N14/4/SPEXS/SP3/ENG/TZ0/XX/M

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MARKSCHEME

November 2014

SPORTS, EXERCISE AND HEALTH SCIENCE

Standard Level

Paper 3

21 pages

Subject Details: Sports, Exercise and Health Science SL Paper 3 Markscheme

Mark Allocation

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

Markscheme format example:

Question			Answers	Notes	Total
4	**a**	**i**	‹a stroke is› caused by a lack of blood flow/oxygen to the brain ***OR*** a condition in which blood supply to some part of the brain is impaired ‹due to a blocked/burst artery› ✓		**1**

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 wording is indicated in the "Answers" column by a slash (/). Either wording can be accepted.

6. An alternative answer is indicated in the "Answers" column by "***OR***" on the line between the alternatives. Either answer can be accepted.

7. Words in angled brackets ‹ › in the "Answers" column are not necessary to gain the mark.

8. Words that are <u>underlined</u> are essential for the mark.

9. The order of marking points does not have to be as in the "Answers" column, unless stated otherwise in the "Notes" column.

10. 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).

11. Remember that many candidates are writing in a second language. Effective communication is more important than grammatical accuracy.

12. 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.

13. 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		Group C/Highly-trained cyclists✓		1
	b		14 –12 ‹gkg^{-1}›✓ = 2 gkg^{-1}✓	*Accept graph read-offs in the range of 13.8–14 for the highly trained runners, giving an answer of 1.8–2 gkg^{-1} for second marking point.* *Unit required to award the mark.*	2
	c		stimulates red blood cell production✓ increases hemoglobin concentration and hematocrit✓ increases blood's oxygen-carrying capacity✓ increases VO_2 max✓ increases endurance capacity / increases aerobic performance / more energy produced aerobically ***OR*** increases time to exhaustion✓		3 max
2	a		any substance or phenomenon that improves an athlete's performance✓		1
	b		most risks are associated with prolonged use✓ bronchospasm in asthmatics✓ cardiac failure in cyclists with underlying problems with cardiac function✓ with bradycardia, can lead to heart block✓ decreased blood pressure can cause light-headedness✓ type 2 diabetics can become hypoglycemic beta blockers impair the function of the endocrine system ***OR*** beta blockers increase insulin secretion in type 2 diabetics✓ can cause fatigue ***OR*** can inhibit performance✓		2 max

3	**a**		perform plyometric exercises early in the training session✓ gradually build sets and reps ‹initially 1 to 2 sets of 6 to 8 repetitions›✓ begin with lower-intensity drills and gradually progress to high-intensity drills✓ perform each exercise at a fast tempo while focusing on proper exercise technique✓ allow adequate recovery between sets to maximize muscle performance✓ for example hopping/jumping/explosive leg movements ***OR*** train CNS to recruit maximum number of motor units ***OR*** jumping from a higher surface and rebounding/standing box jumps ***OR*** bounding activities✓	*Plyometric exercises for basketball should focus on leg power.*	**2 max**

	b		decline in physical performance✓ feelings of fatigue✓ loss in muscular strength/co-ordination/maximal working capacity✓ decreased appetite ***OR*** body weight loss✓ muscle tenderness/muscle soreness✓ head colds ***OR*** allergic reactions ***OR*** both✓ nausea✓ sleep disturbance✓ elevated resting heart rate✓ elevated blood pressure✓ amenorrhea in female athletes✓		**2 max**

