Markscheme

November 2024

Sports, exercise and health science

Standard level

Paper 2

17 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 (***I***). 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

Question			Answers	Notes	Total
1.	**a**		Mid-competitive season ✓		**1 max**
1.	**b**		13.3–12.1 = 1.2 **«**% decrease**»** ✓		**1 max**
1.	**c**		Vertical jump assesses power ✓ Power is required to jump in basketball ✓ Vertical jump is specific to the muscles used/ movement pattern of basketball ***OR*** Basketballers with greater vertical jump height are likely to be more successful at e.g. rebounding/ blocking in competition ✓	*MP3 Accept any suitable example where jumping would be required in basketball.*	**3 max**
1.	**d**		Coordination ✓ Balance ✓ Reaction/ response time ✓ Agility ✓ Speed ✓	*Do **not** accept power or health related components (CV endurance, muscular endurance, flexibility, strength, body composition).*	**2 max**
2.	**a**		Half court post-intervention ✓		**1 max**
2.	**b**		**«**Graphical representation of the**»** variability of data/ standard deviation ***OR*** **«**Graphical representation of the**»** spread of data around the mean ✓		**1 max**

2.	**c**		Diastolic blood pressure decreased significantly for both half court and full court groups ✓ Systolic blood pressure decreased significantly for the full court group ✓ Half court group had no effect/ no significant increase on systolic blood pressure ✓ It could be concluded that full court practice significantly reduces blood pressure ✓ Large variability in data for the systolic blood pressure group reduces confidence in drawing a conclusion ✓	*Must refer to significance for MP1, MP2, MP3, MP4.*	**3 max**
2.	**d**		Systolic blood pressure would increase ✓ Diastolic blood pressure would increase ✓		**2 max**
3.	**a**		Triceps **«**brachii**»** ✓		**1 max**
3.	**b**		Movement permitted at a synovial joint is greater than at a cartilaginous joint ✓		**1 max**
3.	**c**		Striated fibres ✓ Voluntary ✓ Multinucleated ✓ Tubular fibres ✓	*Do not accept muscle attached to the skeletal system.*	**2 max**

3.	**d**		**Strengths:** Limited equipment/ space required to conduct test ***OR*** Equipment required is cheap/ accessible ✓ Quick to administer ***OR*** Limited expertise required/ easy to administer test ✓ Reliable test ✓ Specific to static balance ✓ Suitable for a wide range of populations ***OR*** Limited risk of injury to participants ✓ **Limitations:** Only assesses static balance ✓ Not ecologically valid ✓	*Max 2 for strengths or limitations.*	**3 max**

3.	**e**		**Articular cartilage:** Cartilage that absorbs shock ✓ «Covers the end of bones and» reduces friction between bones ✓ **Meniscus:** «Fibro» cartilage which helps «uneven» bones fit at a joint ✓ Maintain stability of joint ✓ Direct synovial fluid to area of most friction ✓ **Ligaments:** Prevent unwanted movement at the joint ✓ **Joint/ articular capsule:** Helps prevent dislocation/ maintains stability ✓ Keep synovial fluid within the joint ✓ **Synovial membrane:** Secretes synovial fluid «to aid lubrication» ✓	*Do **not** accept synovial fluid and bursae.* *Max 1 per feature.* *For MP2 between the bones is required to award the MP and do **not** accept prevent.*	**3 max**
4.	**a**		Adipose tissue ✓ Skeletal muscle ✓		**1 max**
4.	**b**		Lipolysis is the breakdown of triglycerides/ triacylglycerols/ stored lipids/ fats ✓ Through hydrolysis ✓ Releasing free fatty acids and glycerol «and energy» ✓ Reaction take place in the cytoplasm ✓		**2 max**

4.	**c**		Inhalation increases to increase oxygen consumption for the cycle ✓ Capillaries returning blood to the alveoli have lower oxygen concentration compared to rest ✓ «Net» movement of gases from an area of high concentration to low concentration/ Ficks Law ***OR*** «Net» movement of gases down a concentration gradient ✓ Therefore, greater «net» movement of oxygen diffusing from the alveoli to the «pulmonary» capillaries ✓ Gaseous exchange will be faster during the cycle due to a steeper concentration gradient ✓	*Max 2 if no reference to exercise.*	**3 max**

Section B

Question			Answers	Notes	Total
5.	**a**		Increased hypertrophy of «left» ventricle ***OR*** Increased force of heart contractions ✓ Resulting in an increased stroke volume/ cardiac output ✓ Lower resting heart rate ✓ Lower exercising heart rate «at similar intensities pre-training» ✓ Increased capillarization ✓ Increased arterio-venous oxygen difference ✓ Increased elasticity of blood vessels ✓ Increased haemoglobin content ✓	*Accept any other suitable cardiovascular adaptation.*	**5 max**

