A2.1 Origins of cells (HL)

What the Cell · DP Biology · worksheet · HL statements A2.1.1–9

Name _____ **Date** _____ **Total** _____ / 40

About 40 minutes, or one section at a time. The number of marks shows how many separate points to make.

Section A: Recall

9 marks

1 **State** two features of the early Earth's atmosphere that differ from today's. A2.1.1 **[2]**

2 **List** the four requirements for the evolution of the first cells. A2.1.3 **[2]**

3 **Define** ribozyme. A2.1.6 **[1]**

4 **State** what LUCA stands for, and roughly when it lived. A2.1.7 **[2]**

5 **State** two likely features of LUCA's metabolism. A2.1.9 **[2]**

Section B: Understanding

15 marks

6 **Explain** why a cell is the smallest unit of self-sustaining life, while a virus is not considered living. A2.1.2 **[3]**

7 **Explain** how fatty acids could form vesicles without enzymes, and why this was important. A2.1.5 **[3]**

8 **Explain** why RNA is thought to have been the first genetic material. A2.1.6 [3]

9 **Outline** how the universal genetic code suggests that all life shares one ancestor. A2.1.7 [2]

10 **Describe** how a molecular clock is used to estimate when two groups shared an ancestor. A2.1.8 [2]

11 **Suggest** why the first cells left no fossils. A2.1.3 [2]

Section C: Working with evidence

10 marks

All data in this section are invented for practice. The patterns are realistic.

12 A2.1.4

A student repeats a Miller–Urey type experiment with three gas mixtures, each sparked for seven days.

Gas mixture	Different amino acids detected	Total yield / mg
CH_4, NH_3, H_2, H_2O	11	42
CO_2, N_2, H_2O	3	4
CO_2, N_2, H_2O, iron sulfide	6	15

a **Calculate** how many times greater the yield was with the first mixture than with the second. **[1]**

b **Compare** the results for the three mixtures. **[2]**

c Many scientists now think the early atmosphere was rich in carbon dioxide. **Discuss** what these results suggest about the original Miller–Urey conclusion. **[3]**

d **Suggest** why iron sulfide was added, with reference to hydrothermal vents. **[2]**

e **State** one variable that must be controlled when comparing the mixtures. **[1]**

f **Outline** why these results do not show how a cell formed. **[1]**

Section D: Longer answer

6 marks

13 **Discuss** the evidence that life began near deep-sea hydrothermal vents. A2.1.7, A2.1.8, A2.1.9 **[6]**