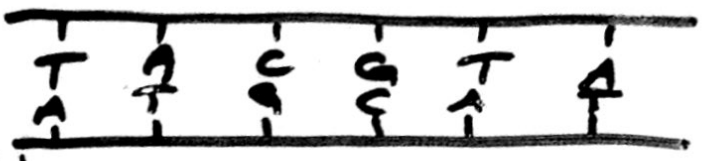


RNA: AUG CAU

2. A strand of DNA with the base sequence T-A-C-G-T-A would have a partner strand with the base sequence A-T-G-C-A-T

"Complementary"

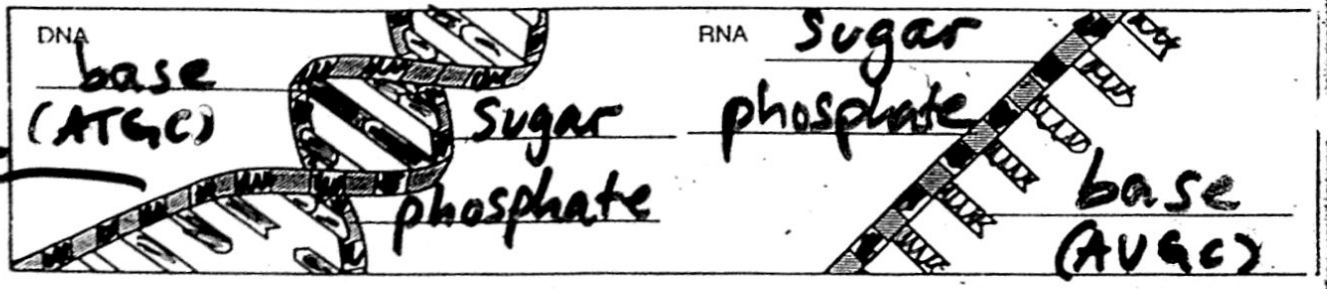
3. In 1962 the Nobel Prize was awarded to Watson, Crick, and Wilkins for their work on the structure of DNA. Rosalind Franklin did not receive Nobel prize

B. STRUCTURE OF DNA AND RNA

Store info on how to make proteins

Textbook reference: Sections 7-3, 7-4, 7-5

** Deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) are two of the cell's most important molecules. These nucleic acids have a complex three-dimensional structure that enables them to direct protein synthesis in the cell. Study the structures of the DNA and RNA molecules illustrated below. Fill in the missing labels. Then complete the chart and answer the questions.



phospho-diester bond between sugar + phosphate

Name	Sugar	Bases	Number of Nucleotide Strands
DNA	Deoxyribose	A, T, G, C	2
RNA	ribose	A, U, G, C	1

DNA
A-T
T-C

RNA
A-U
G-C

1. The two DNA strands twist around each other. This is called a double helix.
2. The repeating units of Sugar and phosphate make the backbone of DNA and RNA.
3. In a DNA molecule, the nitrogen bases of one strand attach to the nitrogen bases of the other. This is called base pairing. The bases are held together by bonds of Hydrogen.
4. A strand of DNA contains the following bases: ATCGACT. What will be the bases on the complementary DNA strand? TAGCTGA On the complementary RNA strand? UAGCUGA
5. Part of the DNA molecule shown above is starting to unwind. What two cellular activities could this be the start of? replication (copying) (DNA → DNA) or transcription (DNA → RNA) (rewrite)

C. SYNTHESIS: STRUCTURE OF PROTEINS

[redacted] DNA codes for Proteins!

