1.12 Biology: Homeostasis and Response: 10-minute Pack

AQA 7402 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Homeostasis relies on receptors, coordination centres and effectors working together within negative feedback loops to keep the internal environment of the body relatively stable.

(a) State what is meant by the term 'homeostasis'. **(1)**

(b) Describe the general roles of a receptor, a coordination centre and an effector within a negative feedback loop. **(3)**

(c) Explain why it is important for mammals to keep their core body temperature and blood pH within narrow limits. **(3)**

(d) State one homeostatic variable, other than core temperature, blood glucose concentration or blood pH, that is controlled in the human body. **(1)**

(Total for Question 1 is 8 marks)

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Mark scheme · 1.12 Biology: Homeostasis and Response: 10-minute Pack

Question 1

(a) the maintenance of a stable/constant internal environment, within restricted (narrow) limits, despite changes in the internal or external environment (oe) **B1**

(a) Answer: The maintenance of a stable internal environment within narrow limits, despite external or internal changes.

(b) receptor - detects a stimulus/change (deviation) from the normal level and communicates this (as a nerve impulse or hormone) to a coordination centre **B1**

(b) coordination centre - receives and processes information from the receptor(s), comparing it with a normal/set level, then sends instructions to (an) effector(s) **B1**

(b) effector - a muscle or gland that brings about a response, which counteracts the original change and restores the level back towards normal **B1**

(b) Answer: Receptor detects the deviation and informs the coordination centre; the coordination centre processes this and instructs an effector; the effector (a muscle or gland) brings about a response that restores the normal level.

(c) enzymes (and other proteins) have an optimum temperature and pH at which the rate of the reaction they catalyse is greatest **M1**

(c) below the optimum temperature, molecules have less kinetic energy and there are fewer successful enzyme-substrate collisions; high temperatures can denature enzymes, while changes in pH can alter the active site and reduce substrate binding **M1**

(c) this reduces the rate of enzyme-catalysed reactions (metabolism), so cell and tissue function becomes less efficient, or could stop altogether/be fatal, if enzymes were denatured or working well below their optimum (oe) **A1**

(c) Answer: Enzymes work fastest at their optimum temperature and pH. Lower temperatures reduce kinetic energy and successful enzyme-substrate collisions; high temperatures can denature enzymes, and changes in pH can alter the active site. These effects reduce enzyme activity and impair metabolism, which could be fatal if severe.

(d) e.g. blood water potential (water content of the blood) / osmoregulation, or blood pressure, or blood carbon dioxide concentration (any one valid physiological variable, not temperature, glucose or pH) **B1**

(d) Answer: For example, the water potential of the blood (osmoregulation).

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