Diploma Programme
Programme du diplôme
Programa del Diploma

Markscheme

November 2019

Sports, exercise and health science

Standard level

Paper 2

18 pages

Subject details: Sports, exercise and health science SL paper 2 markscheme

Mark Allocation

Candidates are required to answer **ALL** questions in Section A **[30 marks]** and **ONE** question in Section B **[20 marks]**.
Maximum total = **[50 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.

Section A

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Notes</th><th>Total</th></tr>
<tr><td>1.</td><td>a</td><td>i</td><td>67.95 ✓</td><td></td><td>1</td></tr>
<tr><td></td><td></td><td>ii</td><td><u>dribbling</u>, <u>variable</u> ✓</td><td></td><td>1</td></tr>
<tr><td></td><td></td><td>iii</td><td>82.73–65.23 ✓
17.50/17.5 ✓</td><td></td><td>2</td></tr>
<tr><td></td><td>b</td><td></td><td>
<table>
<tr><td></td><td>Fixed</td><td>Variable</td><td>Game-based</td><td></td></tr>
<tr><td>Trapping</td><td>improved</td><td>improved</td><td>improved</td><td>✓</td></tr>
<tr><td>Passing</td><td>improved</td><td>improved</td><td>improved</td><td>✓</td></tr>
<tr><td>Shooting</td><td>improved</td><td>declined</td><td>declined</td><td>✓</td></tr>
<tr><td>Dribbling</td><td>declined</td><td>declined</td><td>improved</td><td>✓</td></tr>
</table>
variability reduced for all skills/practice groups post-test ✓

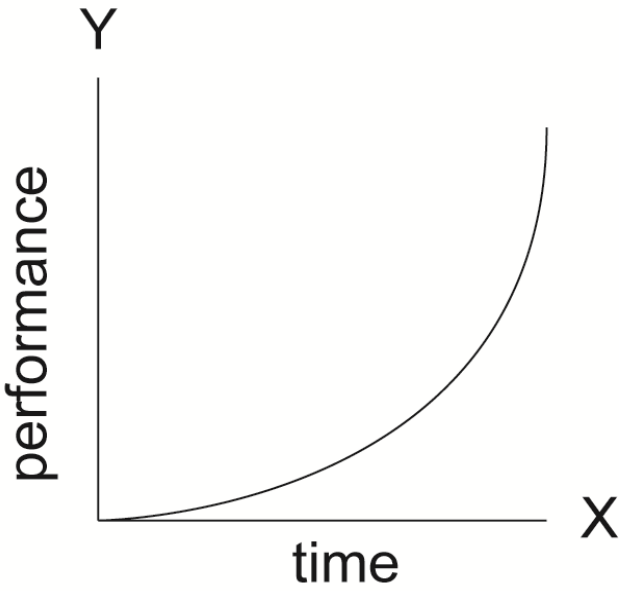
shooting and dribbling appear to be more advanced skills compared to trapping and passing ✓

post-test mean for trapping improved significantly ($p<0.05$) through variable and game-based practice and passing improved significantly for game-based practice ✓
</td><td>Accept in the converse.</td><td>4 max</td></tr>
<tr><td></td><td>c</td><td></td><td>specific movement pattern / skill (eg. passing in pairs) ✓

the performer completes the skill through blocks

OR

practised repeatedly ✓</td><td></td><td>2 max</td></tr>
</table>

			there is limited variance in the practice ✓ low levels of cognitive interference ***OR*** practice is in a closed environment✓		
	d	**i**	practice to performance ✓ performers develop skills through practice, which they then transfer into a competitive environment ✓		**2**
		ii	a temporary occurrence fluctuating over time ✓	To be awarded WTTE, the candidate must differentiate clearly between learning (permanent change) and performance (temporary change).	**1**
	e	**i**		Axes must be correctly labelled (performance *OR* learning / time) to award the mark.	**1**

