



## **GCE AS Level Biology**

S21-B400U20-1

### **Assessment Resource 11**

Biodiversity and Physiology of Body Systems Resource E

1. Transpiration is the loss of water vapour from the leaves of a plant. This allows water to move through the xylem of the plant.

(a) (i) Explain how the cohesion-tension theory accounts for most of the water movement through the xylem of a plant. [4]

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(ii) Explain how water moves by osmosis into the xylem of the root. [2]

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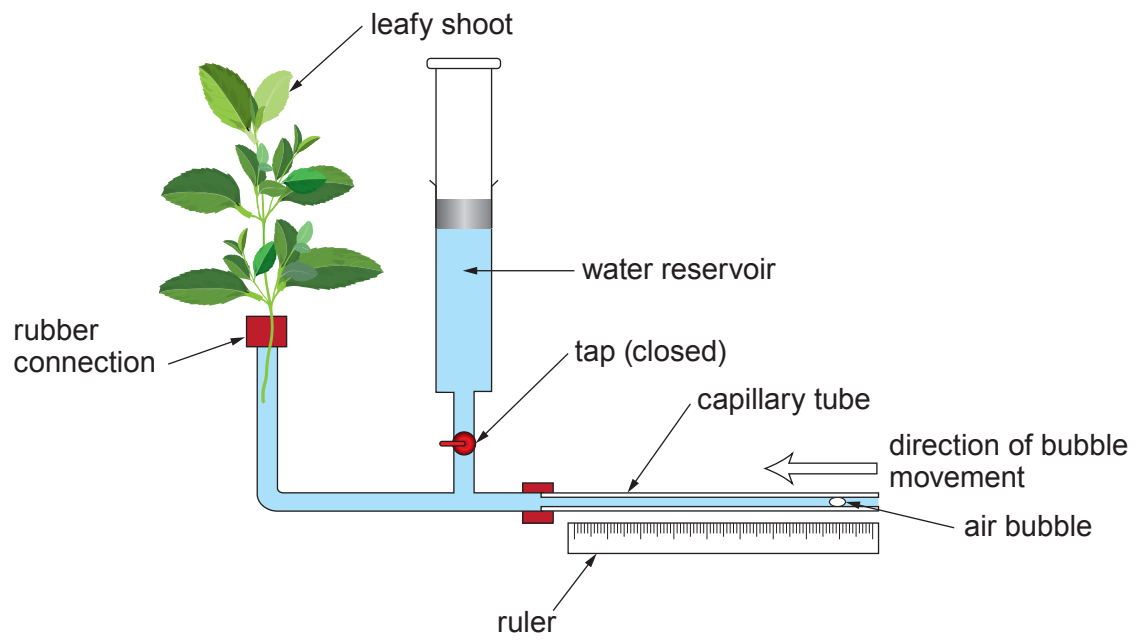
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(b) A potometer was set up, as shown in **image 1.1**, to investigate transpiration in plants. The shoot was exposed to a range of different air speeds using a hairdryer.

**Image 1.1**



- (i) Using the fast air speed, the air bubble in the capillary tubing moved 47 mm in 12 minutes. The capillary tubing diameter was 1 mm. Calculate the volume of water lost through transpiration from the shoot **per hour** using the formula  $\pi r^2 h$ . [3]

$\pi = 3.14$

$h$  = distance moved

Volume of water lost = .....mm<sup>3</sup> hr<sup>-1</sup>

- (ii) Explain why it would be incorrect to conclude that all the water taken up was lost in transpiration from the shoot. [1]

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- (iii) Explain how and why the results obtained would differ if a **xerophytic** plant was used in the same experiment. [3]

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(c) **Table 1.2** shows the results of the experiment for three air speeds generated by the hairdryer.

**Table 1.2**

Air speed setting	Distance moved by the bubble in 12 minutes / mm
slow	28
medium	35
fast	47

A student made the following conclusion from these results: '*Increasing the air speed caused an increase in the distance the bubble moved.*'

Suggest **three** reasons why it would not be possible to be confident in this conclusion.

