

Biology  
UNIT: 4BI1  
PAPER: 2B

Friday 7 June 2024 – Afternoon

Time: 1 hour 15 minutes

Diagram Booklet

THIS DIAGRAM BOOKLET MUST BE RETURNED WITH THE QUESTION PAPER AT THE END OF THE EXAMINATION.

In the boxes below, write your name, centre number and candidate number.

Surname					
Other names					
Centre Number					
Candidate Number					

## **INSTRUCTIONS**

**There may be spare copies of some diagrams in case you need them.**

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## Question 1



## Question 1

During the evolution of living organisms, most species have become extinct. Evolution by natural selection means that species constantly replace each other. The photograph shows the fossilised jaws of a shark called megalodon.

Megalodon was a giant, predatory shark that became extinct 2·6 million years ago.

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Some scientists think megalodon was replaced by giant, predatory toothed whales. These whales were the ancestors of modern orcas. Any sharks that remained evolved to become smaller. As well as the steady loss of species over time, there have been mass extinction events. Approximately 250 million years ago 90% of all animals and plants became extinct. The cause of this mass extinction is not known, but one theory is that it was due to the eruptions of volcanoes. The volcanoes released sulfur dioxide, carbon dioxide and dust into the atmosphere. This caused populations of producer species to fall, atmospheric carbon dioxide levels to rise, and oxygen levels to fall.

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Human activity is now causing another mass extinction. Some scientists estimate that approximately one million animal and plant species are at risk. To prevent species loss, cryozoos are being developed. Cryozoos are storage tanks containing samples of body cells from animals and are kept at a temperature of  $-170^{\circ}\text{C}$ . The cells are put in a salt and sugar solution and then frozen. If a species becomes extinct, the frozen cells can be used to clone new animals. The banteng is an endangered breed of cattle. Banteng body cells have been stored in a cryozoo. These cells have been used with eggs from another species to successfully produce a living banteng.

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(continued on the next page)



