

What is Translation (Protein Synthesis)?

Worksheet

Translation is the process where ribosomes decode mRNA codons and use tRNA to bring matching amino acids, linking them into a protein in three stages: initiation, elongation, and termination.

Questions

1. Which molecule directly carries amino acids to the ribosome during translation?
A) mRNA
B) tRNA
C) rRNA
D) DNA polymerase
2. How many nucleotides make up one codon?
A) 1
B) 2
C) 3
D) 4
3. Which of these is a stop codon?
A) AUG
B) UAA
C) GGC
D) CAU
4. An mRNA ORF is 90 nucleotides long. How many amino acids are in the protein?
A) 30
B) 29
C) 90
D) 27
5. An mRNA's coding sequence (including the stop codon) is 150 nucleotides long. How many amino acids are in the protein?
6. A gene's mRNA has an open reading frame (ORF) of 300 nt. Find the protein's length in amino acids.
7. A tRNA has the anticodon 3'-UAC-5'. Which mRNA codon does it pair with, and which amino acid does it carry?
8. Define: What is translation?
9. Define: Where does translation occur?
10. Define: What are the 3 stages of translation?

Answer Key

1. B) tRNA - tRNA has an anticodon and carries a specific amino acid to match mRNA codons.
2. C) 3 - Codons are triplets of nucleotides, each specifying one amino acid or a stop signal.
3. B) UAA - UAA (along with UAG and UGA) signals termination; no tRNA matches it.
4. B) $29 - 90/3 = 30$ codons; subtract 1 stop codon = 29 amino acids.
5. L = 150 nt Codons = $150/3 = 50$ Remove 1 stop codon $50 - 1 = 49$ amino acids
6. L = 300 nt $300/3 = 100$ codons $100 - 1 = 99$ amino acids (excludes the stop codon)
7. Anticodon 3'-UAC-5' pairs antiparallel with mRNA codon 5'-AUG-3' AUG codes for Methionine (the start amino acid) So this tRNA carries Met
8. The process where ribosomes read mRNA codons and assemble amino acids into a polypeptide chain.
9. On ribosomes, in the cytoplasm (or on the rough ER in eukaryotes).
10. Initiation, elongation, termination.

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