A2.3 Viruses (HL)

What the Cell · DP Biology · worksheet · HL statements A2.3.1–6

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** three features shared by all viruses. A2.3.1 **[3]**

2 **Name** the enzyme that HIV uses to make DNA from its RNA. A2.3.2 **[1]**

3 **Define** prophage. A2.3.4 **[1]**

4 **State** two structural differences between a virus and a bacterium. A2.3.1 **[2]**

5 **State** two shapes of viral capsid, with an example of each. A2.3.2 **[2]**

Section B: Understanding

15 marks

6 **Explain** how an enveloped virus such as HIV gets its envelope. A2.3.2 **[2]**

7 **Outline** the stages of the lytic cycle of bacteriophage lambda. A2.3.3 **[4]**

8 **Explain** why phage lambda cannot reproduce outside a bacterial cell. A2.3.3 **[2]**

9 **Compare** the lytic and lysogenic cycles. A2.3.4 [3]

10 **Explain** why viruses are thought to have arisen more than once. A2.3.5 [2]

11 **Explain** why HIV infection is treated with a combination of drugs. A2.3.6 [2]

Section C: Working with evidence

10 marks

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

12 A2.3.3, A2.3.4

A suspension of phage lambda was diluted in steps of ten. Then 0.1 cm^3 of each dilution was spread on a dish covered with a thin layer (lawn) of *E. coli*. After a day, clear spots called plaques were counted.

Dilution	**10^{-4}**	**10^{-5}**	**10^{-6}**	**10^{-7}**
Plaques	too many to count	312	34	3

a **Explain** how a single phage produces one clear plaque. **[1]**

b **Suggest** why the 10^{-6} dish gives the most reliable estimate. **[1]**

c **Calculate** the number of phages per cm^3 in the undiluted suspension. **[2]**

d 0.1 cm^3 of undiluted suspension was added to a culture of 5.0×10^7 bacteria. The multiplicity of infection (MOI) is the number of phages per bacterium. **Calculate** the MOI. **[2]**

Phage lambda was then added to bacteria growing in a rich or a poor medium. The percentage of infected bacteria that became lysogens (carrying a prophage) was recorded: rich medium 8%, poor medium 46%.

e **Describe** the effect of the medium on lysogeny. **[1]**

f **Suggest** why the lysogenic cycle is an advantage to the phage when its hosts grow poorly. **[2]**

g The lysogens were exposed to UV light. **Predict** what would happen to the number of free phages, with a reason. **[1]**

Section D: Longer answer

6 marks

13 **Explain** why influenza viruses evolve rapidly, and the consequences for controlling flu. A2.3.6 **[6]**