

## DNA AND SYNTHESIS STUDY GUIDE QUESTIONS

1. Name the two main types of nucleic acids. Identify where in the cell each can be found.
2. Describe the 3 main functions of DNA.
3. Name the 4 nucleotides in DNA. Draw a sketch of each, and identify which are pyrimidines and which are purines. On one of the sketches, label the following parts of the nucleotide: nitrogenous base, deoxyribose (5 carbon sugar), 3' end, 5' end, phosphate group.
4. **Describe the structure of DNA** using the following terms: nucleotides, double helix, complementary base pairing, hydrogen-bonding, anti-parallel, 3', 5', sugar-phosphate backbone. Then, **draw a diagram**.
5. a) What exactly is meant by the expression **complementary base pairing**? b) **Why** must A always pair with T and C always pair with G?
6. Rank the following in order of largest to smallest: nucleotide, DNA, chromosome, gene.
7. Explain clearly the differences between genes and chromosomes.
8. **Thinking Question!** Explain how the **structure** of DNA and **complementary base pairing promotes the continuity of life**.
9. a) What is **REPLICATION**? b) Describe DNA **replication** with reference to its three basic steps: **unzipping, complementary base-pairing, joining of adjacent nucleotides**. Use labeled diagrams to assist your explanation!
10. What is **RNA**? How is it structurally **similar** to DNA, and how is it **different**? Present your answer in the form of a **table** like the one on the right.
11. Describe the steps in the process of DNA **TRANSCRIPTION**.
12. List the **3 types of RNA**, **sketching neat diagrams** of each. Next to each diagram, list the **function** of each type.
13. What is **TRANSLATION**? What **three main phases** is it divided into? List the **main events** that occur during **each** of these phases.
14. The sense strand on a piece of DNA reads CCGTTAGGGCAAATTCGCTATTTTTT. What amino acids does this code for?
15. Identify the roles of a) **DNA**, b) **mRNA**, c) **tRNA** and d) **ribosomes** in the processes of **protein synthesis**.
16. a) What are **mutations**? b) Define and differentiate between the **two main types of mutations (chromosomal and gene)**.
17. What are **mutagens**? Give examples of **four environmental mutagens** which can cause mutations in humans.
18. a) **Make up a DNA sequence** to prove that the **addition** or **deletion** of a single DNA nucleotide can dramatically effect the structure and function of the resulting translated **protein**. b) How could this lead to a genetic disorder? c) Give two examples of genetic disorders, and explain what causes them.
19. Explain how a mutation could have a **no effect** at all on an organism.
20. What is the **importance** of mutations to the history and future of life on this planet?