



GCE Biology

S21-A400U10-1

Assessment Resource 9

Energy for Life Resource I

1. (a) Metabolism is a combination of anabolic reactions which build up molecules and catabolic reactions which break them down. Give one example where ATP is used in: [2]

an anabolic reaction;

a catabolic reaction.

(b) With reference to the production of ATP:

(i) state what is meant by substrate level phosphorylation; [2]

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(ii) outline the process of chemiosmosis in an animal cell. [3]

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(c) High levels of ATP within a cell cause the non-competitive inhibition of several enzymes involved in ATP synthesis.

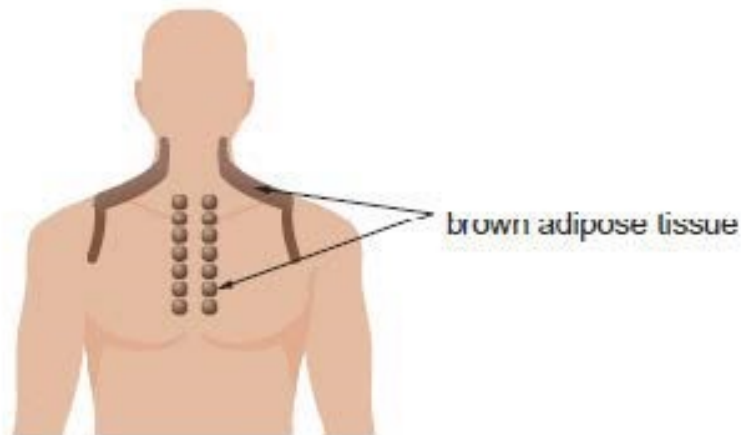
Explain how an ATP molecule could act as a non-competitive inhibitor. [2]

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- (d) There are two types of adipose (fat) tissue in humans, white adipose tissue and brown adipose tissue (BAT).

The function of BAT is to generate heat. In adult humans it is found in the neck, shoulders and chest, as shown in image 3.1.

Image 1.1



In the inner mitochondrial membrane of BAT cells there is a protein which makes the membrane permeable to protons. When there is a fall in body temperature the concentration of this protein in the membrane increases and more heat is generated.

Capsaicin is a chemical found in red chili peppers. It makes the inner mitochondrial membrane of BAT cells more permeable to protons.

- (i) Explain how capsaicin reduces ATP production by BAT cells. [2]

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- (ii) Using all the information provided, suggest why eating red chili peppers causes sweating and reddening to the neck, shoulders and chest. [3]

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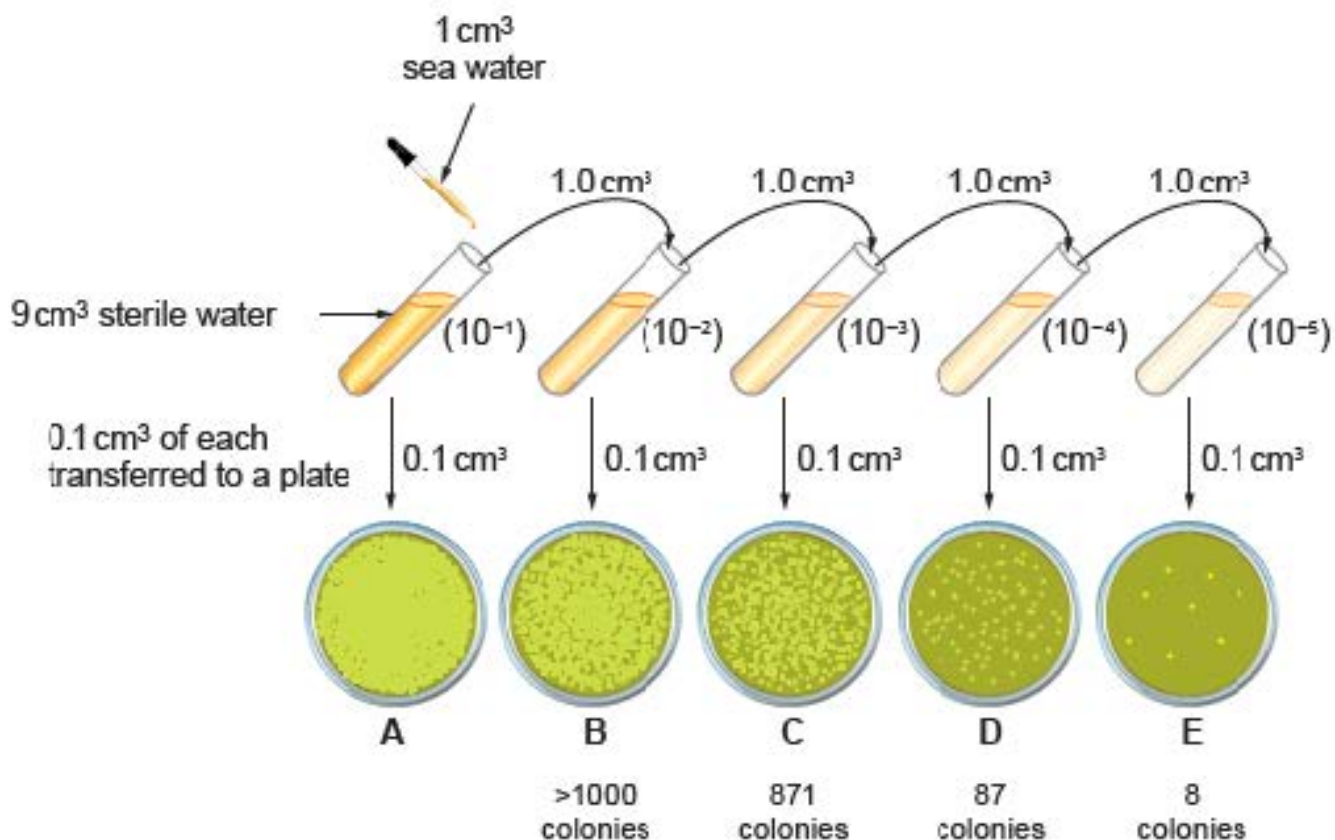
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2. The quality of bathing water at designated coastal resorts is monitored. The number of bacteria present is assessed by using serial dilutions of sea water, plating, incubating and counting the colonies as shown in Image 5.1.

