

AQA A2 Biology Unit 5 Chapter 12 Homeostasis

1.

- (a) The blood vessels in the skin play an important part in allowing a mammal to conserve heat. Describe how.

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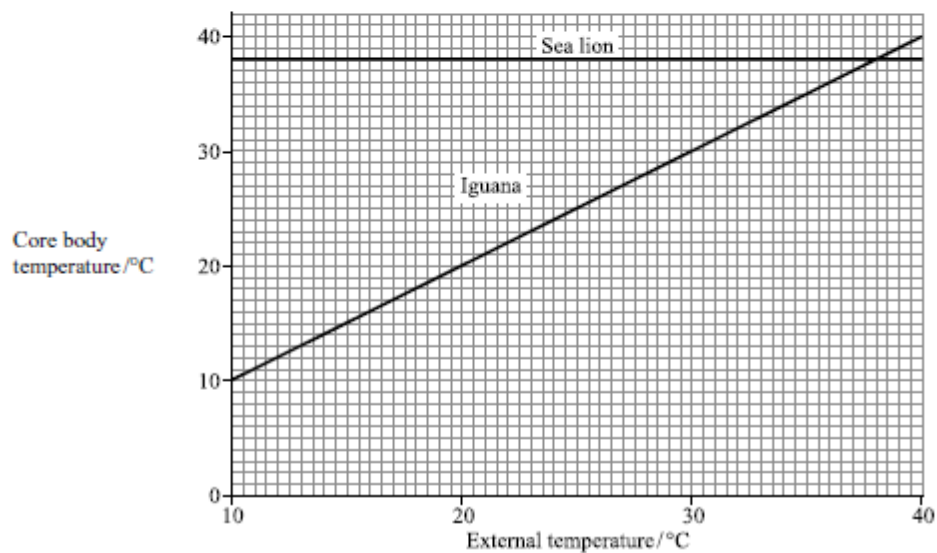
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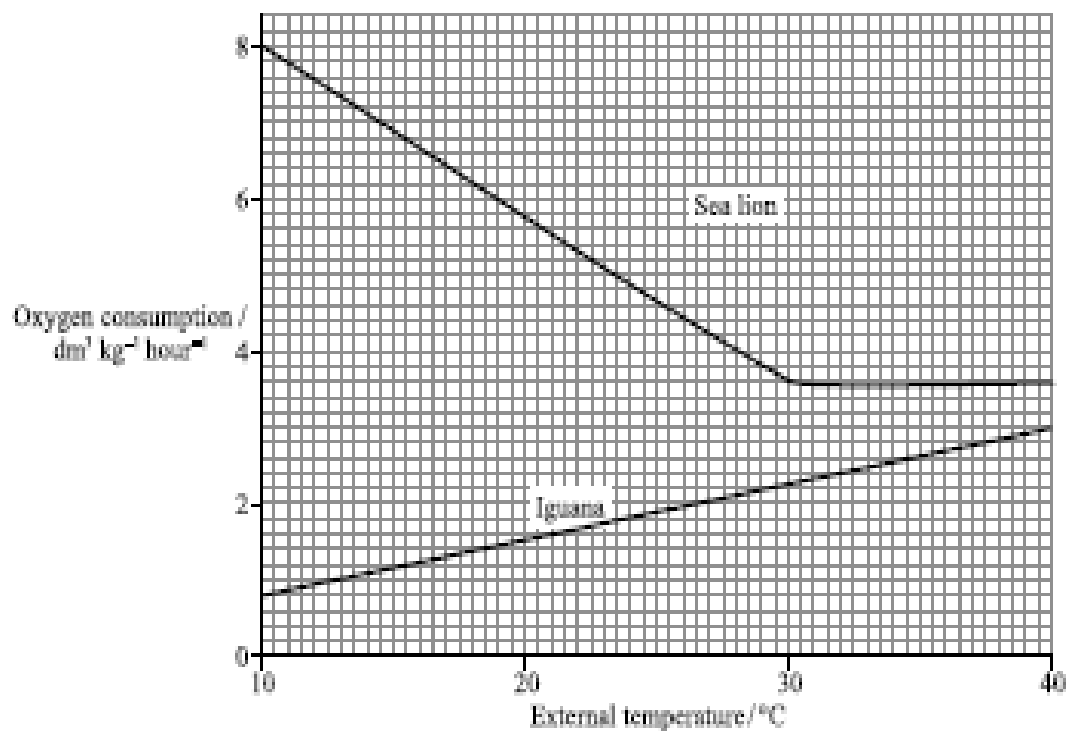
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(2 marks)

- (b) Sea lions and iguanas feed in the sea around the tropical Galapagos Islands. Sea lions are mammals and iguanas are reptiles. Both species spend some time on land. The graphs show the core body temperature and the oxygen consumption of an iguana and a sea lion at different external temperatures.





