**Year 12 Human Biology**

**Unit 3: Science Inquiry - Homeostasis (5%)**

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Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Teacher Mrs Cunningham

**Task 3** Validation: **/48**

**TYPE:** Science Inquiry

**TIME:** 55 minutes

**Science Inquiry Homeostasis Validation**

Understanding the effect of the cold on the human body is an important military concern. Over 90,000 U.S Army and Air Force casualties during World War II were attributable to cold injury.

1. Humans tend to rely on behavioural thermoregulation to protect themselves against the cold.
2. Name the modulator that controls behavioural thermoregulation. (1 mark)

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1. Name the effector which carries out the response for behavioural thermoregulation. (1 mark)

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1. Describe two (2) behavioural responses which the soldiers in field operations during World War II would have relied on to prevent heat loss. (4 marks)

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When behavioural strategies are inadequate to maintain body temperature homeostasis, physiological responses are needed.

1. Sweating is one physiological response which helps to maintain body temperature.
2. Name the stimulus that initiates this response. (1 mark)

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1. Describe the feedback for how sweating helps to maintain body temperature. (2 marks)

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1. Is this an example of a positive or negative feedback? Explain your response. (2 marks)

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1. Explain the effect that sweating has on body fluid balance. (2 marks)

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1. Name the receptor and identify the location of the receptor that detects this change in body fluid. (1 mark)

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1. Using your understanding of feedback loops, explain how metabolism maintains body temperature when it drops too low. (8 marks)

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In an experiment conducted in 1986, finger skin temperature measurements of three 50-70 year old men and a group of three younger men were taken when their hands were submerged in 4°C water for 30 minutes.

1. Complete the following based on the information above.

Aim: (1 mark)

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Hypothesis: (2 marks)

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**Variables:**

Independent: (1 mark)

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Dependent: (1 mark)

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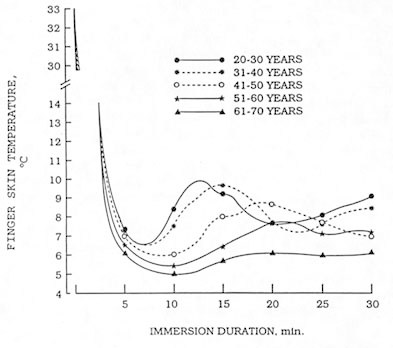
Controlled: (3 marks)

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1. Was this investigation valid and reliable? How could this be improved? (6 marks)

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**Results**

Use Figure One (below) to help you answer questions 6-8.



**Figure One:** Source - Adapted from Mathew et al. (1986).

1. Provide a brief description of these results for 20 - 30 year old males and 61 - 70 year old males, after submerging their hand in the cold water for 30 minutes. (2 marks)

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1. Write a conclusion for these results. (2 marks)

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1. Using your knowledge of feedback loops, explain why there is a decrease in skin temperature when a hand is placed in the cold water. (8 marks)

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**Reference**

FIGURE 7-3, [Finger skin temperature measurements from...]. - Nutritional Needs In Cold And In High-Altitude Environments - NCBI Bookshelf. (2020). Retrieved 20 March 2020, from https://www.ncbi.nlm.nih.gov/books/NBK232852/figure/mmm00012/?report=objectonly