Image 2.1



- (a) (i) Use the number of colonies on plate D to calculate how many bacteria there are in 1 cm³ of the original sample of water. [1]

Number of colonies =

- (ii) Explain why the number of colonies on plates C and E would not be used to calculate the number of bacteria. [2]

C

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E

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(b) Explain why it is essential that the plates are all cultured using exactly the same culture medium and incubation period. [2]

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(c) At the end of the investigation all plates were autoclaved. State one condition produced by the autoclave which results in the sterilisation of the plates. [1]

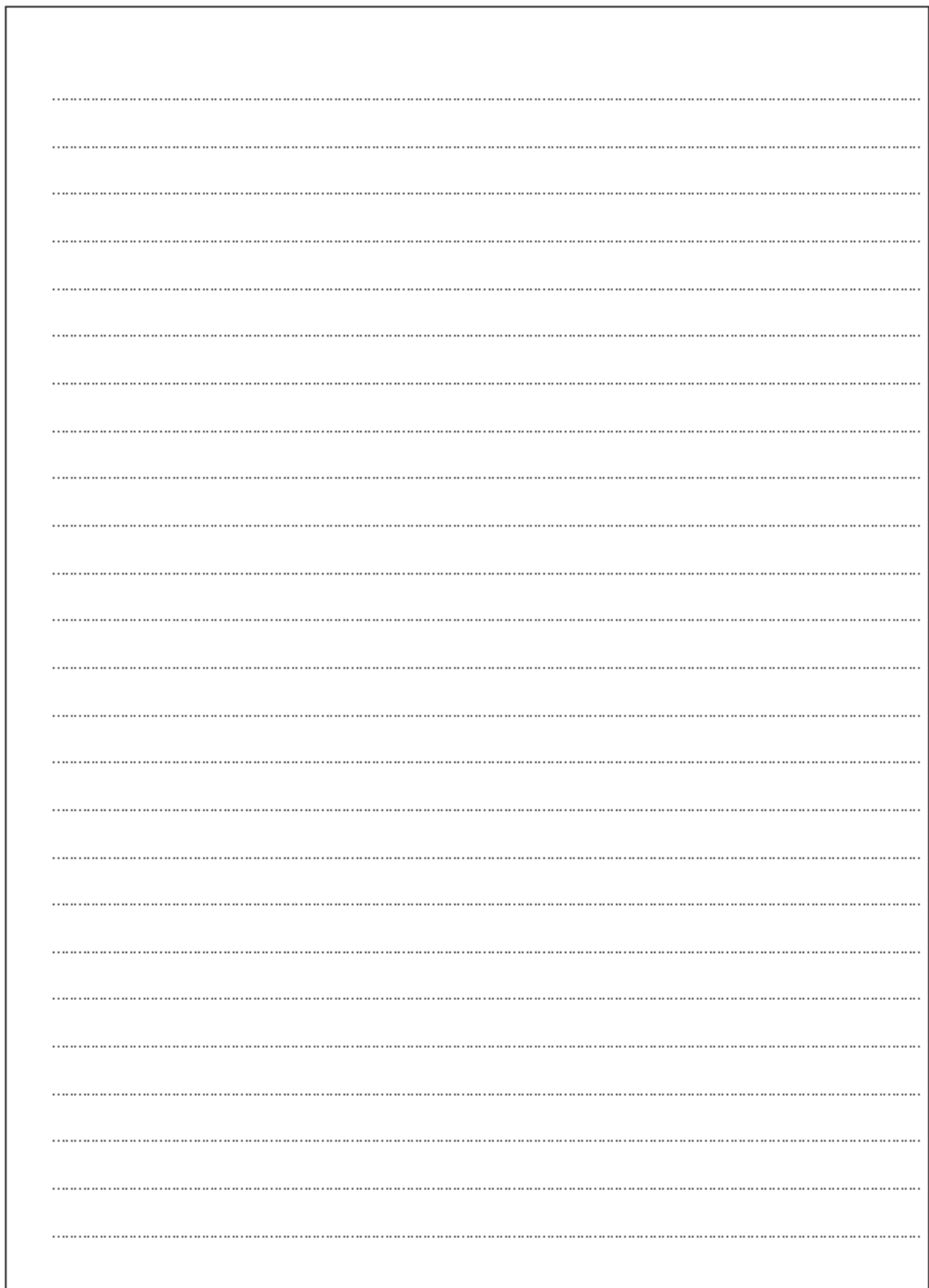
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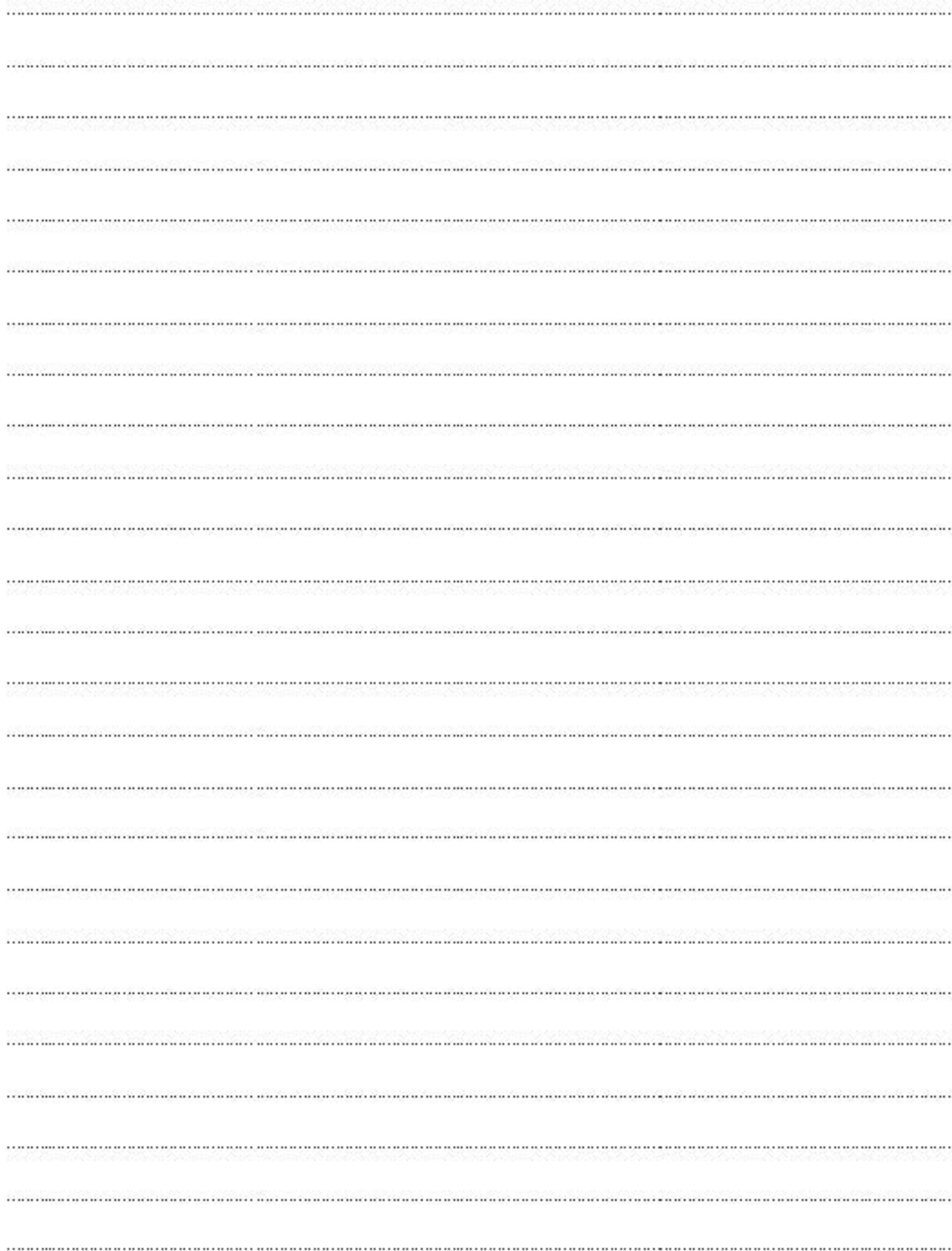
(d) Water quality can be determined by the number of human gut bacteria present. Suggest two suitable conditions for incubation in order to culture human gut bacteria. [2]

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