[3]

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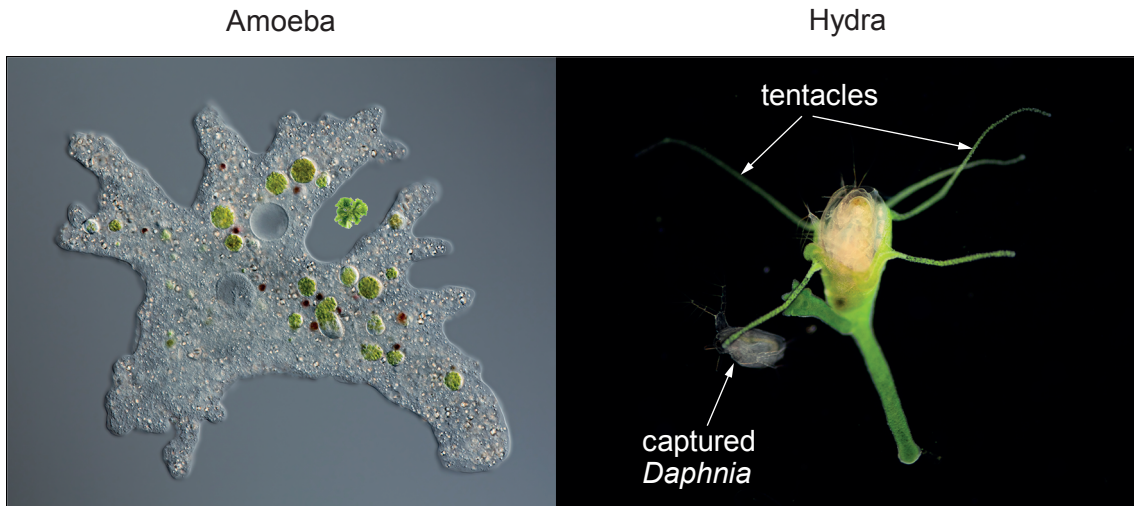
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2. **Image 2.1** shows an amoeba and a hydra feeding. Both organisms are holozoic and heterotrophic.

**Image 2.1**



(a) Define the following terms:

[2]

holozoic; .....

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heterotrophic. ....

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(b) The giant panda, *Ailuropoda melanoleuca*, is a bear which eats bamboo. It is also holozoic and heterotrophic. The giant panda is classified as a carnivore but eats mainly plants. The ancestors of giant pandas were originally carnivores and began consuming bamboo in their diet around 7 million years ago. It is thought that they then switched to eating mainly bamboo about 2 million years ago.

(i) The binomial naming system uses the genus and species name for the giant panda. State the main reason for using this system of naming organisms. [1]

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(ii) **Image 2.2** shows the skull of a giant panda.

**Image 2.2**



Using **image 2.2** and your own knowledge of dentition, state the evidence which supports the classification of giant pandas as carnivores. [3]

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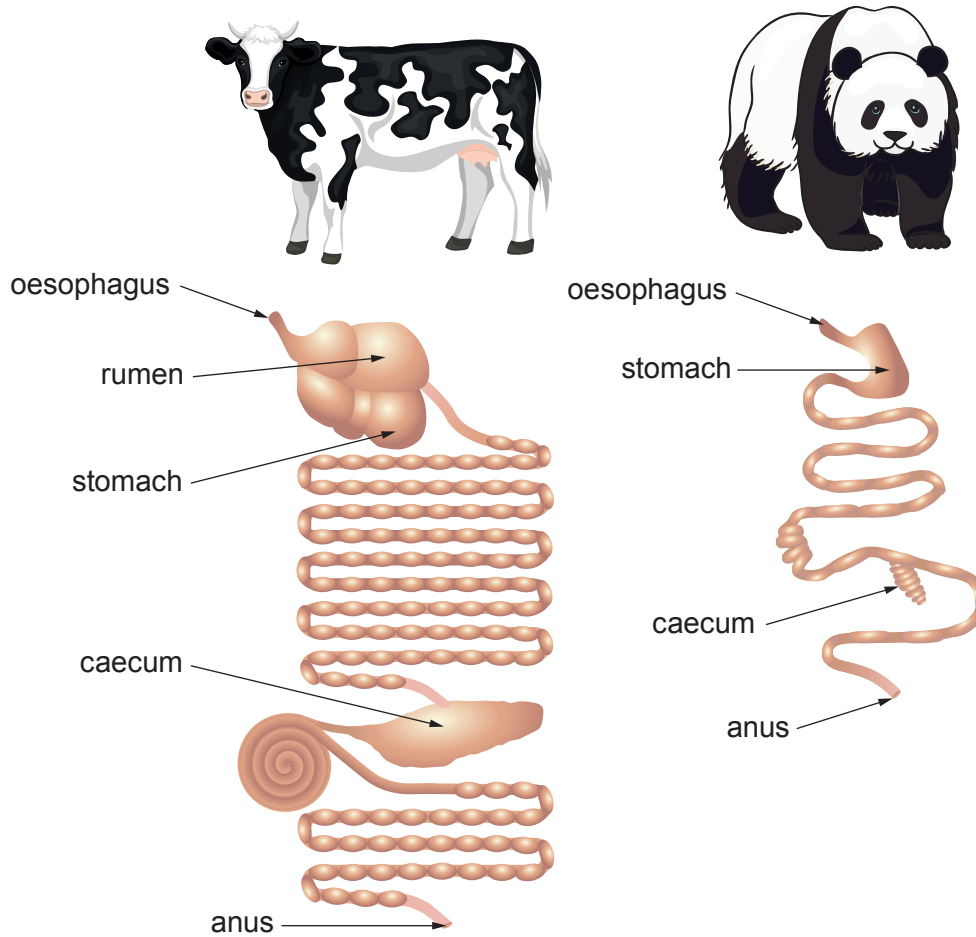
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Image 2.3 shows the digestive tract of a cow and a giant panda.