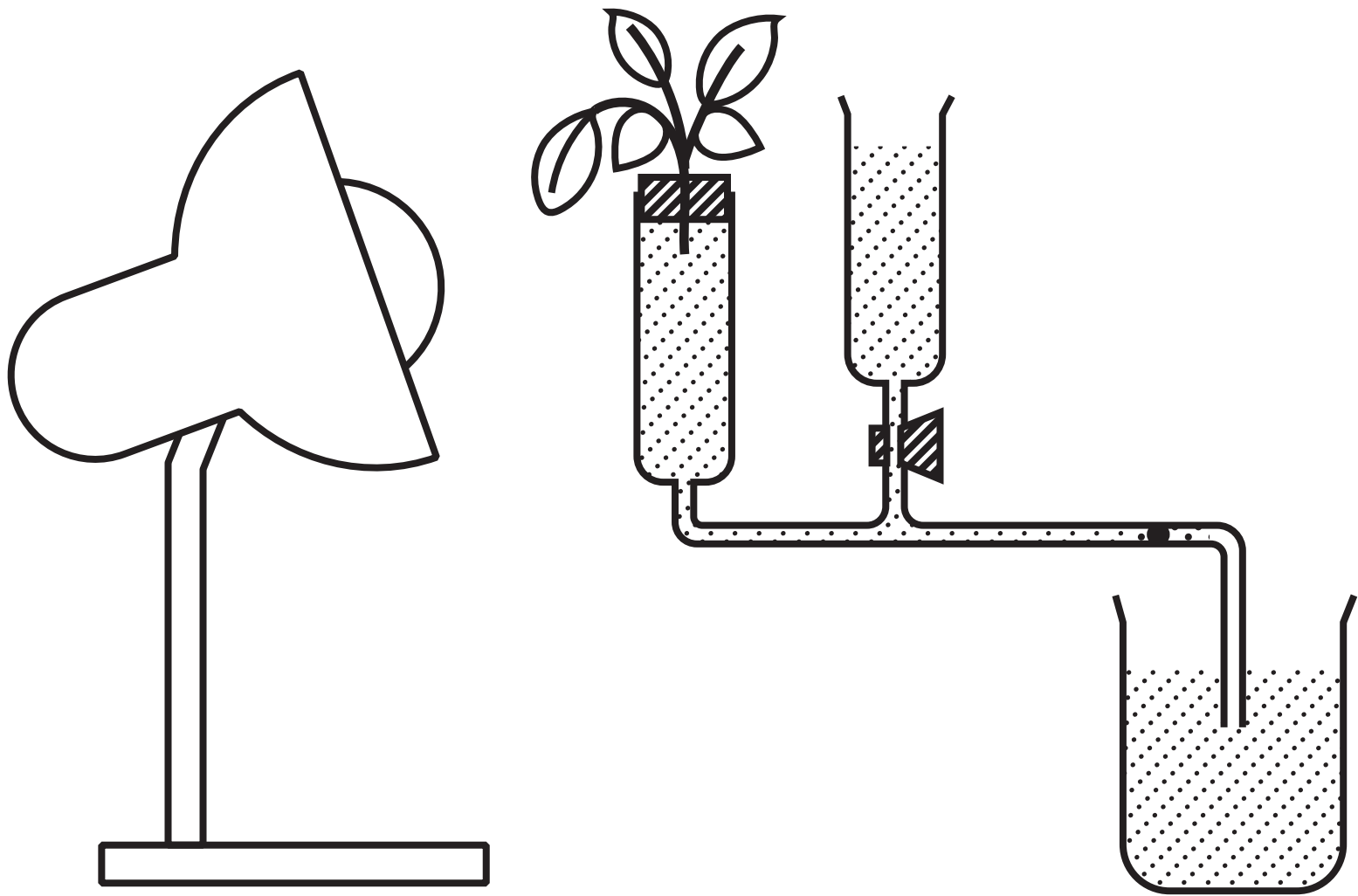
**1 continued.**

**In the future we may be able to bring back extinct species such as mammoths by making clones using the remains of frozen mammoths. Scientists need to consider the advantages and disadvantages of bringing back extinct animals. Currently, the biodiversity of the world is different from the time when mammoths were alive. Many natural predators of mammoths are now extinct. Mammoths may have helped to keep methane-releasing soil frozen, reducing the release of the methane. Mammoths were also an important part of the nitrogen cycle and increased the nutrient content of low-nutrient Arctic soil.**

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## Question 2



**Question 2(b)(i)****TABLE 1**

<b>Light intensity in arbitrary units</b>	<b>Mean volume of water lost by shoot in 10 minutes in mm<sup>3</sup></b>
<b>0</b>	<b>2</b>
<b>5</b>	<b>8</b>
<b>10</b>	<b>12</b>
<b>15</b>	<b>12</b>

Question 2(b)(ii)

