Human Biology – General Year 12 2019

## Task 1 – Unit 3

**Assessment Type:** Science Inquiry

**Conditions**

Period allowed for completion of the task:

* Time to plan and prepare for your practical.
* 120 minutes in class to complete practical and validation

**Task Weighting :** 7% **Due Date: Score : Part A : /45**

**Name :**

**Total : /45**

***BACKGROUND INFORMATION***

Your physical work capacity is a measure of your ability to do physical work. You determine it by measuring your cardiovascular fitness. You can think of your cardiovascular fitness as the sum of the heart muscle fitness, blood vessel efficiency and ventilator muscle fitness. You can improve cardiovascular fitness with a regular exercise program. The cardiovascular system circulates blood throughout the body, which supplies muscles with oxygen and other nutrients whilst removing waste products. Each time the heart beats; blood is either pumped out of the heart to the body or to the lungs with waste products. Heart rate refers to the number of times the heart beats per minute to supply oxygen to muscles and remove waste products by taking them to the lungs via the heart. The number of beats is directly related to the workload being placed on the heart and their cardiovascular fitness. For adults 18 and older, a normal resting heart rate is between 60 and 100 beats per minute (bpm), depending on the person’s physical condition and age. The Harvard step test is a type of cardiac stress test for detecting and diagnosing cardiovascular disease. It also is a good measurement of fitness and a person's ability to recover after a strenuous exercise. The more quickly the heart rate returns to resting, the better shape the person

**Aim: To investigate the effect of increasing time exercising on a subject’s heart rate.**

1. State a possible hypothesis for this experiment (2 Marks)

|  |  |
| --- | --- |
| **description** | **Marks** |
| If .. then.. statement | 1 |
| Using the independent and dependent variable | 1 |

1. Determine the following (2 Marks)
2. Independent variable: time exercising
3. Dependent Variable: heart rate
4. State two controlled variables and explain why they need to be controlled. (3 Marks)

|  |  |
| --- | --- |
| **description** | **Marks** |
| 2 variables controlled – exercise type, method of measuring heart rate, exercise pace, etc | 2 |
| To ensure a fair test. | 1 |

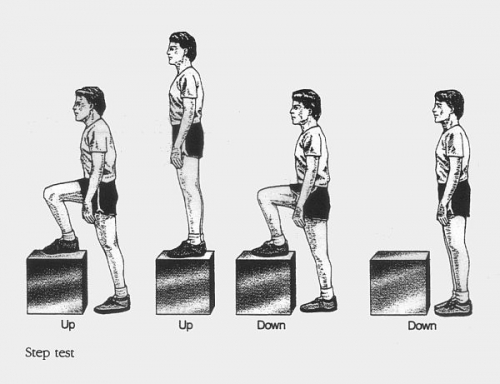
***MATERIALS***

* Stairs/ step
* Stopwatch
* Heart rate monitors

***PROCEDURE***

**WARNING:** If at any stage during the exercise period the subject experiences any discomfort, stop the activity immediately and tell the teacher

* Draw up a suitable table to collect heart rates of at least 3 different test subjects. The heart rate will be measured at 0 minutes, 2 minutes, 4 minutes and 6 minutes.
* Collect the resting heart rate of the test subject.
* Test subject is to use stairs or steps to complete step-ups and step-downs for 2 minutes. Subject is to maintain a consistent beat (1-2-3-4) (**see diagram one on next page**).
* At end of 2 minutes measure subject 1’s heart rate.
* Repeat for test subject 2 and 3.
* Repeat steps 3 and 4, stepping for 4 minutes and 6 minutes each.

