**Yr. 12 ATAR Human Biology ATHBY**

**Task 6: Extended Response In Class Validation**

**Conditions**

Time for task:

Part A: You have one week to research the topic and complete notes. You **may not** use these notes for Part B.

Part B: 30 minutes for in class validation – examination-style extended answer question.

**Task weighting: 3 %**

**Part B: In-class assessment 20 marks**

Answer each part of the following question on the line paper provided.

Responses could include clearly labelled tables and graphs; clearly labelled diagrams with explanatory notes; lists of points with linking sentences and annotated flow diagrams with introductory notes.

For several years, Sophie has avoided all physical exercise, preferring to spend all her spare time in front of her computer and TV. One day, Sophie decided to take part in a hike up Bluff Knoll. This hiking track is rated as strenuous and normally takes 3 hours to complete. Half way through the steep climb Sophie was exhausted. She was breathing rapidly, and her heart rate was high.

1. With reference to the homeostatic mechanisms involved, explain why Sophie’s breathing rate and cardiac output would change during this strenuous exercise and why these changes would continue for quite a few minutes after she reached the top.

(10 marks)

a

|  |  |  |
| --- | --- | --- |
|  | Breathing | Cardiac Output |
| Stimulus | * CO2 levels in blood increase duestrenuous climb-waste product of cellular respiration 1 * CO2 dissolves in blood plasma forming carbonic acid- increases H+ and lowers pH 1 | Same as breathing |
| Receptor | * Chemoreceptors in Carotid and aorta arteries detect increase H+ send nerve messagesto Respiratory centre 1 | Chemoreceptors in Carotid and aorta arteries and medulla oblongata detect increase H+ send nerve message to Cardiac Centre 1 |
| Modulator | * Respiratory Centre in medulla oblongata sends nerves messages to intercostal muscles and diaphragm 1 | Cardiac Centre in medulla oblongata sends nerve messages via sympathetic nervous system to sinoatrial node (SA) 1 |
| Effector  Response | * intercostal muscles and diaphragm   contract at a faster and stronger rate. Increase rate and depth of breathing. 1 | Heart beats faster- cardio can increase 5l per min 1 |
| Feedback | * Decrease level of H+ in plasma due to decrease in CO2  1 | |
|  | Response will continue to exercise is reduced and H+ reduce 1 | |

b Sophie’ s body cells would require higher levels of glucose during the hike. Glucose is required in the body cells for the production of energy during cellular respiration. To maintain glucose levels in a cell, negative feedback mechanisms are necessary for more glucose to be released into the bloodstream and to enter the cell.

Identify, name the source and describe the role of **three (3)** hormones in increasing glucose levels in the bloodstream. (10 marks)

|  |  |  |
| --- | --- | --- |
| Hormone | Source | Role |
| Glugagon 1 | Alpha cells islets of Langerhans/  Islets in Pancreas 1 | Any 2   * Glycogenesis- converts glycogen to glucose in liver cell * Gluconeogenesis of lipids-converts fats/lipids into glucose * Gluconeogenesis of Amino acid converts amino acids into glucose occurs in liver cells |
| Adrenaline 1 | Adrenal medulla 1 | Any 1   * Glycogenesis-converts glycogen into glucose in liver and skeletal muscles * Glycogen in muscles converted to lactic acid, lactic acid converted to glucose in liver * Increases release of fatty acids from adipose tissue * Inhibits insulin secretion |
| Cortisol 1 | Adrenal cortex 1 | Any 1   * Glycogenesis-converts glycogen into glucose in liver and skeletal muscles * Glycogen in muscles converted to lactic acid, lactic acid converted to glucose in liver * Increases release of fatty acids from adipose tissue |

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