TABLE 2

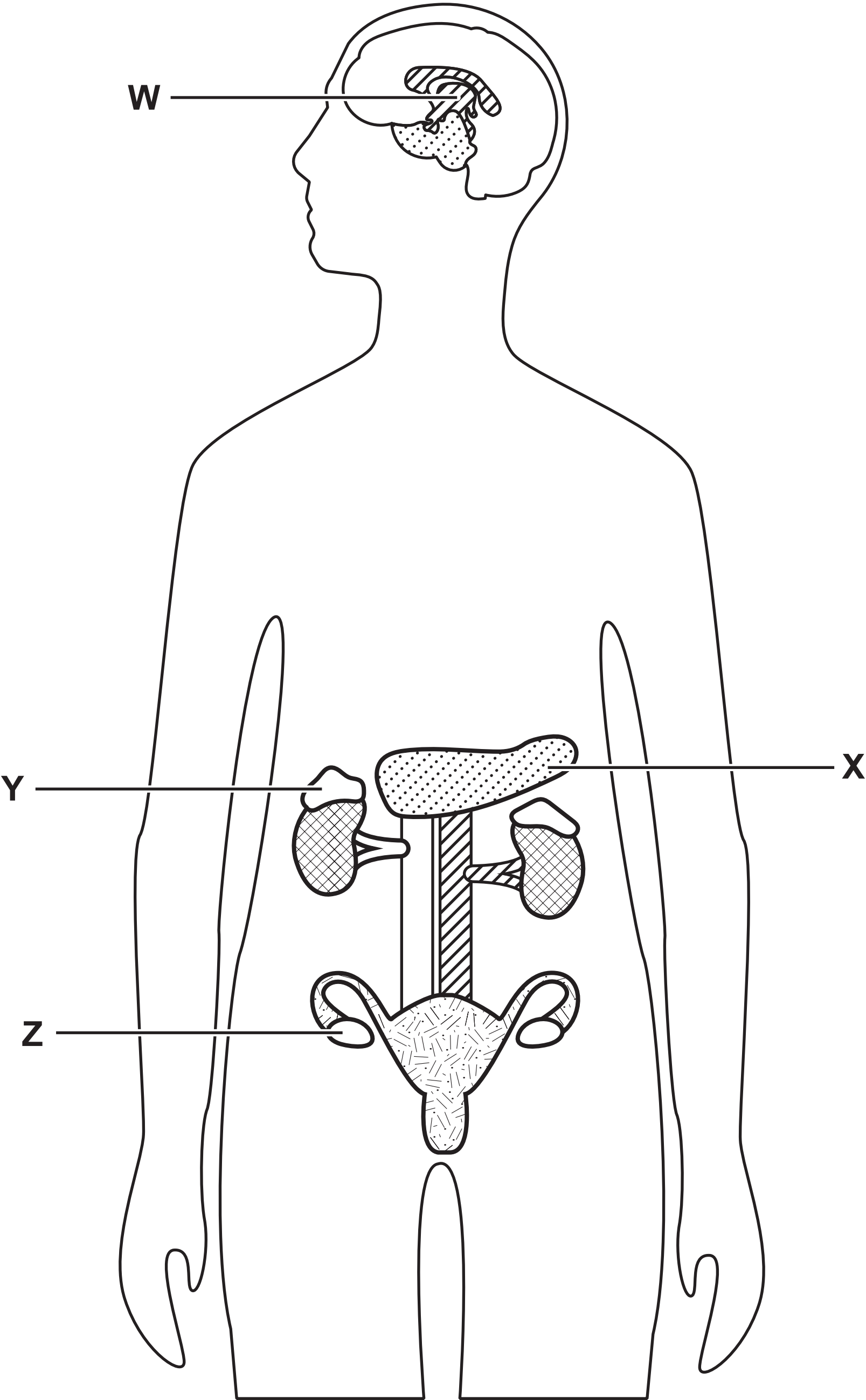
Light intensity in arbitrary units	Mean volume of water lost by shoot in 10 minutes in mm <sup>3</sup>
0	6
5	4
10	0
15	0