<table>
<tr>
<td>4</td>
<td>a</td>
<td></td>
<td>thermal strain of cold water is greater OWTTE✓
water is approximately 25 times more conductive than air✓
body heat is lost approximately 3 to 5 times faster✓
convection/swimming/movement in cold water results in increased heat loss ‹compared with a static position in the water›✓
cold-shock response, such as rapid and deep inhalation✓
risk of hypothermia associated with duration of exposure✓
working muscles don’t allow for effective vasoconstriction✓</td>
<td></td>
<td>3 max</td>
</tr>
<tr>
<td></td>
<td>b</td>
<td></td>
<td>
<table>
<tr><th>Heat acclimatization response</th><th>Effect</th></tr>
<tr><td>improved cutaneous blood flow</td><td>transports metabolic heat from deep tissues to the body’s shell✓</td></tr>
<tr><td>effective distribution of cardiac output</td><td>appropriate circulation to skin and muscles to meet demands of metabolism/thermoregulation/blood pressure✓</td></tr>
<tr><td>lowered threshold for start of sweating</td><td>evaporative cooling begins early in exercise✓</td></tr>
<tr><td>more effective distribution of sweat over skin surface</td><td>optimum use of effective surface for evaporative cooling✓</td></tr>
<tr><td>increased sweat output</td><td>maximizes evaporative cooling✓</td></tr>
<tr><td>lowered salt concentration of sweat</td><td>dilute sweat preserves electrolytes in extracellular fluid✓</td></tr>
<tr><td>increased plasma volume</td><td>less viscous blood✓</td></tr>
<tr><td>reduced use of glycogen</td><td>less heat production✓</td></tr>
<tr><td>increased peripheral dilation</td><td>allows cooling effect of convection✓</td></tr>
</table>
</td>
<td>Award [1] per row.</td>
<td>4 max</td>
</tr>
</table>

Option B — Psychology of sport

Question			Answers	Notes	Total
5	**a**		3.33 – 2.87✓ = 0.46✓		**2**
	b		Group B✓		**1**
	c		*advantages:* allows increased levels of confidence/efficacy in successful skills performance✓ allows player to imagine familiar/non-threatening environment✓ allows rehearse-perfect performance of skill✓ allows player to ignore irrelevant stimuli ***OR*** can help improve concentration✓ can help control emotional responses✓ can help acquire and practice strategy✓ can help coping with pain and injury✓ can help solve problems✓ improve neuromuscular pathways✓ *disadvantages:* may not prepare player for an unexpected or unrehearsed situation✓ may not be able to overcome high level of trait anxiety✓	*Award **[2 max]** for advantages.* *Award **[2 max]** for disadvantages.*	**3 max**

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✓ traits constant in a person's behaviour✓ innate characteristics of behaviour✓		**1 max**
	b		*social learning theory:* ‹social learning theory› explains behaviour in terms of observational learning ‹modelling› and social reinforcement ‹feedback›✓ ‹the social learning theory› approach argues that behaviour is determined largely by the competitive sports event itself✓ the competitive sports environment can influence the way you behave✓ the competitive sports environment can be a stronger influence on behaviour than personality traits✓ you can influence behaviour in competitive sports by changing reinforcement(s)/feedback✓ the competitive sports environment/social learning theory cannot fully predict behaviour✓ *interactionist theory:* the trait approach assumes that reaction to a competitive sports event generally resides within the person✓ B = f (Pe) ***OR*** behaviour (B) is a function (f) of both the person/personality (P) and the environment (e) (where e = the competitive sports event)✓	*Award **[2 max]** for social learning theory.* *Award **[2 max]** for interactionist theory. Eysenck Trait Theory may be referred to regarding Interactionist theory/Trait approach.*	**4 max**

continued …

			the interactionist approach considers the situation and person as both having a part to play in determining behaviour at a competitive sports event✓ personal traits and situational factors can independently determine behaviour to influence reaction to a competitive sports event✓ personal traits and situational factors can interact or mix with each other to influence reaction to a competitive sports event✓		