<table>
<tr>
<td>5.</td>
<td>b</td>
<td></td>
<td>
<table>
<tr><td></td><td>Top spin</td><td>Back spin</td><td></td></tr>
<tr><td>(local) airflow
velocity above the ball</td><td>lower</td><td>higher</td><td>✓</td></tr>
<tr><td>(local) airflow
velocity below the ball</td><td>higher</td><td>lower</td><td>✓</td></tr>
<tr><td>(local) airflow
pressure above the ball</td><td>higher</td><td>lower</td><td>✓</td></tr>
<tr><td>(local) airflow
pressure below ball</td><td>lower</td><td>higher</td><td>✓</td></tr>
<tr><td>Flight path</td><td>dip/ flatten</td><td>lift/ higher</td><td>✓</td></tr>
<tr><td>Bounce</td><td>lower/ flatter</td><td>higher/ bounce up</td><td>✓</td></tr>
</table>
</td>
<td>Accept correctly annotated diagrams for any MPs, ensuring candidates have made a comparison between back spin and top spin.
Accept increased or decreased as alternatives to higher or lower.</td>
<td>4 max</td>
</tr>
<tr>
<td>5.</td>
<td>c</td>
<td></td>
<td>Rehearsal:
(Conscious) repetition of information required for memory ✓
Rehearsal can be used to lengthen the time information remains in the STM ✓
Rehearsal strengthens the memory trace ✓
Increasing likelihood of information encoded/ transferred to the LTM ✓

Chunking:
Grouping larger pieces of information into smaller chunks of information ✓
Smaller chunks of information are easier to store ✓
Increasing the amount of information that can be stored «as it is chunked/ grouped e.g. remembering similar routines as a group» ✓</td>
<td>Max 2 per method.</td>
<td>4 max</td>
</tr>
</table>

5.	**d**		**Physical maturation:** E.g. the more physically mature the performer the more likely they are to cope with the demands of the skill therefore the faster the rate of learning ✓ **Physical fitness:** E.g. Performers who have a higher level of physical fitness will be able to complete/ execute skills with greater ease therefore increasing the rate of learning ✓ **Age:** E.g. As a child moves towards adulthood their attention/ comprehension increases therefore this is likely to increase the rate of learning ***OR*** E.g. As an adult becomes much older their ability to learn new tasks may decrease therefore reducing their rate of learning ✓ **Difficulty of task:** E.g. The more challenging the task the harder it will be to master the task ✓ This could reduce the rate of learning ✓ **Motivation:** E.g. If motivation is low performers are less likely to challenge themselves to practise therefore reducing the rate of learning ✓	*Max 1 per factor* *Candidates must make reference to the rate of learning to receive credit. List or outline the factors is insufficient.* *Accept answers in the converse.* *NB: Age must reference childhood, or elderly rather than just a statement that as age increases so does rate of learning.* *Accept any suitable example for each factor.*	**3 max**

<table>
<tr>
<td>5.</td>
<td>e</td>
<td></td>
<td>Muscle contraction stimulates facilitated diffusion of glucose into the muscle cells ✓

Muscle contractions mobilises GLUT 4 transporters ✓

GLUT 4 stimulating glucose uptake «into muscle cells» through transporting glucose across the cell membrane ✓

Exercise stimulates increased blood flow to muscles increasing blood glucose delivery ✓

The greater the intensity/ duration of exercise the greater the glucose uptake ✓

As skeletal muscle temperature increases the activity of GLUT 4 transporters increases ✓

Exercise increases the sensitivity of muscles to insulin e.g. muscles can take up glucose more effectively in the presence of insulin ✓</td>
<td></td>
<td>4 max</td>
</tr>
<tr>
<td>6.</td>
<td>a</td>
<td></td>
<td>
<table>
<tr><td>Continua</td><td>Marathon</td><td>Dive off platform</td><td></td></tr>
<tr><td>Open-Closed</td><td>Open</td><td>Closed</td><td>✓</td></tr>
<tr><td>Discrete-serial-continuous</td><td>Continuous</td><td>Serial</td><td>✓</td></tr>
<tr><td>Coactive/ interactive/ individual</td><td>Coactive/interactive</td><td>Individual</td><td>✓</td></tr>
<tr><td>Pacing</td><td>Internally</td><td>Externally</td><td>✓</td></tr>
<tr><td>Gross – Fine</td><td>Gross</td><td>Gross</td><td>✓</td></tr>
</table>
</td>
<td>For MP4 allow converse if there is a justification e.g. marathon externally paced within a race, diving internally paced during practice.</td>
<td>3 max</td>
</tr>
</table>

