

CECIL ANDREWS COLLEGE

ATAR Year 12 HUMAN BIOLOGY

Inquiry 1 – Unit 3

THERMOREGULATION

Conditions

Period allowed for completion of the task:

- PART I - Scenario questions (AFL) – to be completed at home (5 marks)
- PART II – Plan/Design a hypothetical investigation on thermoregulation – one class period (at school and finished at home). Completion of the introduction, materials and methods sections of the report should be done at home (16 marks)
- PART III – In – class validation test. Secondary data analysis: You will be provided with a set of results (from an investigation that somebody else has carried out) to analyse and evaluate in class, under test conditions – one class period (25 marks)

	Marks available	
Part 1	5	
Part 2	16	
Part 3	25	
TOTAL	46	

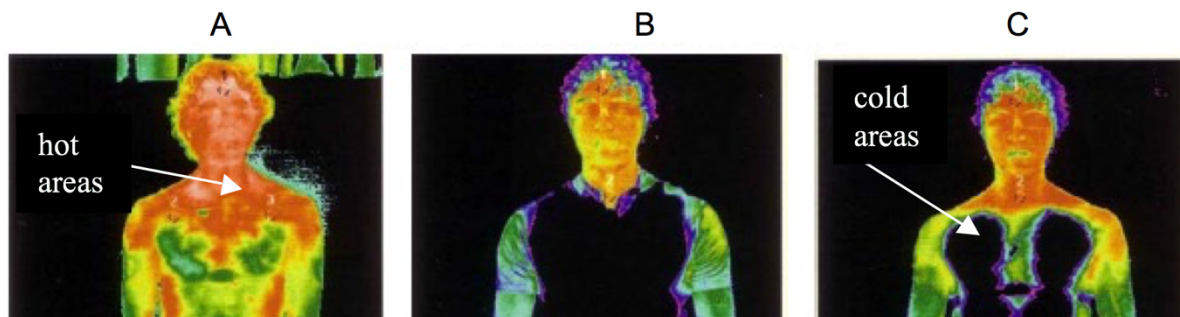
Task weighting

5% of the school mark for Semester I

Part 1

The AFL football season now starts in February and finishes late September. When games are played on hot summer days early in the season, players coming off the field are often seen resting on the bench wearing an ice jacket or standing in front of large fans.

These infrared digital images show the effect of wearing the ice jacket.



(<http://www.dest.gov.au/NR/rdonlyres/45859B13-3E95-43E0-B383-7742447A1B6B/2001/STinSportReport.pdf>)

- A: Player showing heat distribution immediately after coming off the ground.
- B: Player when wearing the ice jacket.
- C: Player immediately after removing the ice jacket.

1. What is the main method of heat lost from the skin when:
 - a) wearing the ice jacket? _____ (1 mark)
 - b) standing in front of the fan? _____ (1 mark)
2. Players standing in front of the fan returned to normal temperature faster than those wearing the ice jackets. Explain this observation. (2 marks)

3. Is the use of ice jackets to be recommended for reducing the body temperature of athletes? Explain why or why not? (1 mark)

PART II

Investigation of temperature regulation mechanisms of the human body

You are required to plan a hypothetical experiment based on the temperature regulation mechanisms of the human body, which will aim to investigate the responses of subjects to extremes of ambient temperature during exercise. Your introduction, materials and methods sections are required to be written up as a scientific report at home.

1. Plan the investigation: Part 2

Things to consider when planning your investigation:

- Research and provide background information on temperature regulation mechanisms.
- Devise a hypothesis and choose independent and dependent variables for your investigation.
- Identify variables to control.
- Identify the most accurate way to measure change in body temperature.
- 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.

2. 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.

3. Materials and method

(6 marks)

- Include a list of materials used in the investigation.
- Include details on the method used to collect the data.
- Include design featured of the investigation that ensure reliability and validity.

Name: _____

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Inquiry 1 – Part III

Validation

Investigation of temperature regulation mechanisms of the human body

The following mean data is taken from an experiment involving ten male recruits (18 to 19 years old) from the Singapore Armed Forces. Subjects performed a 12km march carrying a 28kg load under an ambient temperature of 30 degrees Celsius, where gastrointestinal temperature readings were recorded every 5 minutes for 170 minutes. The march was performed over 3 x 45 minutes of work intervals and was interspersed with a 15 min and 30 min rest interval after the first and second work intervals, respectively. Core temperature was measured using the ingestible telemetric temperature sensor that was ingested about 8 hours before the march.

Results:

Time (mins)	GI Temp (deg C)	Time (mins)	GI Temp (deg C)
0	37.5		
5	37.6	90	38.5
10	37.8	95	38.7
15	37.9	100	38.8
20	37.9	105	39
25	38.1	110	39
30	38.2	115	38.7
35	38.3	120	38.5
40	38.4	125	38.4
45	38.4	130	38.3
50	38.3	135	38.3
55	38.1	140	38.4
60	38	145	38.5
65	38.1	150	38.5
70	38.2	155	38.8
75	38.3	160	39
80	38.4	165	39.2
85	38.4	170	39.4

1. Graph the results from table on the graph paper provided and identify periods of marching and rest (6 marks)

INSERT A PIECE OF GRAPH PAPER HERE

2. Describe the changes that occur to the gastrointestinal temperatures of the soldiers during their march . (3 marks)

3. Account for the changes that occur to the gastrointestinal temperature of the soldiers during rest. (4 marks)

4. What changes would be evident at the surface of the body?

(4 marks)

5. Propose how the data would change if the soldiers were marching in a subzero ambient temperature.

(3 marks)

6. Compare the methods of data collection seen in this experiment with your own experimental design. Which methods are most reliable and why? (5 marks)

[illegible]