**Study Guide**

**Genotype to phenotype**

**(Genotype, transcription, and translation)**

1. Briefly explain what is so key about the three features of DNA that make it an “idea” genetic material.
2. What is the key feature that ensures a specific purine always pairs with the same pyrimidine?
   1. See <http://www.dnalc.org/resources/3d/25-basepairing.html> for more information
3. Apart from number of strands, what is the essential difference between an RNA molecule and a DNA molecule?
4. Can DNA polymerization proceed in the absence of a primer?
5. In what direction does DNA polymerization proceed?
6. Does DNA replication occur at just one site on a chromosome?
7. What are the roles of helicases and gyrases in DNA replication?
8. What is the significance of primases in DNA replication and why do the primers they form have to be removed?
9. On what strand would you find an Okazaki fragment and why are they significant?
10. For an overview animation of DNA replication, have a look at: <http://www.dnalc.org/resources/3d/04-mechanism-of-replication-advanced.html> also available in a basic form at: <http://www.dnalc.org/resources/3d/03-mechanism-of-replication-basic.html>
11. Explain the key differences between mRNA, rRNA and tRNA.
12. What is transcription and where does it occur in the cell?
13. What is translation and where does it occur in a cell?
14. What is the anti-sense strand of DNA, and is it always the same strand of the double helix?
15. What are the key stages in transcription, and what is the code for initiation?
16. What is the switch for termination of transcription?
17. What occurs at the 5’ and 3’ ends in processing the pre-mature mRNA into mRNA?
18. What is splicing and what are the implications of alternative splicing events on protein formation?
19. Why is the genetic code said to be “degenerate”?
20. What is the significance of the A, P, and E sites in the large sub-unit of the ribosome?
21. What happens to mRNA and the ribosome after transcription termination?
22. Which DNA strand is listed in sequence databases and why?
23. How can a ‘frameshift’ occur and what are the probable consequences?
24. What is post-translational modification of protein structure and function, and what implication does this have on predicting gene function based on DNA sequence alone?