

INTRODUCTION TO DNA
(DeoxyriboNucleicAcid) (Located and stays in the Nucleus)

DNA's function is to provide a code for building specific proteins. These proteins then form the structural parts of cells and control chemical processes in the cells (e.g. – enzymes). Cells are the basic unit of structure and function in living things. The DNA tells the cell exactly what and when to do something.

1. What significant breakthrough did James Watson and Francis Crick discover?
2. What is the shape of the DNA molecule? (common and scientific terms)
3. What three main parts does a DNA nucleotide contain?
4. What are the four nitrogen bases found in DNA?
5. In DNA the “A” (Adenine) bonds with?
6. In DNA the “C” (Cytosine) bonds with?
7. Give the complimentary DNA strand for the following strand

G T A A T G
↓ ↓ ↓ ↓ ↓ ↓

REPLICATION:

- Process in which a new (exact) copy of DNA is made.
- The two sides of the DNA molecule are held together by weak bonds called **HYDROGEN BONDS**.
- Exact copies are easily made because the nitrogen bases can only bond “A” with “T” & “C” with “G”.

8. When would DNA need to “Replicate”?

Accuracy & Repair: Approximately 1 error (mutation) per 1 billion nucleotides!!!!

RNA – RiboNucleic Acid (Located in several locations in the cell)

Function of RNA is to take the “code” from the DNA to build a specific protein. This code is in the Nucleus and must get to the Ribosome where AMINO ACIDS can be connected to build a protein.

- Visualize this as a construction site) (Blueprints → Job Site → Materials

Compare DNA to RNA

DNA	RNA
1 Type	3 Types (mRNA, tRNA, rRNA)
Deoxyribose Sugar	Ribose Sugar
Longer	Shorter
Thymine – Nitrogen Base	Uracil – Nitrogen Base (no Thymine)
Double Helix	Single Helix

3 Types of RNA

- * mRNA – Messenger RNA – Takes the code (Blueprint) from the DNA (Nucleus) to the Ribosome (Job Site).
- * tRNA – Transfer RNA (located throughout the cytoplasm) – Brings Amino Acids the building blocks of all proteins (Materials) to the ribosome (Job Site).
- * rRNA – Ribosomal RNA – Most abundant – exact job is unclear. We will not worry about rRNA.

TRANSCRIPTION: (Take the DNA code to the Ribosome) (mRNA)

Use the following DNA to Transcribe the code for a protein. (Use strand #1)

#1: C C G T A C G G A T T A G T C A T T
#2: G G C A T G C C T A A T C A G T A A

mRNA Strand =

Amino Acids – Building blocks of proteins. There are 20 different amino acids found in living things. Mathematically scientist discovered that the RIBOSOME reads the Nitrogen Bases of mRNA 3 bases at a time. ($4^3 = 64$ combinations)

- Circle the “CODONS” on the mRNA strand
- Circle the “START CODON” on the mRNA strand

TRANSLATION: The process of the RIBOSOME reading the CODONS and tRNA carrying AMINO ACIDS to the RIBOSOME.

tRNA will have an ANTICODON – the complementary base to the mRNA CODON.

List the 5 Amino Acids coded from the above mRNA.

PROTEIN: Long chain of Amino Acids (Polypeptide Chain). Proteins provide the structural and functional properties of all cells.

DNA Terms:

1. Base-pairing rule	
2. Complementary base pair	
3. Deoxyribose	
4. Double Helix	
5. Mutation	
6. Nitrogen-containing base	
7. Replication	
8. Messenger RNA (mRNA)	
9. Ribosomal RNA (rRNA)	
10. Termination Signal	
11. Transcription	
12. Transfer RNA (tRNA)	
13. Anticodon	
14. Codon	
15. Protein Synthesis	
16. Start Codon	
17. Stop Codon	
18. Translation	