



Attempt questions first; check the separate key afterward. Use labelled diagrams where asked. Give scientific reasons; answer key covers closed questions.

A. Very short answers - 1 mark each

1. Who proposed evolution by natural selection independently alongside Darwin?
2. Name structures with common origin but possibly different functions.
3. Name structures with similar functions but different evolutionary origins.
4. What is genetic drift?
5. State the Hardy-Weinberg genotype-frequency equation.
6. What is the sum of frequencies of two alleles at one locus?
7. Name the classic example of industrial melanism.
8. Is natural selection directed toward a predetermined future goal?

B. Short answers / practice - 2 marks each

9. Explain chemical evolution as an origin-of-life hypothesis.
10. Describe Miller's experiment and its limitations.
11. Compare fossil, anatomical and molecular evidence for evolution.
12. Explain divergent evolution using vertebrate forelimbs.
13. Explain convergent evolution using analogous structures.
14. Describe adaptive radiation using Darwin's finches.
15. Compare Darwinian selection with Lamarckian inheritance of acquired traits.
16. Explain heritable variation and differential reproductive success.
17. Why does antibiotic resistance not imply bacteria intentionally adapt?
18. Compare directional, stabilising and disruptive selection.
19. Explain founder effect and genetic bottleneck.

20. Describe gene flow and its influence on populations.

C. Application / reasoning - 3 marks each

21. If recessive phenotype frequency is 0.09 under Hardy-Weinberg equilibrium, find q .
22. For $q=0.3$, find p and heterozygote frequency.
23. If $p=0.8$ and $q=0.2$, find AA, Aa, aa frequencies.
24. In 1000 individuals with $q=0.2$, estimate heterozygotes.
25. List five assumptions underlying Hardy-Weinberg equilibrium.
26. Explain how mutation and recombination generate variation.
27. Why can isolation promote divergence between populations?
28. Distinguish similarity due to common ancestry from convergence.
29. Explain why human evolution is branching rather than a simple ladder.
30. Do modern humans descend from modern chimpanzees?
31. Compare biological fitness with physical strength.

D. Extended practice - 5 marks each

32. Explain natural selection with a documented example and a selection-curve sketch.
33. Describe Hardy-Weinberg equilibrium and the factors that disturb it, with a numerical example.
34. Evaluate fossil, comparative and molecular evidence for common ancestry.
35. Outline major stages and uncertainties in human evolution without implying a linear progression.

ANSWER KEY - Numerical / closed questions

- 1) Alfred Russel Wallace. 2) Homologous structures. 3) Analogous structures. 4) Random change in allele frequencies. 5) $p^2+2pq+q^2=1$. 6) $p+q=1$. 7) Peppered moth, Biston betularia. 8) No. 21) 0.3. 22) $p=0.7$; $2pq=0.42$. 23) 0.64, 0.32, 0.04. 24) 320. 30) No; they share ancestors.