2.1 Metabolism & Water

Question Paper

Course	DP IB Biology
Section	2. Molecular Biology
Topic	2.1 Metabolism & Water
Difficulty	Hard

Time allowed: 70

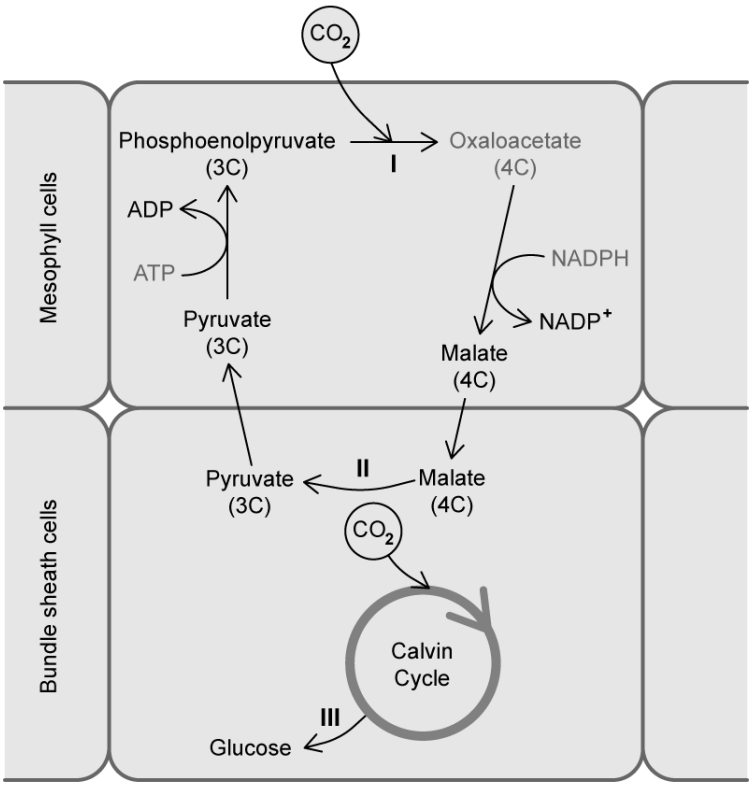
Score: /51

Percentage: /100

Question 1a

a)

Suggest, with a reason, which label (**I**, **II**, or **III**) indicates a catabolic reaction.



[2 marks]

[2 marks]

Question 1b

b)

The diagram in part (a) illustrates how life is based on certain biochemical compounds.

Identify which major group of carbon-containing compounds is dominant in this diagram.

[1 mark]

[1 mark]

Question 1c

c)
Fats and cholesterol are essential to structures and functions in the bodies of animals and therefore need to be transported in blood.

Discuss how these molecules are transported.

[3 marks]

[3 marks]

Question 1d

d)
Draw a labelled diagram of a generalised amino acid.

[4 marks]

[4 marks]

Question 2a

a)
Eastern collared lizards and pigs are two examples of animals that pant to keep cool.

Suggest how panting helps these animals to cool down.

[2 marks]

[2 marks]

Question 2b

b)
Methane is a product of the incomplete breakdown of dead organic matter. Methane can be seen bubbling out of the water in volcanic springs.

Explain why, once methane has been produced, it bubbles off the water.

[2 marks]

[2 marks]

Question 2c

c)
Draw a labelled diagram showing cohesive forces between three water molecules.

[3 marks]

[3 marks]

Question 3a

a)
Outline the significance of the surface tension of water to living organisms.

[2 marks]

[2 marks]

Question 3b

b)
Using your knowledge of the properties of water, explain why dilute aqueous solutions (eg. glucose solution) are clear.

[2 marks]

[2 marks]

Question 3c

c)
Explain the relationship between the osmolarity of a solution and its water potential.

[3 marks]

[3 marks]

Question 3d

d)
Explain how water's high specific heat capacity helps to keep environmental conditions constant for organisms.

[2 marks]

[2 marks]

Question 4a

a)
Water exists in all three of its physical states in Nature.

Give an example of each physical state of water that exists in Nature and how it affects organisms and ecosystems.

[6 marks]

[6 marks]

Question 4b

b)
Compare and contrast the properties of methane and water.

[4 marks]

[2 marks]

Question 4c

c)
Explain why a methane molecule (CH_4) forms a tetrahedral shape.

[2 marks]

[2 marks]

Question 5a

One mark is available for clarity of communication throughout this question.

a)
Multiple pieces of evidence are required for scientists to falsify theories.

Discuss the evidence that scientists used to falsify the theory of vitalism.

[3 marks]

[3 marks]

Question 5b

b)
Deamination (the removal of an amino group from a molecule) and gluconeogenesis (the production of glucose from non-carbohydrate sources) are two reactions that occur in the liver.

From the information given, suggest with reasons, which metabolic reactions these are classified as.

[4 marks]

[4 marks]

Question 5c

c)
Explain the properties of water that are key for the survival of an oak tree.

[8 marks]

[8 marks]