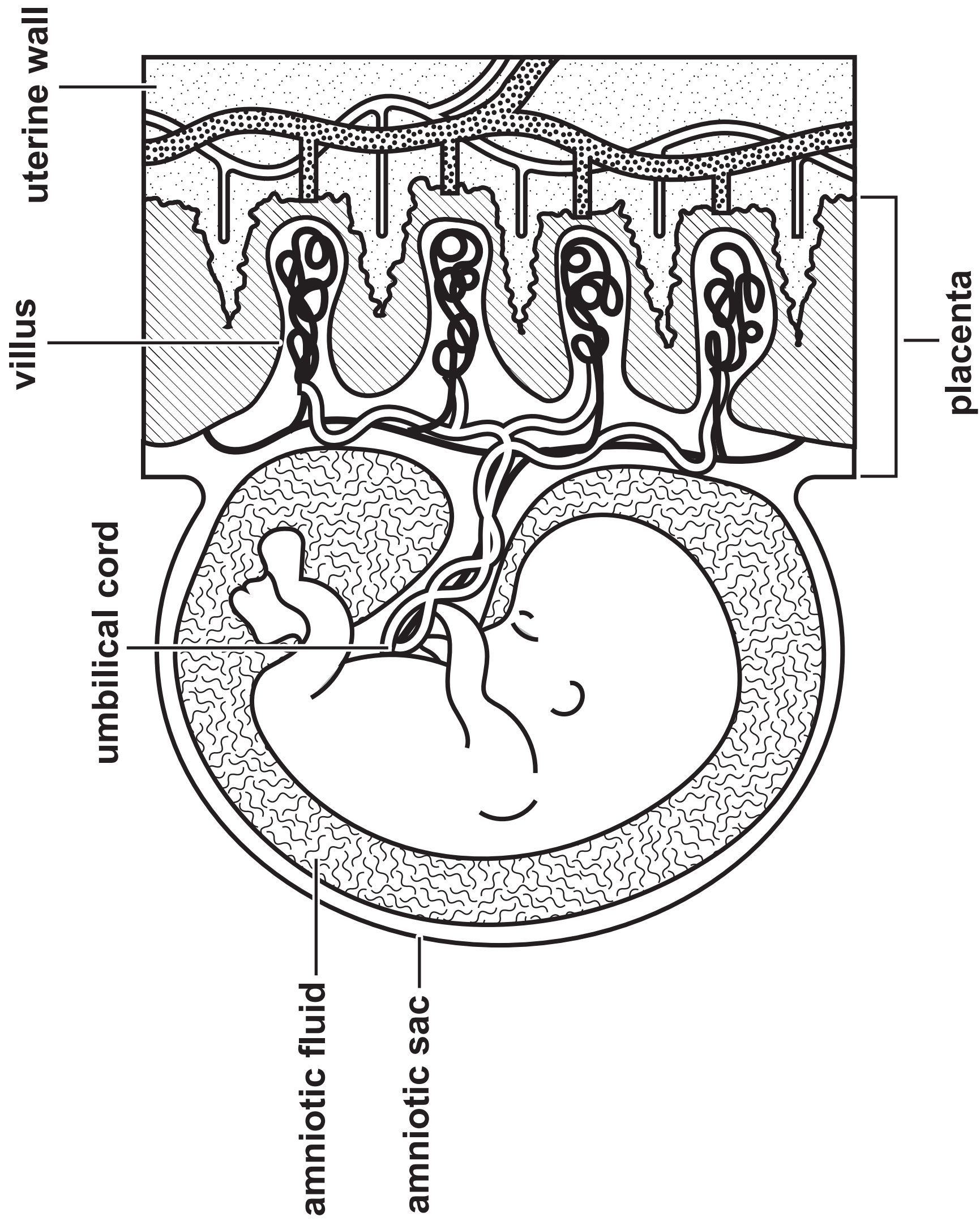


Question 3(b)(i)

Drink consumed by athlete	Volume of urine produced in cm <sup>3</sup>	Colour of urine
no drink	100	very dark yellow
pure water	750	very light yellow
isotonic drink	500	yellow

