Module 07: Genetics & the Central Dogma — Study Questions

1. What are the four nucleotide bases found in DNA, and how do they pair with each other?
2. Describe the overall structure of a DNA molecule. What makes up the "backbone" and what makes up the "rungs"?
3. Why is DNA replication described as "semi-conservative"?
4. What is the role of each of the following enzymes in DNA replication: helicase, DNA polymerase, and ligase?
5. What is the central dogma of molecular biology? Summarize the flow of genetic information.
6. List three differences between DNA and RNA.
7. What is transcription, and where does it occur in the cell?
8. During transcription, what is the role of RNA polymerase?
9. If the template strand of DNA reads 3'–TAC AAG TTT GCA CCG ATT–5', what would the mRNA sequence be?
10. What is a codon? How many nucleotides does it contain?
11. What is the start codon, and what amino acid does it code for?
12. Name the three stop codons. What happens when a ribosome reaches a stop codon?
13. What does it mean that the genetic code is "degenerate" (redundant)?
14. What is translation, and where does it occur in the cell?
15. Describe the roles of mRNA, tRNA, and rRNA during translation.

16. What is an anticodon, and how does it relate to a codon?

17. Using a codon table, determine the amino acid sequence for the following mRNA: AUG–UUC–AAA–CGU–GGC–UAA.

18. What is a point mutation? Give an example of how a single base change can alter the protein produced.

19. How does sickle cell anemia illustrate the connection between a DNA mutation and a change in protein function?

20. Why is the central dogma sometimes called a "one-way street" of information flow? Are there any exceptions?