

Honors Biology
Chapter 10 Review

DNA History and Structure

A. Avery, McCarty & MacLeod
B. Meselson & Stahl

C. Hershey & Chase
D. Griffith

E. T.H. Morgan
F. Watson & Crick (& Franklin)

- 1) List the above scientists in order of their work & contribution to understanding DNA.

- 2) Using the list above identify who worked with:
 - _____ Blender experiment
 - _____ *Streptococcus* bacteria and purified protein and DNA (purified using enzymes)
 - _____ Bacteria and bacteriophage
 - _____ *Drosophila* (fruit flies)
 - _____ *Streptococcus* bacteria and mice
 - _____ Isotopes of nitrogen, cesium chloride and centrifuge
 - _____ Models and X-ray diffraction pictures
 - _____ Isotopes of sulfur and phosphorus

- 3) Using the list above, identify who arrived at the following conclusions:
 - _____ The 3-D structure of DNA is a double helix
 - _____ Replication is semi-conservative
 - _____ The process of transformation occurs
 - _____ Genes are on chromosomes
 - _____ and _____ DNA is the transforming factor/genetic material

- 4) What is transformation?

- 5) What did Hershey & Chase use radioactive sulfur to label? _____ radioactive phosphorus _____?

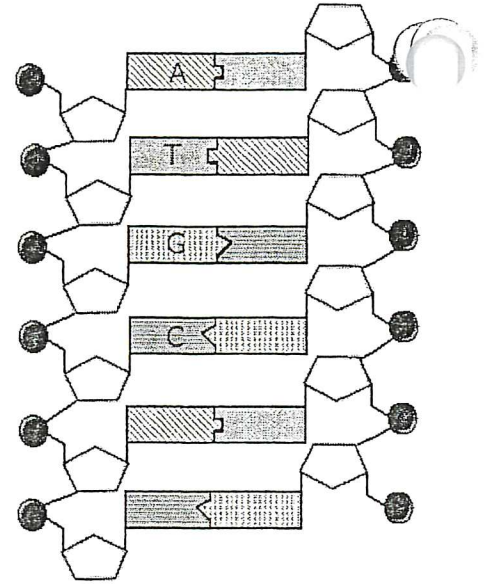
- 6) Write the conclusion of Chargaff's work.

- 7) Name the 2 nucleic acids _____ and _____
 - List 3 differences between them

 - Describe the structure of DNA in two words _____
 - What are the monomers of DNA and RNA? _____
 - What are the 3 parts of the above answer?

 - Which 2 parts make up the sides of the helix, the backbone?
 - How are they joined (type of bonds)?
 - What parts make up the rungs of the ladder?
 - How are they joined to the complementary base on the other strand (type of bonds)?
 - List the rules of base pairing: _____ pairs with _____ and _____ pairs with _____
 - Why are the 2 strands of DNA described as anti-parallel?

- On the diagram:
 - Label the 3' and 5' ends.
 - Circle a nucleotide.
 - Label the sugar and phosphate.
 - Label the bases that are not already labeled



Replication

1. What is the "Central Dogma" of biology?
2. Name the process of making DNA from DNA _____
3. What does it mean to say the DNA replication is semi-conservative?
4. Replication enzymes review:
 - _____ - prevents overwinding of the DNA
 - _____ - breaks the hydrogen bonds between the 2 strands of DNA to separate them
 - _____ - stabilizes and keeps the 2 strands apart
 - _____ - initiates replication by building a RNA primer to provide a 3' end
 - _____ - builds new strand by adding complementary nucleotides
 - _____ - remove & replaces RNA primers; edits & repairs
 - _____ - links together Okazaki fragments
5. DNA polymerase can only add nucleotides to the _____ end so the new chain grows in the _____ to _____ direction.
6. The strand that is replicated toward the replication fork continuously is called the _____ strand and the strand that is replicated away from the replication fork in a series of Okazaki fragments is called the _____ strand.
7. What conclusions did Beadle and Tatum reach with their studies of *Neurospora*?

Protein Synthesis

1. The molecule that moves from the cell nucleus to a ribosome in the cytoplasm where a particular protein will be synthesized is called _____.
2. The process of transcription occurs in the _____ of the cell.
3. The process of transcription produces _____.
4. Which substance remains in the nucleus during protein synthesis?
 - a. DNA
 - b. mRNA
 - c. rRNA
 - d. tRNA
5. The monomers that make up a polypeptide (protein) are called _____.
6. The type of bonds that join amino acids together into a polypeptide chain _____.
7. Which enzyme is involved in transcription of mRNA? _____.

Post-transcriptional processing of the mRNA

1. What protects mRNA from breakdown by enzymes? _____ and _____.
2. The portions of the mRNA that code for the production of proteins are called _____ and are spliced together to form the final mRNA that exits the nucleus.

