

Chapter

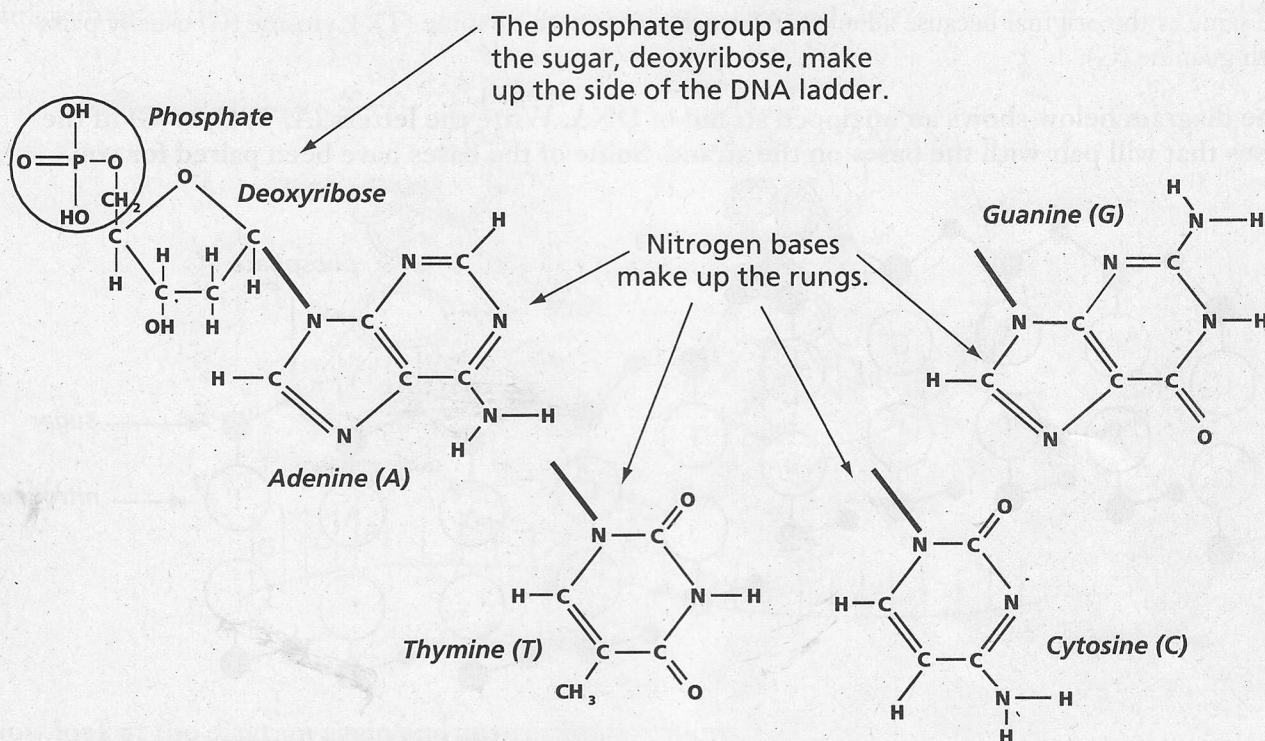
11

DNA and Genes

Content Mastery

Get the Big Picture

Study the picture. Then answer the questions.



A DNA molecule is similar in shape to a ladder.

1. How many types of nitrogen bases does DNA have? _____

Name them. _____

2. What are the sides of the DNA ladder made of? _____

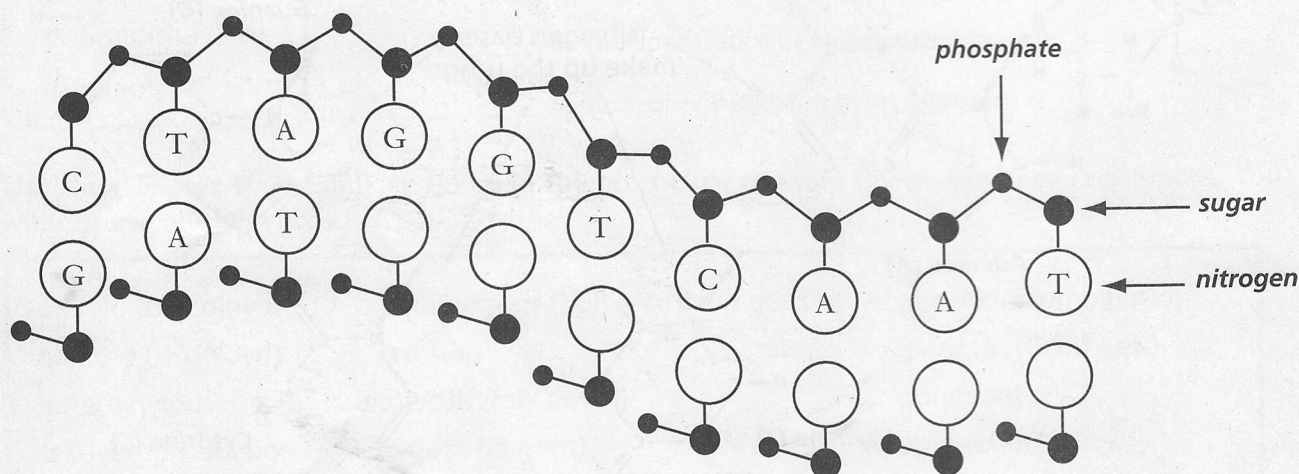
3. What are the steps of the DNA ladder made of? _____