7			stable factor for example lack of talent ***OR*** unstable factor for example poor quality instruction✓ internal cause for example injury ***OR*** external cause for example distance from exercise facility✓ factor you can control for example lack of effort ***OR*** factor out of your control for example cost✓		**2 max**
8	**a**		*drive reduction theory:* direct linear relationship between arousal and performance✓ as arousal increases so does performance✓ little scientific support for this theory✓ *catastrophe theory:* physiological arousal is related to performance in an inverted-U fashion✓ performance depends on the interaction of arousal and cognitive anxiety✓ some scientific support for this theory✓	*Award credit for the use of an annotated diagram.* *Award **[1 max]** for drive reduction theory.* *Award **[1 max]** for catastrophe theory.*	**2 max**

	b		*pros:* reflects the multi-dimensional nature of anxiety✓ information is useful for sports coaches ‹in trying to get athletes emotionally ready for competition, for example to reduce worry and build confidence›✓ reliable and valid self-report questionnaire✓ developed as a sport-specific measure of pre-competitive state anxiety✓ *cons:* athletes react differently in terms of the anxiety-performance relationship ‹*ie* it is important for sports coaches to have sensitivity to each athlete's individual needs pre-competition›✓ it cannot be administered during competition✓ developed as a sport-specific measure of pre-competitive state anxiety✓	*Award **[2 max]** for pros.* *Some justification/application required. Do not award marking point as both a pro and a con.* *Award **[2 max]** for cons.* *Some justification/application required.*	**3 max**
	c		‹PMR is› a technique used to manage stress/tension/anxiety/worry✓ major muscle groups are tensed for a few seconds and then relaxed in sequence✓ tensing the muscles to a large extent enables them to relax fully when released✓ with practice, it is possible to perform the technique in seconds✓ ‹PMR is› a highly effective relaxation technique that can be used by athletes as a strategy to obtain and/or maintain optimal levels of arousal before a competition✓		**2 max**

Option C — Physical activity and health

Question			Answers	Notes	Total
9	a		girls and vigorous✓		1
	b		0.3 – 1.1 %✓ = +0.8 %✓	*Accept answer without specification of positive. Final answer is incorrect if negative.*	2
	c		physical activity includes leisure time activity/transportation ‹for example walking/cycling›/occupational ‹*ie* work›/household chores/play/games/sports/planned exercise – in the context of daily/family/community activities✓ at least 150 min of moderate-intensity/75 min of vigorous-intensity/equivalent combination of moderate and vigorous intensity aerobic physical activity per week✓ moderate low intensity physical activity 3-4 or more days per week✓ aerobic activity performed in bouts of at least 10 min duration✓ try to increase/work towards 300 min of moderate-intensity/150 min of vigorous-intensity/equivalent combination of moderate and vigorous intensity aerobic physical activity per week✓ muscle strengthening activities involving major muscle groups on two or more days per week✓	*Guidelines can be found at http://www.who.int/dietphysicalactivity/factsheet_recommendations/en/*	2 max

	d		lack of dietary calcium✓ cigarette smoking✓ excessive alcohol intake✓ slim build ‹ectomorphy› ✓ obesity✓ lack of estrogen/early menopause/female triad✓ physical inactivity✓ low vitamin D levels ‹lack of sunlight and/or low dietary intake›✓ sedentary lifestyle✓ alcohol abuse✓ history of fracture as an adult✓ family history✓ Caucasian or Asian origin✓ low body mass index/BMI✓		**3 max**
10	**a**		chronic high blood pressure (BP) ***OR*** BP of ≥ 140/90 mmHg ***OR*** define systolic and diastolic BP✓ causes the heart to work harder than normal✓ strain on ‹systemic› arteries and arterioles✓ can lead to atherosclerosis/heart attack/heart failure/stroke/kidney failure✓ BP and body size ***OR*** BP uncommon during childhood✓ risk factors for high BP/obesity/smoking/excessive consumption of alcohol/family history✓		**2 max**

b

Characteristic	Type 1	Type 2
level of insulin	none/almost none	normal/exceed normal✓
term	insulin dependent/childhood onset	non-insulin dependent/adult onset✓
associated with obesity	very uncommon	frequent✓
family history	infrequent	frequent✓
percentage of diabetics	10 % to 20 %	80 % to 90 %✓
use of insulin	always	infrequent✓
onset of symptoms	rapid	slow✓
treatment	insulin injections ***OR*** dietary management	dietary control and weight reduction occasionally oral drugs✓
exercise	glycemic control is generally not improved by exercise	plays a major role in glycemic control✓
age at onset	usually under 20 yrs	usually over 40 yrs✓
basic defect	destruction of β-cells	reduced sensitivity of insulin's target cells✓