**Diagram 1**: Picture showing one cycle of the step test.

1. Create an appropriate table to represent all of your data. (2 Marks)

|  |  |
| --- | --- |
| **description** | **Marks** |
| Units at top | 1 |
| Overall neatness i.e ruler, logically organised. | 1 |

1. Graph the heart rate of your three test subjects on the grid below. (6 Marks)

|  |  |
| --- | --- |
| **description** | **Marks** |
| Title- the effect of increasing time exercising on a subjects heart rate | 1 |
| X axis labelled with units (time) and Y axis labelled with units (heart rate) | 1 |
| Key with the three subjects | 1 |
| Scale on both axis correct | 1 |
| Plotting of points🡪 1 point incorrect -1 mark, two or more points incorrect no marks. | 2 |

1. For all your data obtained, calculate the: (4 Marks)
2. Mean

|  |  |
| --- | --- |
| **description** | **Marks** |
| Correctly calculated | 1 |

1. Median

|  |  |
| --- | --- |
| **description** | **Marks** |
| Correctly calculated | 1 |

1. Mode

|  |  |
| --- | --- |
| **description** | **Marks** |
| Correctly calculated | 1 |

1. Range

|  |  |
| --- | --- |
| **description** | **Marks** |
| Correctly calculated | 1 |

1. Describe the trends in your graph and explain what conclusions can be drawn from your results. Use your data to justify your conclusions. (4 Marks)

|  |  |
| --- | --- |
| **description** | **Marks** |
| Link results of dependent variable to independent variable.  ‘as independent did this dependent did that’ | 1 |
| Justifying statement above using at least 2 separate pieces of data from their results –from the same person for 2 marks if different people 1 mark. | 2 |
| Relate to hypothesis | 1 |

1. Explain the purpose of taking the resting heart rate of each subject at the start of the experiment

(2 Marks)

|  |  |
| --- | --- |
| **description** | **Marks** |
| Resting heart rate is the control | 1 |
| Allows for comparison of effect of independent variable | 1 |

1. Explain two ways in which you could improve the reliability of the results obtained and justify how your improvements would increase the accuracy of the results obtained. (4 Marks)

|  |  |
| --- | --- |
| **description** | **Marks** |
| Two improvements explained 1 mark for each e.g. sample size, repeat trials etc | 2 |
| For each improvement they explain how it will increase accuracy.  ‘ repeating the experiment will allow an average to be obtained and removal of any outliers’ | 2 |

1. Of your sample, state who appears to have the best cardiovascular fitness? (1 Mark)

|  |  |
| --- | --- |
| **description** | **Marks** |
| Correct from their data | 1 |

1. Justify your answer for part a, using specific information that provides the answer. (4 Marks)

|  |  |
| --- | --- |
| **description** | **Marks** |
| The relationship  ‘ the person with …….. appears to be the most fit’ e. lowest resting heart rate, lowest change over experiment, lowest peak. | 1 |
| Compares data for all three test subjects related to relationship above. | 3 |

1. Describe whether this is a valid experiment. (2 Marks)

|  |  |
| --- | --- |
| **description** | **Marks** |
| Yes it is a valid experiment | 1 |
| Describing why🡪 does test what aim describes | 1 |

1. You read the following hypothesis in an advertisement “A regular exercise program will increase cardiovascular fitness.” After reading this you decide to design an experiment to test this hypothesis.
2. Design an experiment that tests this hypothesis, ensuring it is detailed enough to allow the practical to be replicated by others. (5 Marks)

|  |  |
| --- | --- |
| **description** | **Marks** |
| Step by step, logical order | 1 |
| Appropriate language, 3rd person, professional | 1 |
| Appropriate length of time must be at least 8 weeks or more | 1 |
| Appropriate sample size must be 30 or more. | 1 |
| Define the exercise type and length 🡪 reasonable | 1 |

1. State two controlled variables and explain their effect on the data if uncontrolled (4 Marks)

|  |  |
| --- | --- |
| **description** | **Marks** |
| Stating 2 controlled variables. E.g. type of exercise, length of exercise, diet, | 2 |
| Effect if uncontrolled🡪 data becomes unreliable, explanation of not knowing what causes data change/ explanation of how it makes the data unreliable. | 2 |