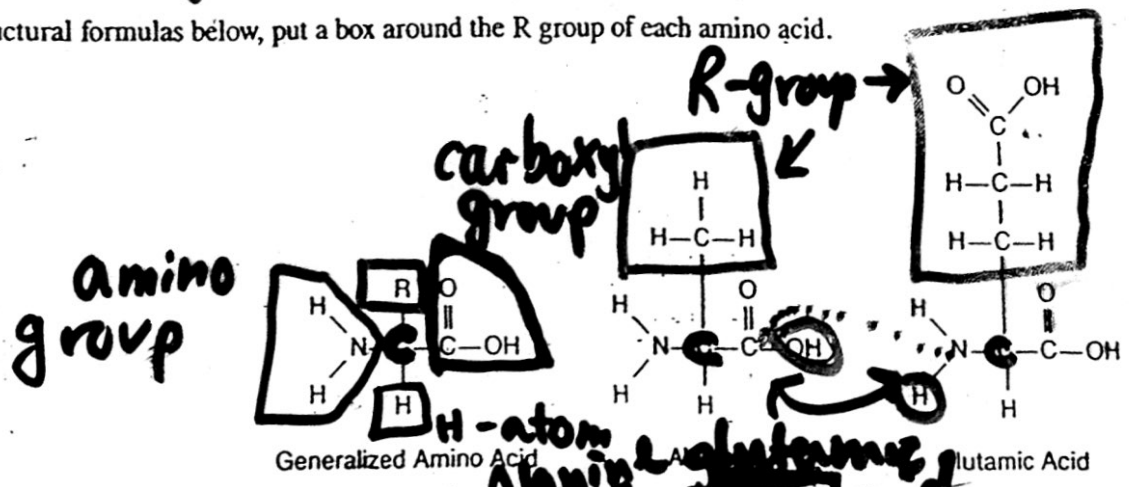
Proteins are the most varied of all the macromolecules. Review the information about proteins from [redacted] Ch. 4
Fill in the blanks of the paragraphs below. a.a.

Proteins are made of building blocks called amino acids. There are three parts that are common to every amino acid: a(n) carboxyl, a(n) amino group, and a(n) Hydrogen. The fourth part of an amino acid is designated by the R-group. It consists of a(n) molecule or compound. An amino acid's R-group determines its chemical properties. Each of the four groups is bonded to a(n) central Carbon [redacted] atom.

Amino acids are joined by a peptide bond that forms between a(n) carboxyl group of one amino acid and a(n) amino group of a second amino acid. When two amino acids join, the molecule formed is called a dipeptide. When more than two amino acids are bonded, a polypeptide chain is formed. Proteins are long polypeptides with about 200 amino acids. or more

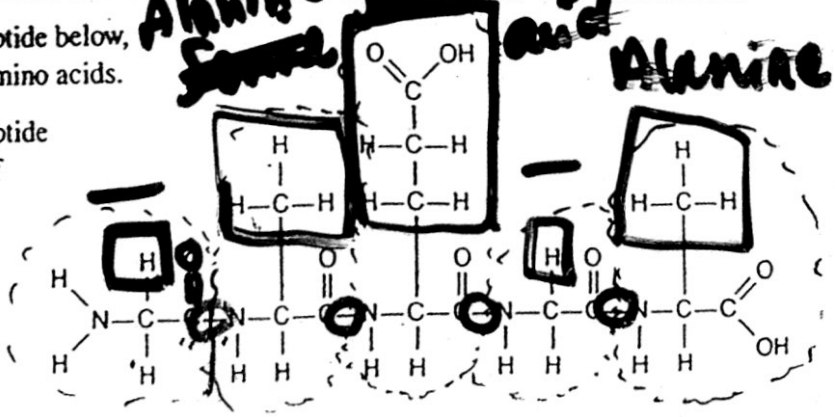
Proteins are distinguished from one another by the sequence, or order, of their amino acids. There are 20 different amino acids. Millions of proteins can be made from these amino acids because they can be arranged in many different sequences.