	e	**ii**	a coordination of physical maturation and motivation has an optimal (positive) effect on learning ✓ motivation is required to help/have a positive effect on how a performer learns ✓ a lack of physical maturation has a negative effect on physically demanding skills ✓ learning cannot go beyond / capped by a learners' physical development / developmental readiness ✓ physical maturation within a particular school/college year group can have a positive effect on learning ✓	Accept answers in the converse.	**3 max**
2.	**a**		Athlete is in flight / in the air ✓		**1**
	b		it is the combination of speed and strength ***OR*** the ability to perform a maximum effort within the shortest period of time ✓		**1**
	c		*Strengths:* easy to administer / limited training required ✓ limited cost / equipment required ✓ athlete can conduct test on their own ✓ relevant to the actions of a volleyball player ✓ good for assessing lower limb power ✓	Award max **[3]** if only strengths or limitations are provided. Award max **[3]** if the answer does not make reference to volleyball.	**4 max**

<table>
<tr><td></td><td></td><td></td><td>Limitations:
requires timing of the participant to mark at the peak of their jump ✓
performance could improve with practice ✓
can only test one person at a time ✓
reliability decreases with fatigue with repeated, continuous trials ✓</td><td></td><td></td></tr>
<tr><td>3.</td><td>a</td><td></td><td><table><tr><td></td><td>Fibrous</td><td>Cartilaginous</td><td></td></tr><tr><td>Movement</td><td>cannot move</td><td>slightly moveable</td><td></td></tr></table>
OR
cartilaginous joints allow more movement than fibrous joints ✓</td><td></td><td>1</td></tr>
<tr><td></td><td>b</td><td></td><td>Bursae:
a small sac lined with synovial membrane containing synovial fluid ✓
often found between a bone and soft tissue, such as tendons or ligaments ✓
reduces friction / facilitates movement between structures in and/or around a joint✓
Synovial membrane:
lines the inner surface of the capsule ✓
secretes synovial fluid into the cavity ✓</td><td>Award max [1] per feature outlined</td><td>2</td></tr>
</table>

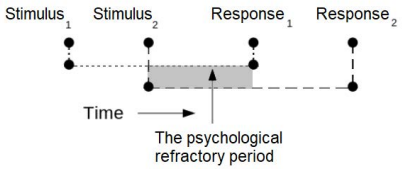
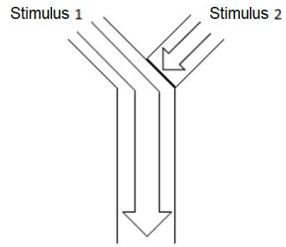
			encloses synovial fluid ✓ *Synovial fluid:* thick stringy fluid that helps to lubricate the joint ✓ nourishes articular cartilage ✓ *Articular cartilage:* smooth tissue that covers the end of articulating bones ✓ allows bones to glide smoothly over each other ✓ absorbs shock ✓		
	c		the prime mover is known as the agonist, *eg*. the quadriceps when the knee extends to kick a ball ✓	Correct example required for **[1].**	**1**
4.			increased systolic blood pressure due to dynamic exercise, *eg*, running ✓ systolic BP increases (with dynamic workload) as a result of increased stroke volume ✓ systolic blood pressure increases proportionally as cardiovascular workload increases ✓ diastolic BP remains constant through the repetitive action of the muscles on the blood vessels ✓ diastolic BP is constant due to a decrease in total peripheral resistance ✓		**3 max**

Section B

Question			Answers	Notes	Total
5.	**a**		*Frequency:* frequency of training can be from 2-7 sessions per week ✓ *Intensity:* often working at an intensity of 60–80% MHR to improve aerobic capacity ✓ interval training can be used working at a higher intensity with medium to long intervals, *eg*, 75–90% MHR, 2–1/3–1 work–relief ratio ✓ *Time:* training over 20 minutes in a continuous manner ✓ *Type:* activities such as running/swimming/cycling/rowing/HIIT ✓ HIIT circuit, including endurance activities in bouts of 30–60s, *eg*. burpees/spotty dogs/jumping jacks ✓ fartlek training can be used to replicate the change intensities within a team game ✓	Headings are not necessary to obtain the marks.	**4 max**
	b		the discus acts as an aerofoil ✓ the angle of flight of the discus causes air to travel faster over the top ✓ air pressure is lower above the discus ✓		**6 max**

