IB Biology SL • Trimester Assessment Worksheet 01

Water and Life Foundations

Topic coverage: A1.1.1, A1.1.5, A1.1.6

Name: _____	Class: _____
Date: _____	Time guide: 35 minutes
Total marks: 26	Level: SL

Focus for this worksheet

• Topic focus: why water is fundamental to life, water as the medium for metabolism and transport, opportunities and challenges of aquatic habitats.

• Use IB-style command terms and support explanations with biological reasoning.

• Answer directly in the spaces provided or on separate paper if more space is needed.

Section A: Multiple choice [4 marks]

1. The earliest cells were most likely to arise in water because water [1]

A. contains more oxygen than air
B. provides a medium in which dissolved molecules can react
C. always stays at exactly the same temperature
D. prevents all substances from diffusing out of cells

2. Which statement best explains why blood is an effective transport medium? [1]

A. Most useful substances are insoluble in water.
B. Plasma is largely water and carries dissolved substances.
C. Blood has no role in waste removal.
D. Water prevents hormones from moving through the body.

3. One advantage of living in water is that [1]

A. buoyancy can support body mass
B. water has lower viscosity than air
C. dissolved oxygen is more abundant than in air
D. aquatic habitats always have constant light intensity

4. A major challenge for many aquatic animals is that water [1]

A. contains no dissolved mineral ions
B. cannot support large organisms
C. offers greater resistance to movement than air
D. cannot moderate temperature changes

Section B: Short answer [8 marks]

5. Outline two reasons why water is described as the medium of life. [2]

6. Explain one benefit and one challenge of living in water for an animal. [4]

7. State two reasons why measurements of extreme points on Earth, such as ocean depth, may change over time. [2]

Section C: Data response / case study [8 marks]

Stimulus 8. Case study: comparing air and lake water as environments

The table gives simplified environmental comparisons for a terrestrial habitat and a lake habitat used for assessment purposes only.

Property	Air	Lake water
Relative buoyant support	very low	high
Typical daily temperature change	14 °C	3 °C
Relative oxygen availability	high	low
Resistance to movement	low	high

8a. Identify the habitat that offers greater buoyant support. [1]

8b. Using the data, explain one reason some very large organisms can live successfully in water. [2]

8c. State the property in the table that suggests temperature is more stable in lake water than in air. [1]

8d. Explain why fish need specialised gas-exchange structures such as gills. [2]

8e. Use the data to suggest which habitat would require more structural support against gravity, and justify your answer. [2]

Section D: Extended response [6 marks]

9. Explain why water is indispensable for life at both the cellular level and the ecosystem level. [6]

End of student response section.

Answer Key and Marking Guidance

Worksheet 01: Water and Life Foundations

General marking notes

• Award [1] for each valid point unless otherwise indicated.

• Accept equivalent wording when the biological meaning is clear.

• For explanation questions, credit the biological link or cause–effect statement, not just a list of terms.

• Do not double-credit repeated ideas expressed in different words.

Section A: Multiple-choice answers

Question	Answer
1	B
2	B
3	A
4	C

Section B: Short-answer markscheme

5. Outline two reasons why water is described as the medium of life. [2]

• Many biochemical reactions occur in aqueous solution / in cytoplasm.
• Water transports dissolved nutrients, gases, hormones, or wastes.

6. Explain one benefit and one challenge of living in water for an animal. [4]

• Benefit: buoyancy supports body mass / reduces need for strong skeletal support.
• Benefit explanation: less energy is needed to resist gravity or large body size becomes possible.
• Challenge: water is dense / viscous so movement is resisted.
• Challenge explanation: streamlined shape / fins / flippers are needed to reduce drag.

7. State two reasons why measurements of extreme points on Earth, such as ocean depth, may change over time. [2]

• Improved surveying / measurement technology gives more accurate values.
• Geological processes / natural change can alter the location measured.

Section C: Data response / case-study markscheme

8a. Identify the habitat that offers greater buoyant support. [1]

• Lake water.

8b. Using the data, explain one reason some very large organisms can live successfully in water. [2]

• Water provides high buoyant support.
• This reduces the effect of gravity / reduces the amount of supporting skeleton needed.

8c. State the property in the table that suggests temperature is more stable in lake water than in air. [1]

• Lake water shows the smaller daily temperature change (3 °C).

8d. Explain why fish need specialised gas-exchange structures such as gills. [2]

• The table shows lower oxygen availability in water.
• Gills provide a surface for extracting dissolved oxygen from water.

8e. Use the data to suggest which habitat would require more structural support against gravity, and justify your answer. [2]

• Air would require more structural support.
• Buoyant support is very low in air, so the body is less supported by the environment.

Section D: Extended response

9. Explain why water is indispensable for life at both the cellular level and the ecosystem level. [6]

Indicative scientific content:

• water forms most of the cytoplasm and allows metabolic reactions to occur in solution
• water dissolves and transports nutrients, gases, hormones, and wastes
• blood, tissue fluid, xylem sap, and other body fluids are mainly water
• aquatic environments provide habitats for many organisms
• water moderates temperature change compared with air
• aquatic life gains buoyant support but also faces challenges such as low oxygen and high viscosity

Marks	Descriptor
5–6	Accurate, relevant and well-organised response with several linked biological ideas and appropriate terminology.
3–4	Some accurate biology with partial development or limited linkage between ideas.
1–2	A small number of correct ideas, often brief, vague, or weakly linked to the question.
0	No relevant creditworthy content.