

Markscheme

May 2018

Sports, exercise and health science

Standard level

Paper 3

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	2005 ✓		1
	b	16.9 – 9.8 ✓ = 7.1 ✓	<i>Accept the subtraction in a different order.</i>	2
	c	«relative» peak VO ₂ «mL kg ⁻¹ min ⁻¹ » increased in 2013 (compared to 2005) ✓ relative peak power output «W kg ⁻¹ » increased in 2013 (compared to 2005) ✓ total body fat (kg/% of mass) decrease in 2013 (compared to 2005) ✓ body mass decrease in 2013 (compared to 2005) ✓ «relative» peak VO ₂ is associated with increased endurance capacity ✓ decreased body mass which subsequently increased his relative peak power output ✓	<i>Award only one point if no data from the table is used.</i>	2 max

Question		Answers	Notes	Total
2.	a	hypothalamus/ brain detects rise in body temperature ✓ sympathetic nervous system activates sweat glands ✓ plasma is the source of sweat formation ✓ sweat is formed in the (coil) secretory part of the sweat gland ✓ sweat passes through the (uncoiled) duct / pores of the gland onto the skin surface ✓ amount of sweat formed depends on the individual / exercise intensity / acclimatization / hydration status ✓		3 max
	b	when humidity is high, the vapour pressure gradient between the skin and the air is decreased ✓ high humidity decreases the capacity of air to accept more water ✓ high humidity limits sweat evaporation / cooling / heat loss OR when humidity is high sweat remains on the skin ✓	<i>Accept in the converse.</i>	2 max
	c	an exothermic / catabolic reaction is required ✓ a break in the chemical bond has a by-product of a release of heat ✓ energy derived from ATP is lost in a form of heat (typically 60–70 %) ✓ more exercise / intensity leads to more ATP hydrolysis and therefore more heat ✓		2

Question		Answers	Notes	Total
3.	a	<p>can improve performance simply because the athlete expects an improvement OR one's expectations affect the body's (physiological and physical) response in some measurable way ✓</p>		1
	b	<p>can be approximately a year «annual» ✓ planning is based on the competition schedule ✓ consists of mesocycles, which are made up of microcycles ✓ consists of transition, preparation, and competition phases ✓ appropriate example eg, training plan to peak for the Olympic trials ✓ Intensity/load are varied throughout the meso/microcycles to allow the athlete to taper/peak for major competition ✓</p>	<p><i>Award [2] max if no example is given.</i></p>	3 max
	c	<p><i>Benefits:</i> EPO increases the number/formation of red blood cells / volume / hemoglobin concentration ✓ increases oxygen transport to muscles ✓ improved <u>endurance</u> performance ✓</p> <p><i>Risks:</i> blood can become too viscous OR known to cause dehydration ✓ (viscous blood) can lead to clotting / heart disease / heart failure / stroke ✓ Increased blood pressure / hypertension ✓ difficult to predict how much red blood cell production will occur ✓ risks to mental health (guilt, burden / stress of keeping secrets) ✓</p>	<p><i>Award [2] max for benefits/risks.</i></p> <p><i>Benefits and risks must be related with health.</i></p>	4 max

Option B — Psychology of sport

Question		Answers	Notes	Total
4.	a	pride ✓		1
	b	5 – 4.5 ✓ = 0.5 ✓	Accept the subtraction in a different order.	2
	c	<p><i>Similarities:</i> referees experienced the same level of stress during the first round and finals ✓ referees experienced the same level of happiness during the first round and finals ✓</p> <p><i>Differences:</i> there is an inverse relationship between stress and happiness OR stress mean score is lower (1.5-2.5) than happiness (3.5-5) ✓ happiness is ranked higher in comparison to stress at all three events ✓ decrease in stress during semi-finals causes significantly higher happiness «relative to this relationship during the first round and final» ✓</p>	Award [1] max for similarities, and [1] max for differences.	2 max

Question		Answers	Notes	Total
5.	a	state in which feelings of nervousness / worry / apprehension / negative emotional mood are associated with arousal / over-arousal of the body ✓		1
	b	the theory suggests that after an optimal point of arousal, there is a rapid decline in performance due to anxiety ✓ after the decline, the performer may try to regain control by decreasing arousal, which can cause a gradual rise in performance «as arousal and anxiety return to much lower levels» ✓ after the decline the performance may continue to deteriorate ✓ catastrophe effect is caused when both cognitive and somatic anxiety and high ✓		2 max

Question		Answers	Notes	Total
6.	a	<i>Exercise is done for:</i> its own sake / enjoyment ✓ the pride / satisfaction that is achieved ✓ for competence / self-determination ✓		2 max
	b	striving towards a tangible external reward (money / trophy / medal) ✓ gaining an intangible external reward (praise / adulation / reputational boost) ✓ earning a medal could control the behaviour of the sprinter ✓ beating or being beaten by a rival ✓ the place that the sprinter achieves provides information about the level of performance ✓ receiving external feedback from a coach or crowd in the form of information about the performance can increase motivation ✓		2 max

Question		Answers	Notes	Total
7.	a	internal / dispositional factors vs external / situational «locus of causality» ✓ stable factors (talent / ability) vs unstable factors (effort) «locus of stability» ✓ controllable factors vs uncontrollable factors ✓	<i>Must link to positive emotions or avoiding negative emotions.</i>	2 max
	b	through modelling/observational learning demonstration is applied ✓ coach highlights cues during demonstration about how best to perform the skill ✓ coach uses repetition to help the process of remembering the demonstration/modelled behaviour ✓ coach demonstrates correctly to help the motor reproduction of the learners ✓ Use of video analysis for modelling ✓		3 max
	c	automation of skills «through overlearning» eg, through practising passes while being distracted ✓ systematic integration / application of PST into performance situations ✓ simulate skills that athletes will want to apply in actual competition ✓ lowering of anxiety ✓ providing and receiving feedback in areas of improvement and changing the skills accordingly ✓	<i>Award [1] max for a list without an appropriate example.</i>	3 max