6.	**b**		**Similarities:** Carbohydrate would be highest percentage of macronutrient ✓ Consume **carbohydrate, lipids, protein** and **water** as part of their diet ✓ Lipid intake will equal to/ higher than protein intake ✓ **Differences:** Marathon runners have a larger percentage of macronutrient from carbohydrate than a sedentary individual ✓ Marathon runner will have a greater total volume of macronutrients than sedentary individual ✓ Marathon runners consume greater volumes of water ✓	*Accept implied reference to similarities and differences.* *E.g. CHO intake for sedentary is 60% and CHO intake for runner is 65%.*	**5 max**
6.	**c**		When the diaphragm contracts/ flattens ✓ When the external intercostal muscles contract they pull the ribcage up **and** out ✓ External intercostal/ diaphragm muscles contract with greater force/ more frequently ✓ External intercostal muscles aid further expansion of the rib cage during exercise ✓ Causing greater/ deeper inhalation/ increased TV during exercise ***OR*** More air rushes into the lungs ✓ Muscles cause a greater pressure gradient **«**with the external atmosphere**»** ✓	*MP3-6 must reference the difference between exercise and rest.*	**5 max**

6.	**d**		Concentric contraction is the shortening of the muscle length under tension ✓ E.g. contraction of the bicep brachii as the elbow flexes whilst holding a weight ✓ eccentric contraction is the lengthening of the muscle under tension ✓ E.g. contraction of the bicep brachii as the elbow extends whilst lowering a weight ✓	*Accept any other suitable example to demonstrate concentric and eccentric contractions.* *Max 1 per example per contraction type.*	**4 max**
6.	**e**		Lactic acid system/ anaerobic glycolysis ✓ Breakdown glucose into pyruvate ✓ Without the presence of oxygen ✓ Releasing a **«**net**»** 2ATP ✓ Lactic acid/ lactate by product ✓ Takes place in the muscle cytoplasm/ sarcoplasm ✓	*Do not credit reference to ATP-PC system as it is not the predominant system.* *There needs to be a distinction between MP 3 and naming the system anaerobic glycolysis.*	**3 max**
7.	**a**		Pacemaker/ SA node fires/ initiates/ sends **«**electrical**»** impulse ✓ SA fires more rapidly during exercise ✓ Impulse travels across the atria walls and arrives at AV node ***OR*** Impulse is <u>delayed</u> at AV node **«**to allow atria systole/ ventricular diastole**»** ✓ Impulse passes from the AV node down to the bundle of His/ AV bundle ✓ Impulse moves up the Purkinje fibers **«**to stimulate the rest of the ventricles to contract**»** ✓	*Responses must be in chronological order as shown in the MS to be credited.* *Max 1 for a list of the four structures in chronological order.* *There must be some description of the sequence/ pathway the signal travels. E.g. the idea of movement of the impulse is required.*	**4 max**

7.	**b**		**Strengths:** Easier to control variables ***OR*** Tests are standardised, allowing for comparisons between athletes ✓ **«**Potential**»** increase in accuracy of equipment ✓ Often record large volumes/ variety of data in one performance ✓ **Limitations:** Lacks ecological validity ✓ Performers may not perform to their optimum/ white coat syndrome ✓ Methods can be expensive, limiting their accessibility for some athletes/ teams ✓ Expertise/ accreditation required to administer ✓ Timely to assess large numbers of participants ✓	*Max 2 for strengths or limitations.*	**3 max**
7.	**c**		**Lowering** body position to **lower** their COM ✓ Position the line of gravity to fall within their base of support ✓ Widen the base of support so the line of gravity is more likely to remain within the base of support ✓ In contact sports, place line of gravity at the edge of the base of support where contact will be made to increase the distance the line of gravity has to move ***OR*** Aim to maintain body position where the COM remains inside the body ✓	*Accept appropriately annotated diagram.* *Do **not** accept just widen the base of support without link to effect on line of gravity.*	**3 max**

7.	**d**		**Skilled performer will be:** More consistent ✓ More accurate ✓ Demonstrate greater control ✓ Learned patterns of movement ✓ Efficient in their movements ✓ Goal-directed in their movements ✓ Fluent in their movements ✓	*Accept in the converse.*	**6 max**
7.	**e**		**Strengths:** Fast nerve conduction ✓ Fast contraction speed ✓ High **«**motor-unit**»** force/ strength ✓ High anaerobic capacity ✓ **Limitations:** Low aerobic capacity ✓ low fatigue resistance ✓	*Award max 3 for strengths only.* *Do not accept fast twitch.*	**4 max**