	*Accept the subtraction in a different order.*	**2**
	c		girls are more likely to exercise if one or both parents engage in physical activity ***OR*** the majority of girls are more likely not to exercise even if their parents exercise ✓		**1**
	d		*Personal factors:* past behaviours, *eg* not having a positive experience in the past through poor modelling or discouragement ✓ Insecurities around body image ✓ *Environmental factors:* social environment, *eg* lack encouragement/companionship from parents ✓ social and cultural norms within various ethnic groups, *eg* false belief/values/attitudes that females should not engage in exercise ✓ Lack of effective leaders/role models ✓		**3 max**

10.	**a**		cigarette smoking ✓ physical inactivity ✓ poor diet ✓		**1 max**
	b		<proliferation of motor vehicles can be overcome by> exercising or walking / biking to school /work/friends/family ✓ <changes in employment and working patterns can be overcome by> choosing a standing desk / going for a walk during breaks ✓ <growth of processed and fast-food options can be overcome by> choosing to eat more nutritious foods/limiting fast food intake ✓	*Accept other suitable examples.*	**2 max**

11.	**a**		hardening of artery walls / an artery becomes damaged and blocked <with cholesterol and other material> ✓		**1**
	b		people who are physically inactive are more likely to have risk factors for cardiovascular disease <such as high blood pressure, obesity, type 2 diabetes and low HDL-cholesterol> ✓		**1**
	c		X: <left> <u>circumflex</u> artery: supplies blood to <most of> the left atrium and <the posterior and lateral walls of> the left ventricle ***OR*** <u>circumflex</u> artery / branches: provides blood to the SA node ✓ Y: <u>left anterior</u> <u>descending</u> artery: provides the major blood supply to the interventricular system	*Accept other valid annotations.* *Accept labels as well as annotations.*	**2**

			OR <u>left anterior descending</u> artery: blockage of this artery due to coronary artery disease can lead to impairment or death ✓		

12.	**a**		body mass index (BMI) ✓ waist girth / anthropometry ✓	*Accept other appropriate methods, eg underwater weighing*	**2**
	b		cumulative effects of factors increase the susceptibility to type 2 diabetes ✓ inactive adults are more likely to gain weight ✓ obese adults are more likely to get type 2 diabetes ✓ susceptibility to type 2 diabetes increases when eating a poor diet <low in unsaturated/high in saturated fat, and food that has high glycemic index and is low in fibre> ✓ lack of awareness of family history decreases the likelihood to change the behaviour and/or lifestyle towards lowering the risk ✓		**4 max**

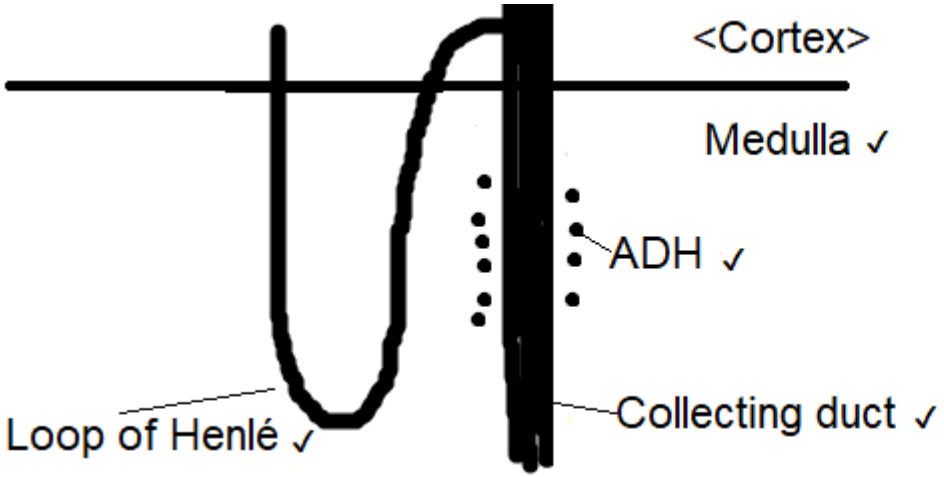
Option D — Nutrition for sports, exercise and health

Question			Answers	Notes	Total
13.	**a**		experimental <group> ✓		**1**
	b		302.00 – 282.80 ✓ = 19.20 <kg> ✓	*Accept the subtraction in a different order.*	**2**
	c		time-restricted diet decreased fat mass and had a positive effect / increased strength ***OR*** statistically significant change in fat mass bench press and leg press as a result of time-restricted diet ✓		**1**
	d		body mass relates directly to the energy cost of exercise when the body is unsupported ✓ an increased fat mass increases the energy cost of movement ✓ fat contributes nothing to the production of force ✓ maximizing fat-free mass is desirable for athletes involved in activities that require strength ✓ correlation does not establish that there is a causal relationship ✓ greater fat free mass but lower fat mass is positively associated with increased strength ✓	*Accept valid examples from the data.*	**3 max**

14.	**a**		glycemic index (GI) is the ranking system for carbohydrates based on the immediate effect of the food on blood glucose concentrations <when compared with a reference food such as pure glucose> ✓		**1**
	b		there is some evidence that use of foods containing carbohydrates before and after exercise may be beneficial in aerobic performance and recovery ✓ lower GI foods/carbohydrates may be beneficial before exercise <as they supply energy source in a more gradual manner> ✓ higher GI foods/carbohydrates may be beneficial after exercise <as they may aid in the recovery process> ✓ glycemic load <that considers both GI and the amount of carbohydrates> should be taken into account for before and after a race ✓		**2 max**

15.	**a**		pepsin ***OR*** trypsin ✓		**1**
	b		amino acids cross the brush-border membrane ✓ channel is required in the apical membrane/ amino acids are transported by active transport ✓ pass through the cytosol of the absorptive cell ✓ cross the basolateral membrane ✓		**3 max**

16.	**a**		urine colour ✓ urine osmolarity ✓		**2 max**

			variation in body mass ✓ hydrometer ✓		
	b			*Award **[1]** per correct identification of each part of the system.*	**4 max**