Option C — Physical activity and health

Question		Answers	Notes	Total
8.	a	Americas ✓		1
	b	450 000 000 – 250 000 000 ✓ = 200 000 000 ✓		2
	c	increase in the use of technology encourages sedentary lifestyle «motor vehicles, robots» ✓ changes in working patterns encourages sedentary lifestyle (less manual) ✓ changes in diet ✓		2 max
9.	a	blindness ✓ kidney disease ✓ nerve damage / amputation ✓ cardiovascular disease ✓		2 max
	b	coronary heart disease ✓ heart attack ✓ stroke ✓ angina / pain ✓ atherosclerosis ✓ hypertension ✓		2 max

Question		Answers	Notes	Total
10.	a	environmental approaches «such as prompts, contracting or perceived choice» OR reinforcement approaches «such as rewards for attendance and participation, external feedback, self-monitoring» OR cognitive approaches «such as goal setting, associative versus dissociative focus during exercise» OR social support approaches «such as role of significant others (spouse, family members, friends), including joining in, adjusting routines, transportation, providing equipment» ✓		1 max
	b	the nature of the exercise programme affects the success rate (enjoyable, aerobic, absence of interpersonal competition, closed and predictable environment, moderate intensity, 20–30 minutes several times a week) ✓ increased levels of dopamine / endorphins / serotonin / decrease in stress with aerobic exercise ✓ rhythmic / repetitive aerobic exercise is most effective ✓ no causal link has been established ✓ positive social contact with others ✓ increase in self-esteem / confidence ✓		3 max

Question		Answers	Notes	Total
11.	a	at least 150 minutes of moderate-intensity aerobic physical activity throughout the week OR at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week OR an equivalent combination of moderate- and vigorous-intensity activity ✓ aerobic activity should be performed in bouts of at least 10 minutes duration ✓ for additional health benefits, older adults should increase their moderate-intensity aerobic physical activity to 300 minutes per week OR engage in 150 minutes of vigorous-intensity aerobic physical activity per week OR an equivalent combination of moderate- and vigorous-intensity activity ✓	Accept reasonable answers other than WHO guidelines.	2 max
	b	loss of independence ✓ development of secondary complications as a result of long-term hospitalization ✓ long-term pain management ✓ Limited movements /reduced ability to participate in some activities ✓		2
	c	uncontrolled disease state (unstable angina, poorly-controlled diabetes, uncontrolled hypertension) ✓ triggering of other health issues (eg, heart attack, respiratory tract infections) ✓ hazards of exercise (eg, cycling and swimming accidents) ✓ existing health issues eg, reduced mobility, musculoskeletal injuries ✓		3 max

Option D — Nutrition for sport, exercise and health

Question		Answers	Notes	Total
12.	a	Group 2 ✓ carbohydrate electrolyte plus whey protein ✓		1
	b	700 – 600 mL ✓ = 100 mL ✓	<i>Accept the subtraction in a different order.</i>	2
	c	better hydration is achieved using carbohydrate electrolyte drink with whey protein as after each hour «the cumulative urine» volume produced was less than the «cumulative urine» volume produced for the other two drink conditions ✓ «cumulative urine» volume produced every hour was similar using carbohydrate electrolyte drink with whey protein compared to the other drinks which increased in volume «exponentially» «after 3 hours» ✓		2
13.	a	the minimum level of energy expenditure that is required to sustain the body's vital functions ✓		1
	b	rugae: folds in the stomach «to increase surface area» ✓ lumen: open area in stomach «that is filled with nutrients» ✓ mucous coating / mucosa: a protective lubricant produced by mucous membranes ✓ gastric juices (containing hydrochloric acid) «pH 1-4» ✓		2 max

Question		Answers	Notes	Total
14.	a	specific temperature «eg, work at body temperature» ✓ specific pH «eg, pepsin only works in stomach pH 1–4» ✓ substrate specific «eg, pancreatic lipase breaks down fats» ✓	Accept if the example implies the condition.	2 max
	b	catalysts / speed up the process of digestion ✓ lowering the activation energy for the reaction ✓ enzymes breakdown macronutrients into small molecules so they can be absorbed «by carriers» ✓ breakdown from macronutrients to micronutrients ✓ Digestive enzymes are secreted in inactive form and are activated at the site of function to protect the secretion organs from any damaging, premature enzymatic action ✓ Carbohydrates are acted on by amylase ✓ OR Proteins are acted on by pepsin ✓ OR Fats are acted on by lipase ✓	Award 1 [max] for specific example. Accept other relevant examples.	3

Question		Answers	Notes	Total
15.	a	basic substance for all metabolic processes in the body / maintains homeostasis ✓ regulates body temperature ✓ enables transport of substances essential for growth ✓ allows for the exchange of nutrients and metabolic end products ✓		2 max
	b	creatine increases muscle PCr levels OR enhances ATP-PCr energy system ✓ maintains muscle ATP levels better ✓ enhances peak power production ✓ facilitates recovery from high-intensity exercise ✓		2 max
	c	receptors in the hypothalamus are stimulated «when there is a need to minimize dehydration» ✓ hypothalamus stimulates the pituitary gland to release ADH ✓ «ADH» acts on the kidneys ✓ «ADH» increases water permeability of the renal tubules and collecting ducts «nephrons» ✓ increased re-absorption of water ✓ smaller amount of water is eliminated through urine/urine with higher concentration of solutes ✓		3 max