More protein synthesis:

1. The process of translation produces _____.
2. What molecule has codons? _____
3. How many nucleotides make up one codon? _____
4. What molecule has an anti-codon? _____
5. What molecule carries the amino acids to the ribosome during translation? _____
6. Ribosomes:
 - a. the site that tRNA enters with the correct amino acid based on its codon/anti-codon match _____
 - b. the site that holds the growing polypeptide chain _____
 - c. the site that the empty tRNA leaves from _____
7. Given the following template strand of DNA create the mRNA (transcription)

DNA 5' GTAGGCGCGTAGACCGCTATC 3'

Translate the mRNA to show the amino acid sequence. (You will need a genetic code table)

8. What marks the
 - a. start of transcription?
 - b. End of transcription
9. What marks the
 - a. start of translation?
 - b. End of translation?
10. What kind of mutation if:
 - a. one base is switched out for another? _____ Does it cause a frameshift? _____
 - b. One base is added? _____ Does it cause a frameshift? _____
 - c. One base is deleted? _____ Does it cause a frameshift? _____
 - d. Two bases are deleted? _____ Does it cause a frameshift? _____
 - e. Three based are inserted? _____ Does it cause a frameshift? _____
11. Why is it said that the genetic code is universal?

Chapter

11

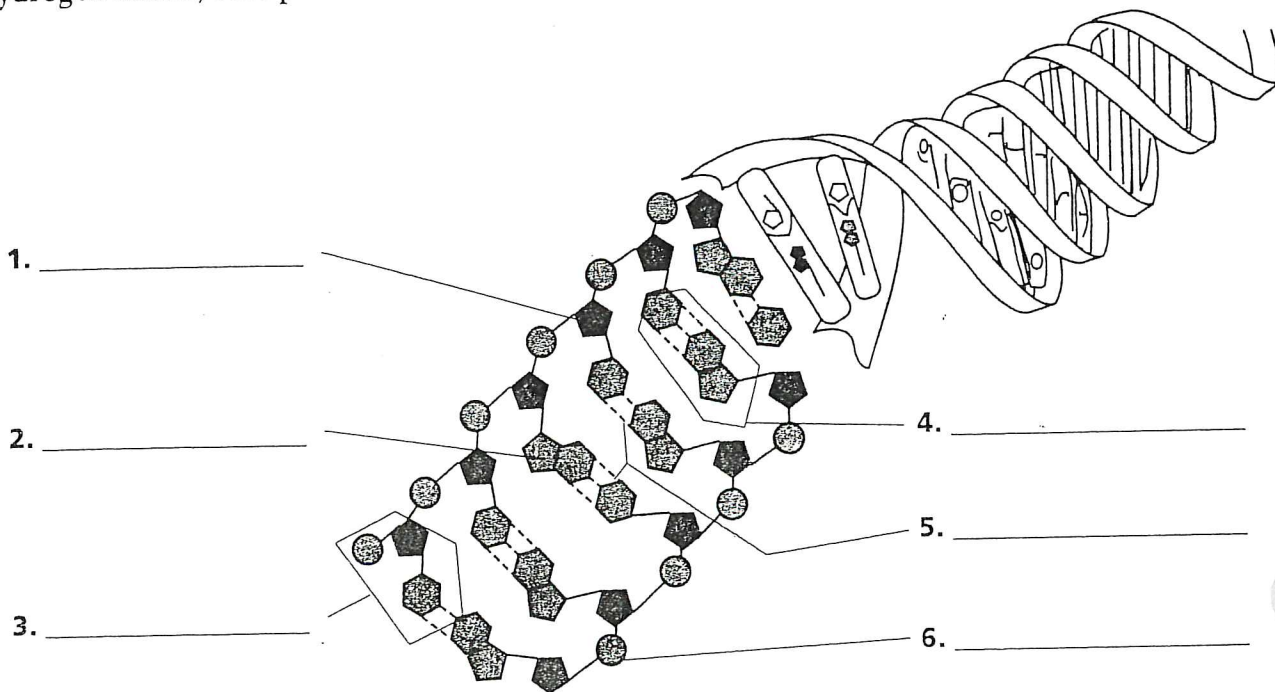
DNA and Genes

Reinforcement and Study Guide

Section 11.1 DNA: The Molecule of Heredity

In your textbook, read about what DNA is and the replication of DNA.

Label the diagram. Use these choices: nucleotide, deoxyribose, phosphate group, nitrogen base, hydrogen bonds, base pair.



Complete each statement.

7. _____, guanine (G), cytosine (C), and thymine (T) are the four _____ in DNA.
8. In DNA, _____ always forms hydrogen bonds with guanine (G).
9. The sequence of _____ carries the genetic information of an organism.
10. The process of _____ produces a new copy of an organism's genetic information, which is passed on to a new cell.
11. The double-coiled shape of DNA is called a _____.

