**Human Biology – ATAR Year 12**

**Task 4 – Unit 3**

Assessment type: Science inquiry

Conditions Time allowed for completion of the task:

• investigation planning – one class period

• conduction of investigation – up to three class periods

• completion of the introduction, materials and method sections of the scientific report – at home

• completion of the results, analysis and evaluation of data sections of the scientific report – one period under test conditions

Task weighting: 1.5% of the school mark for this pair of units \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Investigation – Temperature regulation mechanisms of the human body (64 marks)**

You will be required to plan, conduct and evaluate an investigation based on the temperature regulation mechanisms of the human body. You will write up your investigation as a scientific report.

**Part A: Planning and Conducting**

**Plan the investigation**

Things to consider when planning your investigation:

• research and provide background information on temperature regulation mechanisms

• devise a hypothesis and choose dependent and independent variables for your investigation

• identify variables to control

• decide upon the appropriate sample size, trials and data collection methods

• describe, in detail, the methodology you will use during your investigation

• decide upon the data recording method.

**Conduct the investigation**

• set up times and places for the measurements to be taken

• carry out data collection from test subjects

**Commence writing the scientific report (10 marks)**

• include an introduction to the investigation

• include the background research on temperature regulation mechanisms

• write the hypothesis for the investigation

• identify the dependent and independent variables

**Materials and method (5 marks)**

• include a list of materials used in the investigation

• include details on the method used to collect the data

• include design features of the investigation that ensured reliability and validity

**Results** (10 marks)

* show processing of raw data by identifying any outliers and working out averages
* plot appropriate graphs by hand to show results

**Part B: In Class Validation**

To complete Part B students are allowed the task sheet and the report they have completed for Part A.

**Complete the remainder of the scientific report under test conditions.**

**Analysis and evaluation** (15 marks)

* describe the trend and/or pattern in your data
* state how your data relates to your hypothesis
* use your knowledge and understanding to explain the trend and/or pattern of your results
* comment on the reliability and accuracy of the data collected
* list **two** limitations in the data collection strategy that may have affected the reliability of your data and comment on how they would have affected it
* list **two** improvements you could make to the data collection strategy to improve your investigation

**Conclusion**  (2 marks)

* summarise your findings and comment on the reliability and validity of the outcome of the investigation

The following questions relate to the Investigation you conducted for task 4.

1. State the hypothesis for your experiment. (2 marks)

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2 Did your experiment have a control group? Explain the role of a control group?

(2 marks)

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3 Do you consider your results to be reliable? What evidence did you use to make this decision? Discuss one way you could improve the reliability of your investigation?

(3 marks)

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4 State 3 variables you controlled during the experiment. (3 marks)

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Above is a procedure for a temperature investigation.

5 Why did the Scientists make sure all subjects were not suffering from any medical conditions? (2 marks)

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6 Use an annotated diagram to explain the physiological responses that occurred when you exposed your subjects to high temperatures. (10 marks)

**Task 4 Answer Key**

Planning

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Succinctly writes a general introduction that summarises the aim of the investigation | 1 |
| Provides background information on temperature control mechanisms and the function of the following in maintaining constant body temperature:   * vasoconstriction/vasodilation * shivering * piloerection * sweating * importance of maintaining constant body temperature, optimal for reactions | 1  1  1  1  1 |
| Writes a hypothesis relating dependent and independent variables and stating direction of effect  OR  Writes a simple hypothesis relating dependent and independent variables without stating direction of effect | 2  1 |
| Correctly identifies the dependent and independent variables | 1–2 |
| **Total** | **10** |

Materials and Method

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Clearly lists materials with quantities | 1 |
| Explains the method in detail, including how the sampling and data collection will be determined  OR  Briefly describes the method | 2  1 |
| Uses an appropriate sample size and number of trials to increase reliability | 1 |
| States how the effects of uncontrolled variables and other factors were minimised during data collection in order to increase validity | 1 |
| **Total** | **5** |

Results

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Records raw data in an appropriate format   * uses headings * groups relevant data * records repeat trials | 1  1  1 |
| Carries out simple processing of raw data   * calculates mean values | 1 |
| Identifies outliers in the raw data | 1 |
| Plots a/an appropriate graph/s of the processed data using correct conventions   * uses appropriate title, stating independent and dependent variables * correctly labels axes with names * labels axes with units * uses correct type of graph * plotted graph correctly | 1  1  1  1  1 |
| **Total** | **10** |

**Analysis and evaluation**

| **Description** | **Mark** |
| --- | --- |
| Makes a valid statement about the trends and patterns using data collected  OR  Describes the trends but no data included | 2  1 |
| Makes a valid statement about the trends and relates it to hypothesis | 1 |
| Explains data using scientific knowledge and understanding and provides detail on the changes to the body during exercise for temperature control, including breathing rate, circulation and sweating  OR  Explains data using scientific knowledge and understanding and provides generalised changes to body during exercise without using correct or appropriate terminology | 2  1 |
| Comments on the reliability of the raw data collected, using correct terminology, such as repeat trials or greater number of test subjects  OR  Makes comments on the reliability of the raw data collected that are generalised and not related to repeat trials or more test subjects | 2  1 |
| Comments on the validity of the raw data collected, using correct terminology, such as variables being controlled to eliminate sources of error  OR  Makes comments on the validity of the raw data collected that are generalised and not related to control of variables | 2  1 |
| Comments on the validity of the raw data collected, using correct terminology, such as variables being controlled to eliminate sources of error  OR  Makes comments on the validity of the raw data collected that are generalised and not related to control of variables | 2  1 |
| Lists **two** limitations in the data collection strategy that may have affected the accuracy or precision of the raw data collected – one mark for each limitation | 1–2 |
| Suggests at least **two** improvements to the data collection strategy – one mark for each improvement | 1–2 |
| **Total** | **15** |

**Conclusion**

|  |  |
| --- | --- |
| **Description** | **Mark** |
| Summarises results of the investigation with the use of data | 1 |
| Comments on the validity of the outcome of the investigation by relating it back to the hypothesis | 1 |
| **Total** | **2** |