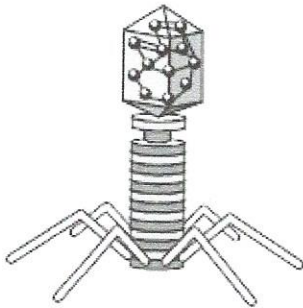


## Bacterial Transformation

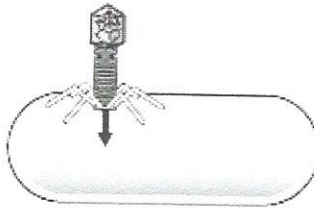
**The Hershey-Chase Experiment** Hershey and Chase hoped to find out whether DNA or protein carried the genetic information of a virus. The scientists used radioactive substances to label the DNA in some viruses. They used the protein coat in other viruses. Then they let the viruses inject their genetic material into bacteria.

Follow the directions.

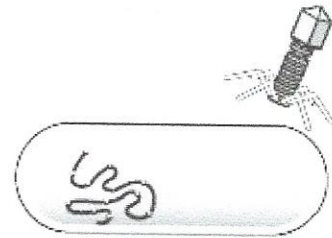
1. Label the illustration that shows the bacterium that contains DNA with the radioactive label.
2. Label the illustration that shows the bacterium that contains DNA without the radioactive label.



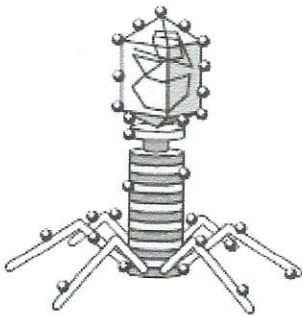
**DNA with radioactive label**



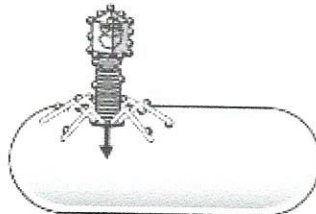
**Phage infects bacteria**



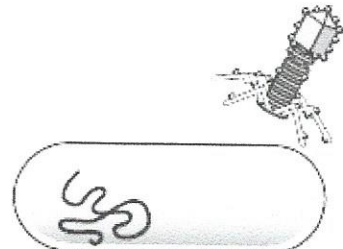
\_\_\_\_\_



**Protein coat with radioactive label**



**Phage infects bacteria**



\_\_\_\_\_

Answer the questions.

3. What did Hershey and Chase conclude was the genetic material of the virus? Circle the correct answer.

DNA

protein

carbohydrate

4. What result did Hershey and Chase's experiment have in the scientific community?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

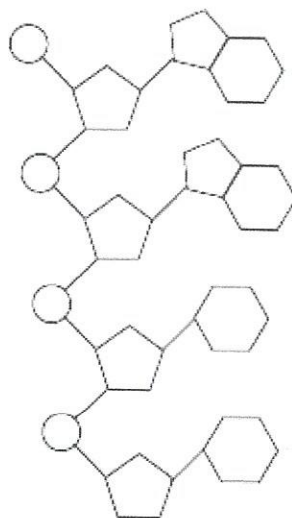
\_\_\_\_\_

## Solving the Structure of DNA

**Nucleic Acid and Nucleotides** DNA is made of long chains of nucleotides. Each nucleotide contains three basic parts: a base, a deoxyribose molecule, and a phosphate group. There are four different bases: adenine, cytosine, guanine, and thymine. Only one base is found in each nucleotide.

*Follow the directions.*

- In the diagram below, the sequence of nucleotides has the code AGCT. Color the diagram using this key:  
 deoxyribose: red  
 phosphate group: blue  
 adenine: yellow  
 cytosine: green  
 guanine: orange  
 thymine: black
- Circle one complete nucleotide.