Using information from the graphs, answer the following questions.

- (i) The mean temperature of the sea surrounding the Galapagos Islands is 21 °C while the mean air temperature during the day is higher than this. Suggest why the iguana feeds for only short periods of time in the water before returning to the land.

(2 marks)

- S (ii) Explain the link between core body temperature and rate of oxygen consumption in the sea lion between the external temperatures of 10 °C and 30 °C.

(2 marks)

2.

During exercise, much heat is generated. Describe the homeostatic mechanisms that restore normal body temperature following vigorous exercise.

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(5 marks)

3.

- (b) (i) Explain how normal core body temperature is maintained when a person moves into a cold room.

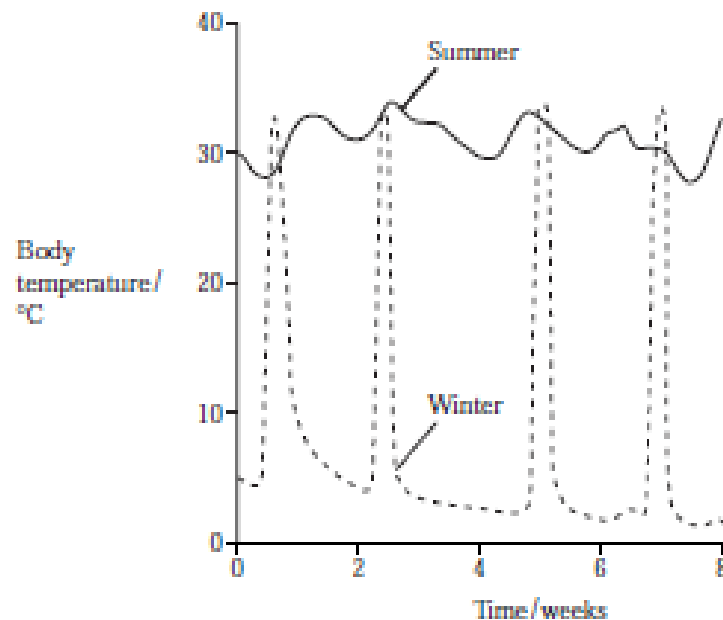
(5 marks)

- S** (ii) How does maintaining a constant body temperature allow metabolic reactions in cells to proceed with maximum efficiency?

(5 marks)

4.

The echidna is an Australian mammal. In winter, its body temperature falls to a temperature similar to that of its environment and it hibernates. However, during the period of hibernation, it becomes active every few weeks and at these times its temperature rises to a level similar to its summer temperature. The graph shows how the echidna's temperature varies in the summer and in the winter.



- (a) Explain how the fall in body temperature to that of the environment helps the echidna to survive the winter.

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(2 marks)

- (b) Explain how a higher body temperature is of benefit to an active echidna.

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(2 marks)

5.

The kangaroo rat is a small desert mammal. It takes in very little water in its food and it rarely drinks. Its core body temperature is 38 °C.

- (a) The kangaroo rat takes in some water by feeding and drinking. Describe another method by which the kangaroo rat could obtain water.

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(2 marks)

- (b) At an environmental temperature of 28 °C and 100 % saturation of the external air with water vapour, the temperature inside a kangaroo rat's nasal passages was 31 °C. At the same environmental temperature but 0 % saturation with water vapour, the temperature in the nasal passages was 26 °C. Explain the difference in temperature of the nasal passages and suggest how the lower nasal temperature helps the kangaroo rat to survive in hot, dry conditions.

