

**Semester 2**  
**Benchmark 1 Study Guide**  
**DNA and Genes**

1. What happens in DNA replication? Where does DNA replication take place?
2. Which type of RNA is involved in replication?
3. What is the subunit of DNA?
4. What are the 3 parts of a nucleotide of DNA?
5. What are the 4 nitrogen bases in DNA?
6. Which ones bond together (complimentary base pairs)?
7. What shape is a DNA molecule?
8. What scientists determined the shape of DNA?
9. Where in the cell is DNA found?
10. What is the subunit of RNA?
11. What are the 3 parts of a nucleotide of RNA?
12. What are the 4 nitrogen bases in RNA?
13. Which ones bond together?
14. Where is RNA made? What are the 3 types of RNA?
15. What is the job of each type of RNA?
16. Where is each type of RNA found in the cell?
17. How are DNA and RNA similar? Different?
18. What are ribosomes made up of? What do ribosomes do?
19. Where does protein synthesis start? Where does protein synthesis end?
20. What happens in transcription?
21. Where in the cell does transcription take place? What type of RNA is involved in transcription?
22. What happens in translation? Where in the cell does translation occur?
23. What types of RNAs are involved in translation? Be able to identify in a picture.
24. What is a mutation?
25. What is a point mutation? What is a frame shift mutation? What types of mutations are these?
26. What is translocation?
27. What is a mutagen? Give some examples.
28. What is a codon? Where is it found?
29. What is an anticodon? Where is it found?
30. What is a peptide bond? What do they hold together?
31. During replication, what is the complimentary strand of DNA if the original strand is CAA TAG ACT?
32. What is the mRNA strand if the original DNA is CAA TAG ACT? tRNA?
33. Using the mRNA codon chart, what is the amino acid sequence to question 36 above?
34. If the protein (amino acid sequence) is methionine-glutamate-phenylalanine-stop, what are the corresponding tRNA, mRNA, and original DNA?
35. Vocabulary: clone, gene splicing, genetic engineering, plasmid, recombinant DNA, transgenic organism, gene therapy, human genome
36. Explain how gene therapy is used to treat a person with cystic fibrosis.
37. List all the applications of genetic engineering.
38. How are transgenic organisms created? List steps involved.
39. How are transgenic bacteria used in medicine?
40. List all the things that plants are being genetically engineered to do.