1. In the structural formulas below, put a box around the R group of each amino acid.



2. In the structural formula of the polypeptide below, circle the peptide bonds that join the amino acids.

3. In the structural formula of the polypeptide below, put a box around the R group of the constituent amino acids.



4. Write the sequence of amino acids in this polypeptide ___, Alanine, Glutamine acid, ___, Alanine

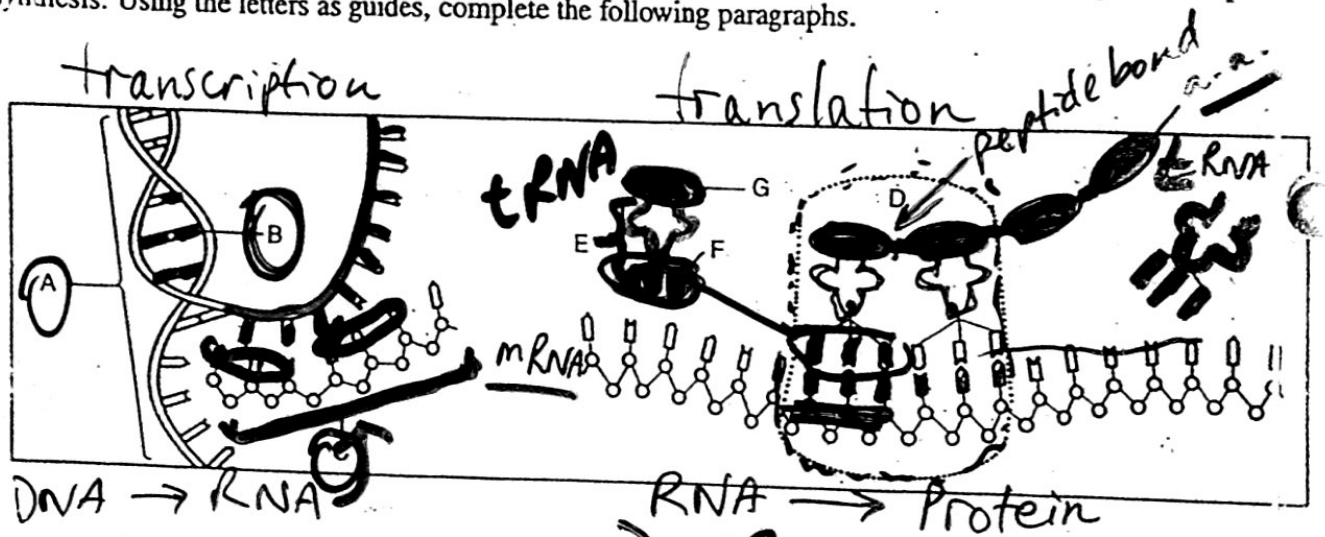
5. Write a possible mRNA sequence that would code for this polypeptide. (Use Table 7–1 from your textbook.)
___, GCA, GAA, ___, GCA

6. Write the sequence of DNA that coded for the mRNA you wrote in question 5. ___, CGT, CTT, ___, CGT

D. MECHANISM OF PROTEIN SYNTHESIS "Translation"

Textbook reference: Sections 12.2-12.3

Once the structure of DNA became known, the events by which the cell makes proteins could be reconstructed. DNA carries the genetic code, the cell's "master plan" for protein synthesis. RNA copies this code and brings together the amino acids that form the proteins. Study the diagrams below, which represent the process of protein synthesis. Using the letters as guides, complete the following paragraphs.



Protein synthesis begins when a strand of (A) DNA unravels. The code for producing a protein is carried in the sequence of the (B) bases/nucleotides in the DNA. Each group of three *Bs* forms a Codon, which represents a particular amino acid. One of the unwound strands of DNA forms a complementary strand called (C) mRNA. This process is called transcription. It takes place in the nucleus of the cells. In figure 2, *C* has moved into the cytoplasm where it attaches to a (D) ribosome. A phase of protein synthesis called translation then begins. A cloverleaf-shaped molecule of (E) tRNA approaches the *D*. At one end of this molecule are three bases known as an (F) anticodon. At the *D*, each *F* aligns with its complementary Codon on the *C*. This occurs according to base pairing. At the other end of *E*, an (G) amino acid is attached. As the *D* moves along the strand of *C*, new *Gs* are attached. This brings the *Gs* close to each other. The *Gs* are joined by peptide bonds, and the resulting strand is a polypeptide.