			difference in air velocity creates a differential pressure above and below the discus ✓ lift is generated as a result of the pressure gradient ✓ flight of discus becomes horizontal at apex of flight ✓ when the pressure is equal above and below the discus ✓ unbalanced forces acting on the discus <*eg*, gravity> cause the angle of the discus to change ✓ so, air travels slower on the top, causing a pressure gradient ✓ discus accelerates towards ground ✓ creates an asymmetrical flight path ✓		
	c		The greater the intensity of the exercise, the greater the EPOC ✓ initial stages of exercise, oxygen demand cannot be met by the aerobic system <oxygen deficit> ***OR*** initial stages are met by anaerobic processes ✓ oxygen deficit is paid back after exercise/oxygen debt ✓ alactic/fast component is replenished with <3–4 litres of> oxygen ✓ ATP and CP/PC stores are replenished ✓		**5 max**

			myoglobin oxygen levels are replenished ✓ aerobically metabolize lactic acid ✓ resynthesize lactate to glycogen ✓ replacement of muscle / liver glycogen stores ✓		
	d		aerobic training is likely to cause a higher VO_2 max than those with no training ✓ anaerobic non-interval training is likely to have little effect on VO_2 max compared to those with no training ***OR*** high-intensity interval training produces improvements in maximum oxygen consumption ✓ activities where individuals have trained a greater area of muscle mass are likely to have a higher VO_2 max ✓ due to an increase in stroke volume/maximal cardiac output ✓ increased oxygen carrying capacity/hemoglobin content ✓ increased capillary density in muscles ✓ increased mitochondrial density / increased arteriovenous oxygen difference ✓ increased maximal minute ventilation/increased muscular endurance of respiratory muscles ✓	Accept other appropriate physiological adaptations. Award max **[4]** if only physiological adaptations given.	**5 max**

6.	**a**		When a stimulus is closely followed by a second stimulus, the first stimulus must be cleared before the second can be processed ***OR*** S2 only becomes relevant when S1 is finished with ✓ the delay in reaction time to a second stimulus is called the psychological refractory period ✓ a performer/defender has to sort out new and correct stimulus, but first they have to disregard the old and now useless stimuli, <u>which causes the delay</u> ✓ any other action/response must wait until the first response has been completed ✓ *eg*, in soccer an attacker may lean to the left/fake/dummy to move the defender; this is S1 ✓ the defender will begin to respond (R1) to S1/ to the initial stimulus first ✓ the attacker immediately moves to their right to beat the defender; this is S2 ✓ the defender cannot respond to S2 until they have completed R1 <therefore they appear to be slow and beaten by the attacker> ✓	Award max **[4]** if no example has been provided. Award max **[2]** for an explanation of the PRP including a schematic representation if no example provided.   The single channel hypothesis [Source: Psychological refractory period adapted from Multidix, https://creativecommons.org/licenses/by-sa/4.0/, Single channel hypothesis by International Baccalaureate Organization]	**5 max**

<table>
<tr>
<td></td>
<td>b</td>
<td></td>
<td>
<table>
<tr><td>Contrast</td><td>Type IIa fast oxidative glycolytic</td><td>Type IIb fast glycolytic</td><td></td></tr>
<tr><td>myoglobin content</td><td>medium</td><td>low</td><td>✓</td></tr>
<tr><td>capillary density</td><td>medium</td><td>low</td><td>✓</td></tr>
<tr><td>fibre diameter</td><td>medium</td><td>large</td><td>✓</td></tr>
<tr><td>mitochondria</td><td>high</td><td>low</td><td>✓</td></tr>
<tr><td>sample activity</td><td>eg. 400 m sprint</td><td>eg. 100 m sprint</td><td>✓</td></tr>
<tr><td>Compare</td><td>Type IIa fast oxidative glycolytic</td><td>Type IIb fast glycolytic</td><td></td></tr>
<tr><td>glycogen</td><td>high</td><td>high</td><td>✓</td></tr>
<tr><td>PC stores</td><td>high</td><td>high</td><td>✓</td></tr>
<tr><td>sarcoplasmic recticulum</td><td>high</td><td>high</td><td>✓</td></tr>
</table>
</td>
<td>Award max [3] for each of contrast / compare</td>
<td>4 max</td>
</tr>
<tr>
<td></td>
<td>c</td>
<td></td>
<td>an increase in CO_2 causes a decrease in pH ✓

