

TEST #6 –PROTEIN SYNTHESIS – STUDY GUIDE

Short answer and essay questions should be answered in **complete sentences**, if you fail to do so you will not receive full credit. Use your notes and chapter 12 in the textbook as your source for preparing for the test.

1. What is a gene? What is gene expression?
2. What are the two steps in the process of gene expression?
3. What are the ways DNA and RNA are different?
4. List the three types of RNA and their structure and function.
5. What do you start with in transcription? What do you end with? Where does this process take place?
6. What do you start with in translation? What do you end with? Where does this process take place?
7. What are the enzymes that participate in transcription called? What are the jobs of these enzymes?
8. What is the promoter? The terminator?
9. What is the strand of DNA that is used to code for proteins called? What is the role of the other strand in gene expression?
10. Distinguish an intron and an exon.
11. Are both introns and exons transcribed? What happens to the introns? What is the name of this process?
12. How does the RNA get from the nucleus to the cytoplasm?
13. Which molecule's three nucleotide sequence is used to identify the amino acid in the genetic code?
14. What is a codon? Which molecules have codons?
15. Explain why codons are read as triplets of nucleotides. (How many nucleotides are there? How many amino acids are there?)
16. How many different codons are there? Why so many?
17. How do you read the genetic code to identify an amino acid?
18. What does it mean when you say the genetic code is universal? Explain how we use the universal genetic code to bioengineer human insulin from bacterial cells.
19. What is the start codon? What amino acid does it code for?
20. What are the three stop codons?
21. What is the shape of a transfer RNA molecule? What are on the opposite ends of this molecule?
22. What is an anticodon? Which molecules have anticodons?
23. What is the relationship between a codon and an anticodon?
24. How many transfer RNA molecules are there? Why not 64?
25. What are the two subunits of a ribosome made of?
26. What type of bond holds amino acids together in a polypeptide chain?
27. What is the difference between a polypeptide and a protein?
28. What is a mutation? During which process do most mutations occur? What causes mutations to occur?
29. Explain three ways that a mutation could have no effect on a cell.
30. What process relies on beneficial mutations to occur? What sort of time frame does it take to see significant changes caused by beneficial mutations?
31. Why is a mutation more harmful if it happens in a gamete than in a body cell?
32. Distinguish a gene mutation and a chromosome mutation? Which one is more serious? Why?
33. Describe the four possible point mutations that can occur.
34. Explain how a frame shift mutation changes the amino acid sequence of a protein. What causes them?

Terms you should know (these always seem like pretty good terms to know for the fill in the blank questions):

Nucleotide Phosphate group Nitrogenous bases 5 carbon sugar Ribose Deoxyribose Adenine Guanine Cytosine Thymine Uracil Base pairing rule Double helix Hydrogen bonds	Prokaryotes Eukaryotes Chromatin Chromosomes Complementary strands Gene Exon Intron Gene expression Transcription Translation Ribonucleic acid Messenger RNA Transfer RNA Ribosomal RNA RNA polymerase Sense strand Nonsense Strand (Antisense)	Promoter Terminator DNA template strand RNA splicing Codon Genetic code Start codon Stop codons Anticodon Ribosome Peptide bond Mutation Gamete Point mutation Chromosome mutation Frame-shift mutation Insertion Deletion Duplication Inversion Translocation Mutagens Carcinogen ** Lab: CHNOPS
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Types of questions to anticipate:

- You should know how to use the genetic code to identify a specific amino acid. (Remember, that you plug in the messenger RNA codon sequence in the genetic code to identify the amino acid, NOT the tRNA anticodon).
- You should be able to identify the correct sequence of template DNA, complimentary DNA, messenger RNA codons, transfer RNA anticodons and amino acid sequences, given any other piece of information and a genetic code.
- You should be able to interpret the flow chart of gene expression, what each step (transcription and translation) begins and ends with and where it occurs.
- You should be able to identify each of the components in an illustration of gene expression, including: DNA, messenger RNA, transfer RNA, ribosomes, nucleus, amino acid, polypeptide chain, codons and anticodons.
- You should know the steps of transcription and translation in order.
- You should be able to distinguish how a mutation can be neutral, beneficial or harmful.
- You should be able to distinguish a gene mutation from a chromosome mutation.