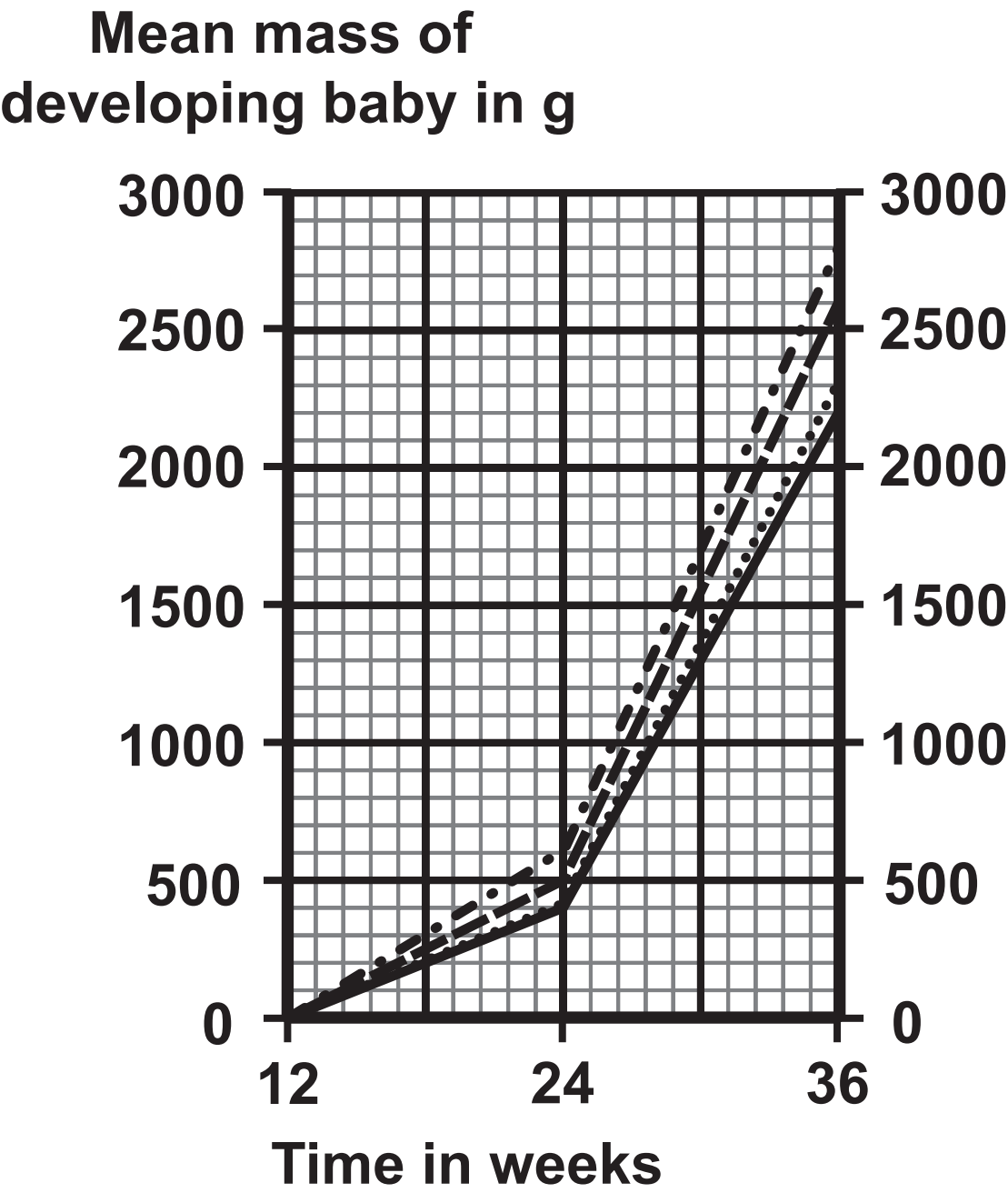
Question 4(a)(i)





Question 4(c)(i)

- KEY:
- - · - Group A
  - - - Group B
  - ..... Group C
  - Group D



Question 5(a)(ii)

