2023 Bi H1 Q2

Section: DNA and the Genome

Topic: Gene Expression

Question Summary

The question tests understanding of base pairing during transcription, and how to calculate the percentage composition of bases in mRNA from a given DNA strand.

Worked Solution

Given DNA strand composition: A = 24%, C = 16%, G = 29%, T = 31%.

Step 1: Recall the base-pairing rules for transcription

• A in DNA pairs with U in mRNA
• T in DNA pairs with A in mRNA
• C in DNA pairs with G in mRNA
• G in DNA pairs with C in mRNA

Step 2: Transfer the percentages according to these pairings

DNA base	Pairs with	mRNA base	% in mRNA
A (24%)	U	U	24%
T (31%)	A	A	31%
C (16%)	G	G	16%
G (29%)	C	C	29%

Step 3: Check total

24 + 31 + 16 + 29 = 100%, confirming the values are consistent.

■ Answer: D — A = 31%, C = 29%, G = 16%, U = 24%, T = 0%

Revision Tips

• DNA → mRNA base pairing: A–U, T–A, C–G, G–C.
• In RNA, uracil (U) replaces thymine (T).
• Only the template strand of DNA is used to form mRNA.
• Percentages are transferred according to the base-pairing rule — the DNA bases become their complements in mRNA.
• Check your totals always equal 100%.