***Year 11 ATAR  
Physical Education Studies***

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***Exercise Physiology Lab & Investigation***

***Part A***

**Total Mark: /25**

**Percentage: %**

***STUDENT NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

**INVESTIGATING PHYSIOLOGICAL RESPONSES TO EXERCISE**  
Investigate and report on the bodies short-term response to exercise and role of carbs fats and protein as a fuel source.

### Instructions to candidates

Write your answers on lined paper. A blue or black ballpoint or ink pen should be used.

Wherever appropriate, fully labelled diagrams, tables and examples should be used to

illustrate and support your answers.

Section A is completed in a lesson prior to the ***formal in class test.***  
  
**Laboratory**

*Aim*

Your aim is to discover the immediate physiological responses to exercise, and explain why these responses are occurring.

*Design:*

* All students are to complete the Beep Test.
* Working in pairs you are to record your partner’s results.
* Participating students are instructed to try and get the best score possible.
* One partner will record how many 20m intervals the subject completes and the time/duration of the activity.
* One partner will write observations about how easy or hard the subject is finding the race.

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*Equipment:*

Beep test instrument

*Data Collection:*

The students should record notes on the following:

* Subjects’ descriptions of feelings of fatigue against levels.
* One partner will record how many 20m intervals the subject completes and the time/duration of the activity.
* ***Complete all sections of the table***

Fill in the attached table by recording the following: **(4 marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Heart Rate**  **BPM** | **Perceived Exhaustion Rate**  **Rating 1-10** | **Sweating**  **Rating 1-10** | **Duration** |
| **Level 1** |  |  |  |  |
| **Level 2** |  |  |  |  |
| **Level 3** |  |  |  |  |
| **Level 4** |  |  |  |  |
| **Level 5** |  |  |  |  |
| **Level 6** |  |  |  |  |
| **Level 7** |  |  |  |  |
| **Level 8** |  |  |  |  |
| **Level 9** |  |  |  |  |
| **Level 10** |  |  |  |  |
| **Level 11** |  |  |  |  |
| **Level 12** |  |  |  |  |
| **Level 13** |  |  |  |  |

**Investigation Questions**  
**Question 1.**Looking at your results, explain the pattern you noticed with regard to the subject’s heart rate. Did it plateau? Why do you think this occurred? **(3 Marks)**  
  
  
**Question 2.**  
Look at your results with regards to how much your subjected sweated throughout the test. Explain these results in relation to the concept of temperature regulation. **(3 Marks)**  
  
**Question 3.**  
Think about the test your subject completed and look at the results to determine what would have been happening to their body. Explain how each of the following would have changed as an immediate response to exercise and why? **(8 Marks)**  
  
 a) Stroke Volume  
  
 b) Heart rate  
  
 c) Tidal volume  
  
 d) Selective Redistribution of Blood

**Question 4.**  
At the conclusion of the beep test, the subject would have continued to breathe heavily after for a few minutes afterwards. With the aid of a diagram, identify and discuss the concept that explains this. **(4 Marks)  
  
  
Question 5.**  
Discuss the utilisation of carbohydrates, fats, and proteins in the beep test. **(3 Marks)**

**ANSWER KEY**

**Investigation Questions**  
**Question 1.**Looking at your results, explain the pattern you noticed with regard to the subject’s heart rate. Did it plateau? Why do you think this occurred? **(3 Marks)**

- Immediate response to exercise should increase the subjects heart rate  
- Psychological factors can affect the heart rate – such as stress at the beginning  
- Once the athlete begins the test, the heart rate should stabilise and then steadily increase throughout the duration of the levels/test  
- Heart rate is directly proportionate to workload, as the workload increases, the working muscles require more oxygen in order to perform at a more demanding level, as well as the removal of carbon dioxide   
  
**Question 2.**  
Look at your results with regards to how much your subjected sweated throughout the test. Explain these results in relation to the concept of temperature regulation. **(3 Marks)**

- Working muscles increase heat production in the body during exercise  
- To avoid overheating, the blood acts as a temperature regulator, taking heat from within the body to the skin surface, where evaporation of sweat assists in cooling the body.  
  
  
**Question 3.**  
Think about the test your subject completed and look at the results to determine what would have been happening to their body. Explain how each of the following would have changed as an immediate response to exercise and why? **(8 Marks)**  
  
 a) Stroke Volume  
- The total amount of blood the heart pumps with each beat  
- During exercise, the body's demand for oxygen increases and as a result, Cardiac Output, Heart Rate and Stroke Volume all increase proportionally to cater for this.

b) Heart rate  
- Number of times heart beats per min  
- To provide more rapid supply of fuel and energy to the muscles, heart rate increases during exercise  
- This increase is directly proportional to the workload  
- During exercise, the body's demand for oxygen increases and as a result, Cardiac Output, Heart Rate and Stroke Volume all increase proportionally to cater for this.  
  
 c) Tidal volume  
- Tidal volume refers to the amount of air inhaled and exhaled during normal respiration  
- The increased need for oxygen and the removal of carbon dioxide during exercise results in an increased tidal volume.  
- At rest, tidal volume is approx 500-600ml–During exercise, it increases up to 3L/min

d) Selective Redistribution of Blood  
During exercise, arteries open up and contract to allow more or less blood to reach certain areas of the body.  
- Arteries taking blood to working muscles will open up (dilate) to allow more blood flow to the muscle whilst arteries taking blood to non-active areas of the body contract to reduce blood flow.   
- This increases the amount of blood available to the working muscles.  
  
**Question 4.**  
At the conclusion of the beep test, the subject would have continued to breathe heavily after for a few minutes afterwards. With the aid of a diagram, identify and discuss the concept that explains this. **(4 Marks)**

- 1 mark for correctly drawn graph

2 marks for EPOC  
 - Identifies oxygen debt or excess post O2 consumption  
 - Gets the body back to resting state, replenish CP system

1 mark for Oxygen Deficit  
 - Identifies oxygen deficit and explains oxygen consumption vs oxygen usage

Diagram, timeline

Description automatically generated

**Question 5.**  
Discuss the utilisation of carbohydrates, fats, and proteins in the beep test. **(3 Marks)**

- Only carbs used as only they can provide fuel quick enough. Carbs are stored in the muscles as glycogen and can be broken down quickly as an immediate source of energy. Due to the short duration of the beep test glycogen stores should be sufficient enough to complete beep test using only carbs

- Fats not used – cannot be broken down quick enough to be used. Or only at the start line prior to race. Fats are broken down in triglycerides and take longer than carbs to be utilised as a source of energy. Due to intensity and short duration of beep test, fats would not be used.

- Proteins not used – cannot be broken down quick enough to be used. Can be used after for recovery and to aid protein synthesis.