Section 11.2 From DNA to Protein

In your textbook, read about genes and proteins and RNA.

Complete the chart on the three chemical differences between DNA and RNA.

Structure	DNA	RNA
1. strand of nucleotides		
2. sugar		
3. nitrogen base		

In your textbook, read about the genetic code.

Complete each statement.

4. Proteins are made up of _____.
5. There are twenty different types of _____.
6. The message of the DNA code is information for building _____.
7. Each set of three nitrogen bases that codes for an amino acid is known as a _____.
8. The amino acid _____ is represented by the mRNA codon ACA.
9. _____ and _____ are mRNA codons for phenylalanine.
10. There can be more than one _____ for the same amino acid.
11. For any one codon, there can be only one _____.
12. The genetic code is said to be universal because a codon represents the same _____ in almost all organisms.
13. _____, _____, and _____ are stop codons.
14. _____ and _____ are amino acids that are each represented by only one codon.

Chapter 11 DNA and Genes, *continued*

Reinforcement and Study Guide

Section 11.2 From DNA to Protein, continued

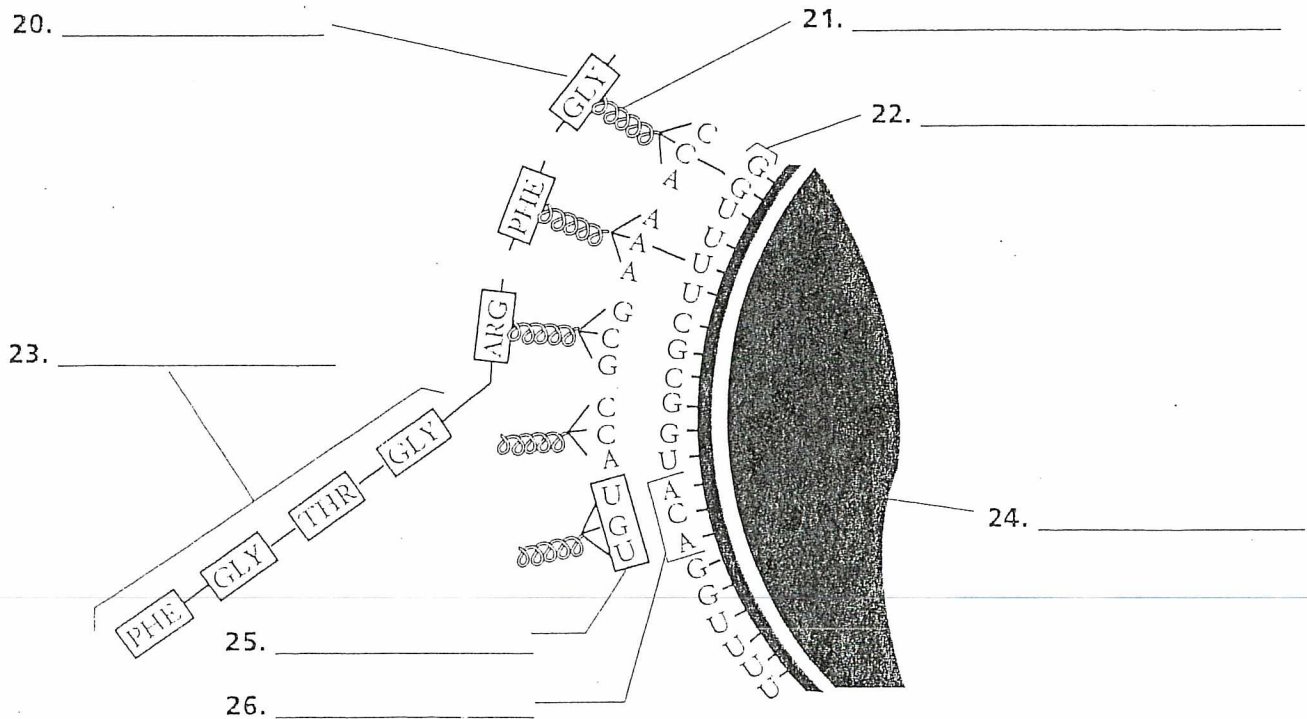
In your textbook, read about transcription from DNA to mRNA.

Complete each statement.

- 15. Proteins are made in the cytoplasm of a cell, whereas DNA is found only in the _____.
- 16. The process of making RNA from DNA is called _____.
- 17. The process of transcription is similar to the process of DNA _____.
- 18. _____ carries information from the DNA in the nucleus out into the cytoplasm of the cell.
- 19. mRNA carries the information for making proteins to the _____.

In your textbook, read about translation from mRNA to protein.

Label the diagram. Use these choices: transfer RNA (tRNA), amino acid, amino acid chain, codon, anticodon, messenger RNA (mRNA), ribosome.



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