Image 2.3



(iii) Describe how **and** explain why the gut of the panda differs from the gut of a cow. [4]

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- (c) Cellulase producing bacteria have been found in the faeces of some giant pandas. Using your knowledge of digestion, suggest where in the gut the bacteria would need to be located to provide the greatest benefit to the panda. Explain your answer. [3]

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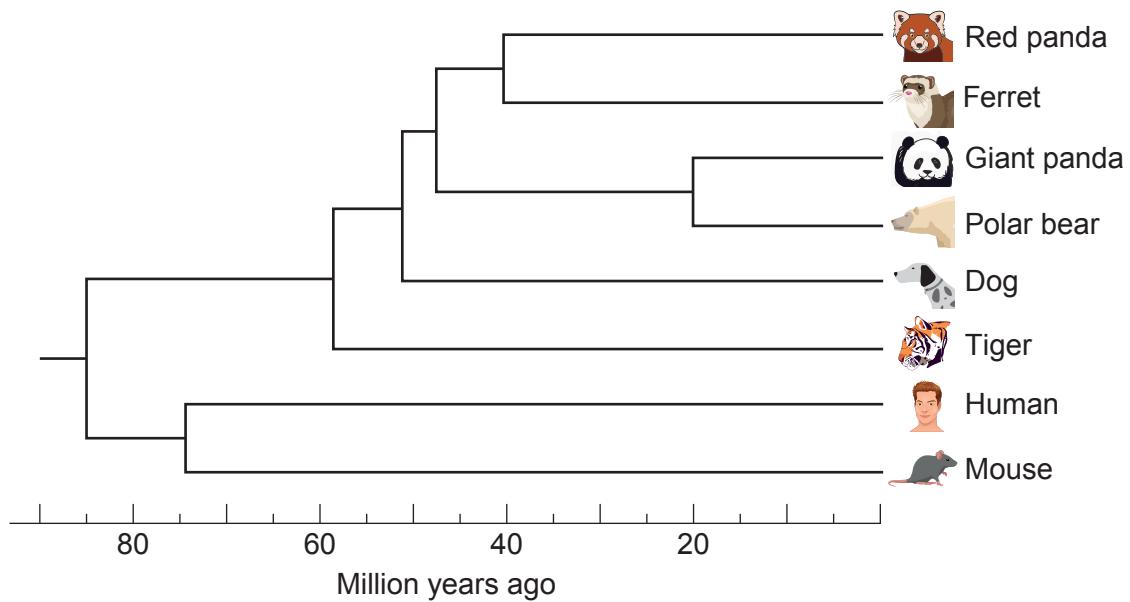
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**Image 2.4** shows a phylogenetic tree. The tree was constructed using information gathered after analysis of haemoglobin from a number of species.

**Image 2.4**



- (d) (i) Using **image 2.4**, state how many million years ago the last common ancestor existed between the giant panda and a human. [1]

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- (ii) State the information that the analysis of the haemoglobin would provide, and how this could have been used to construct the phylogenetic tree shown in **image 2.4**. [4]

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There are only around 1 000 giant pandas living in the wild. These are split between three areas in China as shown in **image 2.5**.

**Image 2.5.**



The separation of the populations of giant pandas was thought to have caused a reduction in the biodiversity of the species. Further studies have revealed that the biodiversity is high even though the number of individuals is low. The high biodiversity is caused by a high level of genetic polymorphism.

- (e) State what is meant by a 'high level of genetic polymorphism'. [2]

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