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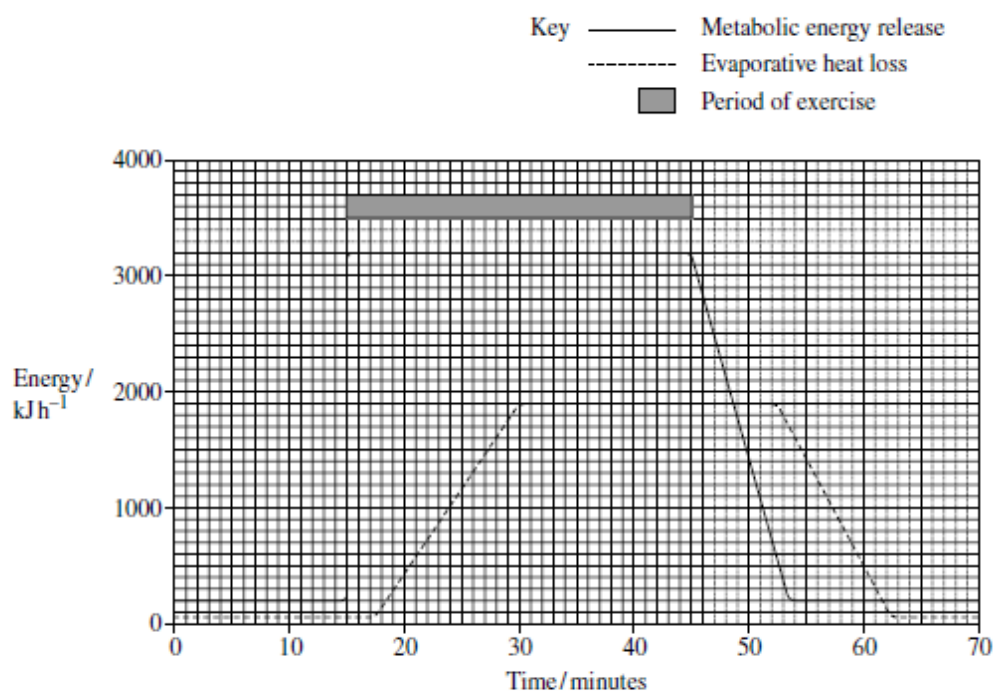
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(4 marks)

6.

The graph shows the changes in metabolic energy release and evaporative heat loss by a person during a period of exercise.



- (a) Calculate the total extra metabolic energy released during the period of exercise.
 Show your working.

Total extra energy released during exercise kJ (1 mark)

- (b) (i) Explain what caused the change in evaporative heat loss between 17 and 30 minutes.

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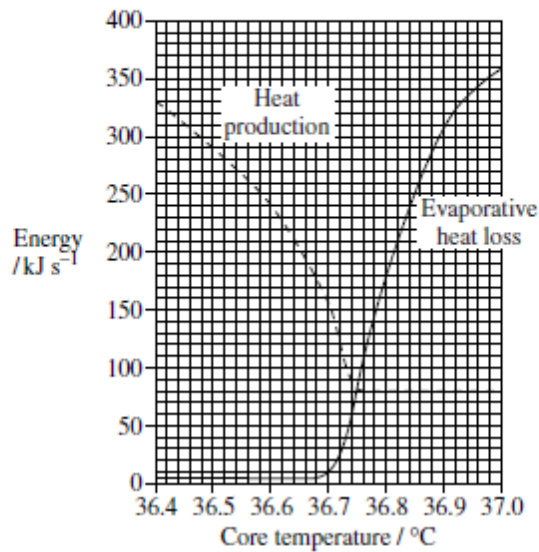
 (2 marks)

- (ii) Evaporative heat loss decreases only gradually after the period of exercise.
 Explain why.

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 (1 mark)

Scientists studied heat production and evaporative heat loss in a person who was at rest. The results are shown in the graph.



- (a) The person's core temperature was monitored using a sensor in contact with one eardrum. The eardrum is very close to the hypothalamus. What is the advantage of recording the core temperature close to the hypothalamus?

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 (1 mark)

- (b) (i) What is evaporative heat loss?

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 (1 mark)

7.

- (b) (ii) Describe and explain **one** other way in which the body increases heat loss as core temperature rises.

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 (2 marks)

- (c) Use the graph to give the range of temperatures over which the rate of respiration remained constant.

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 (1 mark)