

Nucleic Acid Worksheet

1. What are nucleic acids? Why are they important?
2. What are the two types of nucleic acids, and what are their main differences?
3. DNA and RNA occur as polymers. What is their monomer called? What are the three components of this monomer and draw the general structure.
4. Draw the open chain of ribose and the open chain of deoxyribose. Their cyclic structures are given in the text.
5. In one sentence based on visual clues, describe the difference between a pyrimidine and a purine.
6. List the 5 different nucleotides that occur in DNA/RNA along with their one-letter abbreviations. Circle the pyrimidines. Put a box around those that only occur in DNA.
7. Why do think nucleotides are also sometimes referred to as “bases” or “nucleotide bases”?
8. Why are primes used in the numbering system? What do they represent?
9. What is the difference between a nucleotide and a nucleoside? Explain by giving an example, using structures.
10. What kind of bond links a base to a sugar? Is the sugar an alpha or beta anomer? In what position(s) of the sugar does this occur? In what position(s) of the base does this occur?
11. Instead of the term “Formation of a nucleoside”, what could the name of the reaction be? What functional group is being formed?
12. What is the difference between “Uridine” and “Uridine 5’-monophosphate (UMP)”? Can you see why UMP is named in that fashion?
13. How would UMP differ from UDP and UTP?
14. The bond that links a base to a sugar is a glycosidic bond. What is the name of the kind of bond that links a sugar to a phosphate group?
15. Define the primary structure of DNA/RNA. Compare and contrast to the primary structure of proteins.
16. In proteins, a peptide read from the N terminal to the C terminal. Is there a kind of direction in DNA/RNA as well? Briefly explain.
17. Draw the structure of 5’-TTG-3’.
18. Give the equation for Chargaff’s rules. What does it mean?
19. Who proposed DNA was a double helix? In what decade?
20. What kinds of forces hold the double strands of a DNA double helix together? Do the two strands go in the same direction or in opposite directions?
21. Draw out the base pairs in your book and point out the hydrogen bonds that form between them.

22. Hydrogen bonds can be disrupted by heat. Which base pair can withstand more heat based on the answer above?
23. If one DNA single strand has the sequence 5'-AATGCAA-3', what is the sequence of its complementary strand?
24. When DNA replicates, how is it able to "unwind" its double helix?
25. Reactions require energy. The reaction that adds a new nucleoside to a growing chain of DNA requires energy as well. Where does this energy come from? What is the name of the enzyme involved in this process?
26. The enzyme named above only moves in what direction along the DNA strand? What consequences does this have on the other strand? What is an Okazaki fragment, and how are they later "glued" together?
27. What are the types and major functions for each type of RNA?
28. Define transcription and translation. Which process occurs first in order to make protein from DNA?
29. In what direction does a polymerase move when synthesizing a strand of mRNA?
30. What mRNA sequence is synthesized from a section of DNA that is 3'-TTGACCT-5'?
31. Where in the cell is mRNA synthesized? Where does it go after its synthesis?
32. Define codon.
33. What is the sequence of amino acids coded by the following mRNA? 5'-GUAAACAGCUGA-3'
34. What codon(s) signal the start and stop of protein synthesis?
35. In one sentence, explain what tRNA does.
36. What enzyme attaches the correct amino acid to each tRNA? Is there only one kind of this enzyme that works for all 20 different amino acids?
37. Define anticodon. Define translocation.
38. Why does protein synthesis end when the stop codon is encountered by the ribosome?