*Award **[1]** per row.*

4 max

11	**a**		increases in cerebral blood flow✓ changes in brain neurotransmitters✓ increases VO_2 to cerebral tissue✓ reduced muscular tension✓ distraction from daily hassles/routine✓ enhanced feeling of control/competency✓ positive social interactions✓ improved self-concept/self-esteem✓ structural changes in the brain✓ relieves feelings of stress ***OR*** endorphins to create feelings of euphoria✓		**3 max**
	b		social environment, for example unsupportive peers✓ physical environment, for example distance to facilities✓ time, for example amount of leisure time✓ characteristics of physical activity offered, for example if only highly competitive activities✓ leader qualities, for example lacking empathy towards individual needs✓ social and cultural norms, for example gender/ethnic expectation✓		**3 max**

Option D — Nutrition for sport, exercise and health

Question			Answers	Notes	Total
12	**a**		eat too much sugar✓		**1**
	b		70 – 30 %✓ = 40 %✓		**2**
	c		reduced carbohydrate diet✓ low glycemic index/GI and high fibre diets✓ high protein diet✓ low energy/fad/crash diets ***OR*** weight loss centres✓ diet pills/supplements✓ pharmacological agents✓ control energy expenditure and intake✓		**3 max**

13	**a**		liver✓		**1**
	b		brush border membrane✓ ***OR*** brush border found on the villi in the small intestine✓ brush border creates a very large surface area for quicker absorption of fatty acids ‹FAs›✓ pass through the cytosol of the absorptive cell✓ cross the basolateral membrane✓ enter the lymphatic system✓ fatty acid binding proteins✓ triglycerides are too big to be transported across brush border and are broken down into FAs and glycerol✓ FAs and glycerol rebuilt into triglycerides once inside the cytosol of the absorptive cell✓ chylomicrons carry triglycerides into the bloodstream✓		**3 max**

14	**a**		body weight stability ***OR*** percentage bodyweight lost following exercise✓ urine volume✓ urine colour✓ body water stores/BIA✓		**1 max**
	b		during exercise, muscles gain water at expense of plasma volume✓ endocrine system monitors fluid levels/electrolyte concentration and corrects imbalances✓ muscle potassium disturbances due to electrolyte loss in sweat may contribute to fatigue ‹by altering membrane potential›✓ renin-angiotensin mechanism✓ role of aldosterone/Na^+ and H_2O reabsorption✓ role of hypothalamus/osmoreceptors/blood osmolarity✓ role of ‹posterior› pituitary✓ role of antidiuretic hormone ‹ADH›✓		**4 max**

15	**a**		*strengths:* increases blood pH ***OR*** blood more alkaline✓ additional/effective blood buffer ***OR*** acid-base balance✓ allows higher concentrations of lactate in blood✓ delays fatigue ***OR*** improves anaerobic work✓ *limitations:* diarrhea/cramps/bloating✓ ethical use/personal choice✓ conflicting evidence✓ unpleasant taste✓	*Award **[2 max]** for strengths.* *Award **[2 max]** for limitations.*	**3 max**
	b		kidneys work harder to remove/excrete extra nitrogen ***OR*** excessive long-term protein intake can lead to kidney damage✓ increased water loss✓ body excretes water to dispose of urea✓ dehydration✓ osteoporosis ***OR*** bone calcium loss✓ stress on heart✓ potential source of illegal substances/nandralone✓ potential nutrient imbalance✓		**2 max**