

Total: 24 marks

Objective

1 Key knowledge and worked examples

One fork pair at 50 bp/s: $6.4 \times 10^9 / 100 = 6.4 \times 10^7 \text{ s} \approx 2 \text{ years}$. With 3×10^4 origins: $\sim 2100 \text{ s} \approx 35 \text{ min}$ of synthesis, inside an 8 h S phase ✓.

2.3 What lesion class does nucleotide excision repair own? [3]

Compute E. coli's copy time (4.6 Mb, 1000 nt/s, bidirectional). Compute the human single-origin time and the 30 000-origin time. Explain why eukaryotes need many origins AND why S phase still takes 8 h. [8]