decrease in pH is detected by the chemoreceptors ✓

movement is detected by the proprioceptors ✓

this stimulates the ANS to increase the depth of breathing ✓

baroreceptors inform the ANS to increase the rate of breathing ✓

the increase in rate of breathing causes the lungs to stretch further ✓</td>
<td></td>
<td>5 max</td>
</tr>
</table>

	d		stretch receptors initiate exhalation ✓ the diaphragm and/or <internal> intercostal muscles contract more forcefully ✓ accessory muscles are required to pull the rib cage in during exercise ✓ the rib cage moves downwards **and** inwards further when exercising ✓ increasing the depth of breathing ✓ the rate of breathing is increased ✓ the thoracic volume decreases further ✓ the thoracic cavity pressure raises higher than at rest ✓ air rushes out faster due to a greater difference between the lungs and the atmosphere ✓	*Award max **[5]** if no mention of accessory muscles.*	**6 max**
7.	**a**		angular momentum is defined as moment of inertia x angular velocity ✓ angular velocity and moment of inertia are inversely proportional ✓ angular momentum is when a body is spinning about an axis ✓ a moment of inertia is determined by the distance of the load from the rotational axis ✓ angular momentum remains constant unless the figure skater is acted upon by an unbalanced force ✓ figure skater rotates in the transverse plane about the longitudinal axis ✓	Accept in the converse Award max **[5]** if the student does not refer to figure skating.	**6 max**

			a figure skater can increase their moment of inertia by moving their limbs away from the centre of their body/axis ***OR*** a figure skater can increase their angular velocity by moving their limbs close to the centre of the body/axis ✓ in picture A, the figure skater has a large moment of inertia and therefore their rate of spin (angular velocity) is low ***OR*** in picture B, the figure skater has a small moment of inertia and therefore their rate of spin (angular velocity) is high ✓		
	b		joint is a ball and socket joint ✓ movement is adduction ✓ agonist pectoralis major and/or latissimus dorsi ✓ antagonist deltoid ✓ concentric contraction of the agonist ✓ third-class lever ✓		**4 max**
	c		defined as the removal of glucose units from glycogen, producing glucose-1-phosphate ***OR*** defined as the breakdown of glycogen to glucose ✓		**5 max**

			glycogen is stored in the liver ✓ glucagon acts on the liver to stimulate glycogenolysis ✓ insulin inhibits glycogenolysis ✓ requires enzymes for optimal function ***OR*** phosphorylase is the main enzyme ✓ it provides a rapid rate of production of glucose-6-phosphate ✓ adrenalin is released during the fight or flight system, which also stimulates glycogenolysis to raise glucose levels ✓ glucose is taken up by the muscle cells, where glycolysis takes place ✓ involves a hydrolysis reaction ✓		
	d		is controlled by nerve stimuli ✓ is fed by capillaries ✓ *Contractility:* ability to generate force / create tension ✓ *Extensibility:* ability to be stretched beyond its normal resting length ✓ *Elasticity:* ability to return to resting length after it has been stretched ✓	Award max **[2]** if only a list of characteristics is given.	**5 max**

			Atrophy: a decrease in <u>myofibrils / fibre diameter</u> due to a lack of physical activity ✓ *Hypertrophy:* an increase in <u>myofibrils / fibre diameter</u> due to an increase in activity/training ✓		