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|  | **Year 11 General Biology**  **Unit 2: Solving Problems to survive**  **2021** |

**Task 11: Investigation – Adaptations (Weighting = 10%)**

**Due: Wednesday 22nd September**

**Investigation timeline**

|  |  |
| --- | --- |
| Zoo Trip | Friday 17th Setempber |
| Worksheets completed and submitted | Wednesday 22nd September |
| In class validation task | Wednesday 22nd September |

**Introduction**

Homeostasis is the process by which the body maintains a relatively constant internal

environment; it involves a stimulus‐response model in which change in environmental

conditions is detected and appropriate responses occur via negative feedback. Organism have special adaptation to help to maintain homeostasis. Each adaptations is directly related to the organism habitat and its requirement to maintain homeostasis.

Changes in an organism’s metabolic activity, in addition to structural features and changes in

physiological processes and behaviour, enable the organism to maintain its internal

environment within tolerance limits (temperature, nitrogenous waste, water, salts, and gases).

Thermoregulatory mechanisms include structural features, behavioural responses and

physiological mechanisms to control heat exchange and metabolic activity; animals can be

endothermic or ectothermic.

The type of nitrogenous waste produced by different vertebrate groups can be related to the

availability of water in the environment.

Animals have a variety of behavioural, physiological and structural adaptations to maintain

water and salt balance in terrestrial and aquatic environments.

**Your task**

During the zoo trip you will take part in a formal presentation, including live animal encounters

and PowerPoint slides to investigate structural features, behavioural responses and physiological adaptations that help animals maintain a relatively constant internal environment. Looking at the stimulus‐response model, we will explore the regulation of temperature, utilisation of water, production of nitrogenous waste, as well as the concentration of salts and gases.

Part 2 Validation will involve 1 short answer and 2 extended response questions. Part 2 is an open book assessment where you can use your zoo worksheets to assist you to answer the questions, therefore explicated detail and depth is required.

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| Assessment Part | Marks awarded | Marks available | Percentage |
| Part 1 - Worksheets |  | **73** |  |
| Part 2 – Validation Task |  | **28** |  |
| **Total** |  | **101** |  |

**Marking guide for worksheets**

|  |  |  |
| --- | --- | --- |
| **Description** | **Marks** | **Mark awarded** |
| **Page 1** | **/12** |  |
| Define homeostasis | 2 |  |
| Why is homeostasis so important? | 2 |  |
| Tolerance limits diagram and explanation | 3 |  |
| Stimulus response model | 5 |  |
| **Page 2** | **/10** |  |
| What is negative feedback? | 2 |  |
| What is positive feedback? | 2 |  |
| Negative feedback model for glucose | 6 |  |
| **Page 3** | **/7** |  |
| Define osmoregulatory | 1 |  |
| Define osmoconformer | 1 |  |
| When is nitrogenous waste produced? | 1 |  |
| Waste removal from blood and excretion | 2 |  |
| Water balance after excretion | 2 |  |
| **Page 4** | **/17** |  |
| Penguin thermoregulation table | 6 |  |
| Penguin info | 1 |  |
| Penguin Plunge activity | 5 |  |
| Thermoregulation in gigantotherms | 5 |  |
| **Page 5** | **/7** |  |
| African lions info | 1 |  |
| Thermoregulation on the Savannah | 6 |  |
| **Page 6** | **/9** |  |
| Pairing activity | 4 |  |
| Reptile info | 2 |  |
| Maintenance of homeostasis table | 3 |  |
| **Page 7** | **/7** |  |
| Kangaroo info | 2 |  |
| Maintenance of homeostasis table | 3 |  |
| Kangaroo diagram | 2 |  |
| **Page 8** | **/4** |  |
| Hopping-mouse info | 1 |  |
| Hopping-mouse adaptations | 3 |  |
| **Total marks** | **/73** |  |

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| Logo, company name  Description automatically generated | **Year 11 General Biology**  **Unit 2: Solving Problems to survive**  **2021** |

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**Part 2 – Validation Task**

Short answer (10 marks)

Birds and mammals maintain their body temperature within very narrow limits independent of the temperature of the surrounding environment. In contrast, the body temperature of most reptiles is more or less determined by the temperature of the surrounding environment.

Question 1

1. Name one mechanism by which endothermic animals maintain a fairly constant body temperature **in hot weather**.

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(1 marks)

1. Name one mechanism by which endothermic animals maintain a fairly constant body temperature **in cold weather**.

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(1 marks)

1. Complete the following table

|  |  |  |
| --- | --- | --- |
|  | Advantage | Disadvantage |
| Endothermy |  |  |
| Ectothermy |  |  |

(4 marks)

1. Describe two adaptations of the Spinifex Hopping mouse and explain how these help it adapt to its environment.
2. ­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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(2 marks)

Extended Response (20 marks)

1. Describe the physiological and behavioural responses of an animal that lives in a cold environment to regulate its core temperature. Do the same for an animal that lives in a

hot environment. (10 marks)

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2 Compare and contrast homeothermic endotherms and poikilothermic ectotherms. Choose one animal and identify what are they classified into. Describe their maintenance of homeostasis through temperature, water balance and nitrogenous waste. (10 marks)

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