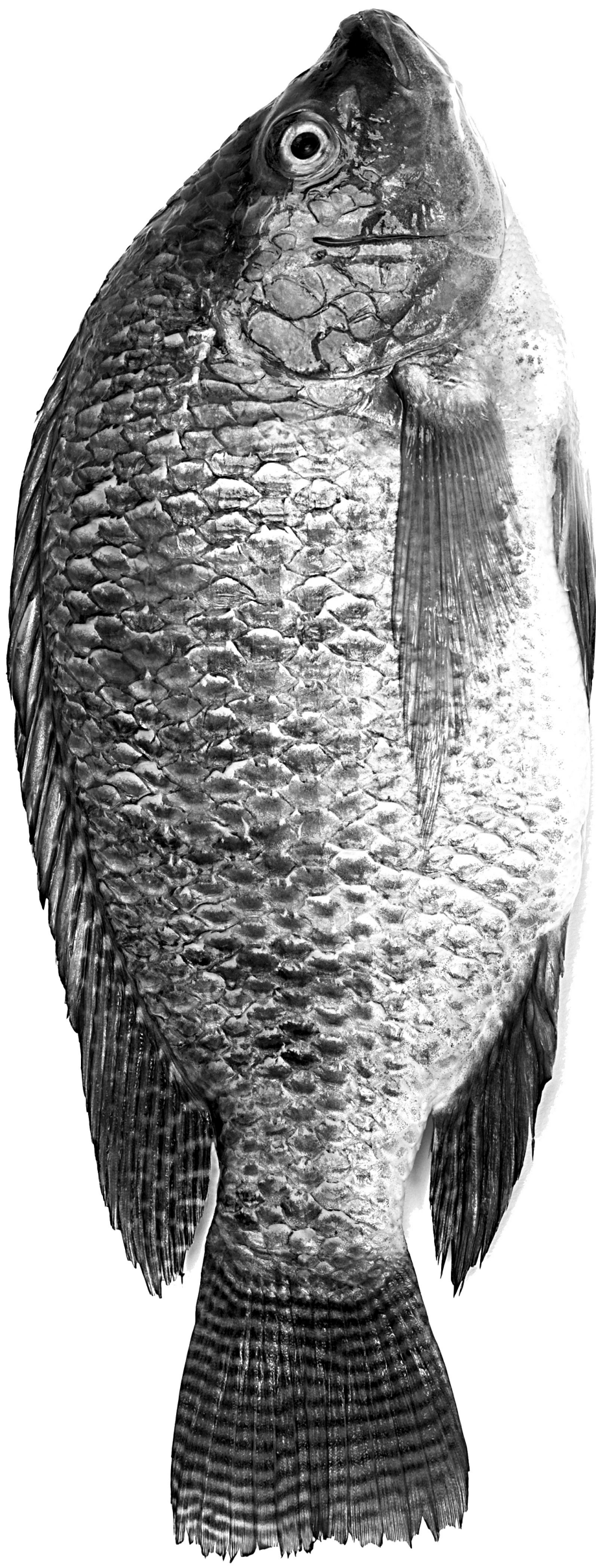
- A DNA  $\xrightarrow{\text{transcription}}$  RNA  $\xrightarrow{\text{translation}}$  protein
- B DNA  $\xrightarrow{\text{translation}}$  RNA  $\xrightarrow{\text{transcription}}$  protein
- C RNA  $\xrightarrow{\text{transcription}}$  DNA  $\xrightarrow{\text{translation}}$  protein
- D RNA  $\xrightarrow{\text{translation}}$  DNA  $\xrightarrow{\text{transcription}}$  protein

Question 5(b)(i)

Codons	Amino acid
UUU, UUC	W
AUG	X
UGU, UGC	Y



## Question 6(a)



Question 6(a)(i)

Nutrient group	Percentage of daily requirement provided by a portion of tilapia
lipids	16
protein	38
carbohydrate	16

Type of fish	Total starting mass of fish in g	Total mass of fish after seven months in g	Feed conversion index
non-GM	1250	2830	1·9
GM	1250	3750	1·2

**Question 1 (Source: © Chris Hellier / Science Photo Library)**

**Question 6(a) (Source: © David Nunuk / Science Photo Library)**