4. What kind of bonds hold the chains of building blocks together? _____

**Chapter
11****DNA and Genes, continued****Content Mastery****Section 11.1 DNA: The
Molecule of Heredity****Study the Diagram**

When the DNA ladder replicates, or copies itself, the ladder breaks apart. You can think of the ladder breaking apart as a zipper unzipping. When the two sides of the ladder are apart, free nucleotides attach to the nucleotides already on the sides of the ladder, and two copies of the DNA are formed. The copies are the same as the original because adenine (A) usually pairs with thymine (T). Cytosine (C) usually pairs with guanine (G).

The diagram below shows an unzipped strand of DNA. Write the letters (A, T, C, or G) of the bases that will pair with the bases on the strand. Some of the bases have been paired for you.



1. **True or false?** Nucleotide bases already attached to proteins form the copied side of the DNA ladder.

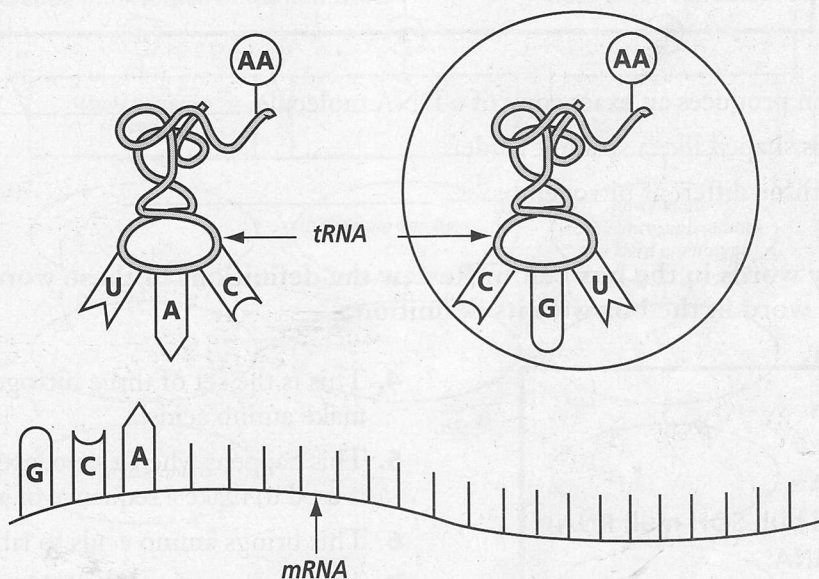
2. **True or false?** The process of DNA replication results in a copy of the original strand of DNA.

3. **True or false?** Sugar and phosphates provide the energy for DNA replication.

4. **True or false?** The final result of DNA replication is two copies of the original DNA strand.

**Chapter
11****DNA and Genes, continued****Content Mastery****Section 11.2 From DNA to Protein****Section 11.3 Genetic Changes****Study the Diagram**

The mRNA strand shown below is in the process of synthesizing, or making, proteins from amino acids. tRNA molecules bring the amino acids to the mRNA strand. Circle the tRNA molecule that will attach to the codon shown on the mRNA strand. Remember, cytosine (C) pairs with guanine (G), and adenine (A) pairs with uracil (U).



Now look at the diagram again and answer the questions.

1. How did you know which tRNA molecule would attach to the codon shown?

2. Suppose one of the bases on the mRNA was changed. Would the same tRNA molecule still attach to the strand? Explain your answer.

3. What would happen to the mRNA strand if an incorrect amino acid was inserted?

**Chapter
11****DNA and Genes, continued****Content Mastery****Review the Vocabulary**

Review the Chapter 11 vocabulary words in the box below. Then write true or false after each statement.

double helix

nitrogen

DNA replication

1. DNA replication produces an exact copy of a DNA molecule. _____
2. A double helix is shaped like a straight ladder. _____
3. DNA has only three different nitrogen bases. _____

Use the vocabulary words in the box below. Review the definitions of these words. Then draw a line to match each word in the box with its definition.

- a. transcription
- b. translation
- c. transfer RNA
- d. ribosomal (ri buh SOH mul) RNA
- e. messenger RNA
- f. codon (KOH dahn)

4. This is the set of three nitrogen bases used to make amino acids.
5. This happens when a sequence of bases in mRNA is used to make a sequence of amino acids.
6. This brings amino acids to ribosomes.
7. This carries the copied DNA code out to the cytoplasm.
8. This happens when DNA unzips and makes an RNA copy of itself.
9. This is the part of the RNA that makes up ribosomes.

Use the vocabulary words in the box below to fill in the blanks in the statements. You will not use all the words.

frameshift mutation
(FRAYME shihft • mew TAY shun)
chromosomal mutation
mutagen (MYEWT uh jun)

nondisjunction
point mutation
mutation

10. A P _____ is a change in a single base pair in DNA.
11. Broken chromosomes are one cause of ch _____ m _____.
12. N _____ happens when homologous chromosomes fail to separate properly.
13. A m _____ is any agent that can cause a change in DNA.