

True / False (1/2 point each)

1. Positioning of the ribosome on the start codon of an open reading frame:
___ can be disrupted by antibiotics.
___ requires ATP in eukaryotic organisms.
2. Deamination of aromatic primary amines:
___ results in the conversion of uracil to cytosine.
___ can be used to regulate protein production.
3. Ring-type E3 ubiquitin-protein ligases:
___ promote ubiquitination of phosphorylated substrates.
___ are covalently linked to ubiquitin.
4. Regarding methionine:
___ fMet is required for efficient protein synthesis *in vitro* when using an *E. coli*-derived cell-free translation system.
___ it is seldom removed from the beginning of prokaryotic proteins.

Multiple Choice and One-Two Word Answers (1 point each)

5. What is the main purpose of translational frameshifting?
 - A) it is a necessary step for translation initiation
 - B) it is required for repairing misincorporated amino acids
 - C) it is a way to regulate the translation of an open reading frame
 - D) it is required for translation termination
6. Regarding your assigned reading of amyloidoses, which of the following applies to amyloid fibrils?
 - A) they are rich in α -helix structure
 - B) they are rich in β -sheet structure
 - C) they are aggregates of unstructured proteins
 - D) they are generally derived from mutant proteins
7. RNaseP is required for which of the following?
 - A) tRNA maturation
 - B) rRNA maturation
 - C) polyadenylation of mRNA
 - D) mRNA turnover
8. What trinucleotide sequence is found at the end of all tRNAs?

9. What molecule provides the nucleophile during translation termination?

10. Of the components required for prokaryotic translation, name one that requires a metal co-factor?

Short Answer - These can be answered using one or two sentences (10 points total)

11. Explain what is meant by the fact that the genetic code is degenerate. (2 points)

12. Why would the open reading frame for ubiquitin be overlooked when a new genomic sequence is being annotated? (2 points)?

13. What is the strongest experimental evidence to date in support of the 23S / 28S rRNA being the catalytic entity that promotes the peptidyl transferase activity of the ribosome? Provide specifics (3 points)

14. List three macromolecular complexes associated with the translation process that were discussed in class and/or your readings, and briefly describe their functions using one short sentence for each description. (3 points)

Long Answer - answer any two of the following questions using several sentences and/or diagrams (each question is worth 5 points); continue on the next page if necessary. (10 points total).

15. Describe the effect of phosphorylation on the functions of eIF2 α and eIF4-BP. Explain in sufficient detail to reflect your knowledge of the topic.

16. If an organism uses inosine in the wobble position of its Tyr and Cys tRNAs (tRNA^{Tyr} and tRNA^{Cys}), what effect does this have on its use of stop codons? Explain in sufficient detail to reflect your knowledge of the topic.

17. Describe the effect(s) of paromomycin on translational accuracy? Make sure to indicate any physical interactions that this compound has with the translation machinery.

Bonus Question - Answer only one of the following two questions (2 points)

1. With respect to translocation during the translation process, what is meant by the term hybrid state?
2. You have identified an insertion mutation in a gene of your organism that changes the organism's color from blue to red. The mutation is near the beginning of the open reading frame. In conducting a screen for suppressors that can revert the color back to the wildtype color, you have identified a tRNA. What is the likely change to the tRNA that accounts for its ability to suppress the color phenotype?