

2023 Bi H1 Q4

Section: DNA and the Genome

Topic: Mutations

Question Summary

The question asks which type of mutation causes all codons after the mutation to change — as happens in the genetic disease phenylketonuria (PKU).

Worked Solution

The key phrase is 'all codons after the mutation change'. This indicates that the reading frame of the DNA sequence has been shifted. Mutations that insert or delete nucleotides (not in multiples of three) cause this shift. When this happens, every codon downstream of the mutation is read incorrectly, producing a completely different amino acid sequence — often leading to a non-functional protein.

■ Answer: D — Frame-shift mutation

Revision Tips

- Frame-shift mutation: caused by insertion or deletion of one or two bases, alters all codons beyond the mutation site, and produces a drastically altered protein.
- Nonsense mutation: introduces a premature stop codon.

- Missense mutation: changes one amino acid.
- Duplication: repeats a section of DNA.
- Translocation: segment moves to another chromosome.