*Answer the questions.*

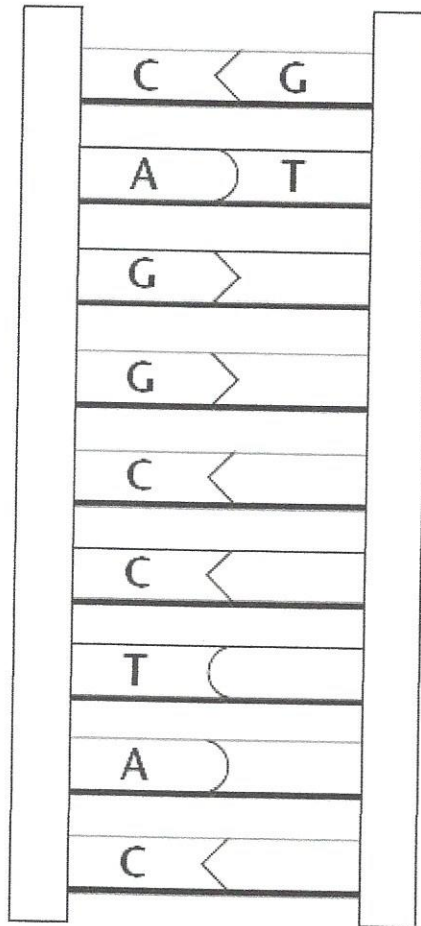
- Circle the correct answers. What two parts do all nucleotides have in common?  
 guanine                      deoxyribose                      phosphate group
- Each nucleotide is connected to the next nucleotide. The connection is found between  
 A. sugar of one nucleotide and phosphate of another  
 B. base of one nucleotide and sugar of another  
 C. phosphate groups of two nucleotides
- What are the parts of a DNA nucleotide? \_\_\_\_\_

## The Double-Helix Model

**Base Pairings** Four nucleotides make up DNA: adenine, cytosine, guanine, and thymine. These nucleotides always occur in pairs called base pairs. The diagram below is a model of DNA.

Follow the directions.

- Write the missing letter to complete each base pair. The first two have been done for you.



Key	
A	= Adenine
C	= Cytosine
G	= Guanine
T	= Thymine

Answer the questions.

- What nucleotide is always paired with thymine? \_\_\_\_\_
- What nucleotide is always paired with guanine? \_\_\_\_\_
- Whose rule does base pairing prove? \_\_\_\_\_
- Suppose a strand of DNA has the following code on one side.

A G T C C A G T A

What would be the matching other side of a DNA strand? \_\_\_\_\_

## Copying the Code

**The Role of Enzymes** Enzymes have several important jobs in DNA replication. The jobs of some enzymes are listed below.

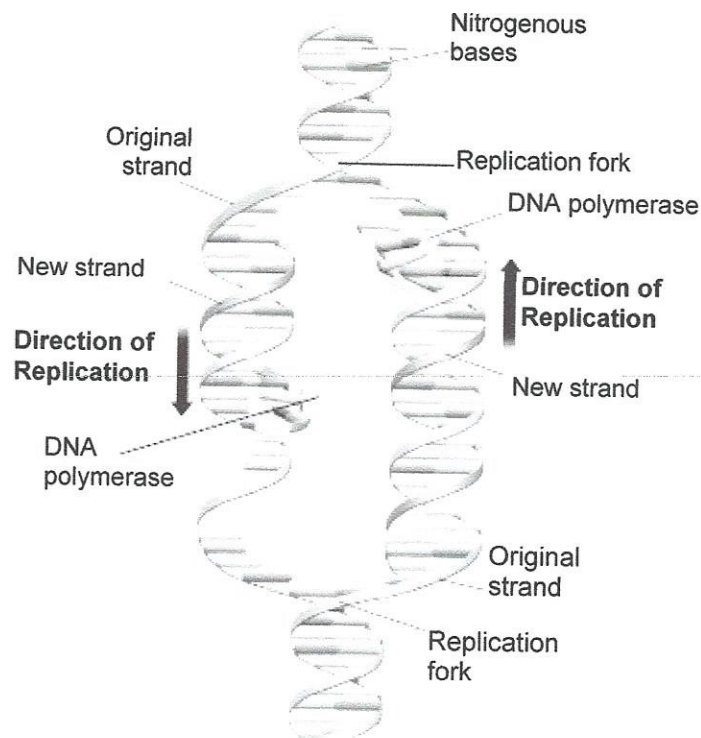
Write the jobs in the order in which they occur.

join free nucleotides to existing DNA strand  
unzip DNA

unwind DNA

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

The diagram below shows the replication of DNA. Look carefully at the diagram.



Answer the questions.

4. In your own words, define the word *replicate*. \_\_\_\_\_  
\_\_\_\_\_
5. Enzymes usually end in -ase. What is the name of the enzyme that joins individual nucleotides? \_\_\_\_\_
6. Circle the correct answer to complete the sentence. A(n) \_\_\_\_\_ is the place where a DNA strand opens to make new strands.  
original strand                      old strand                      replication fork

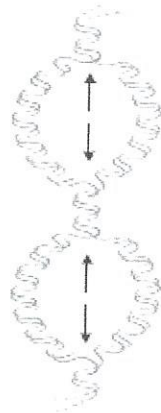
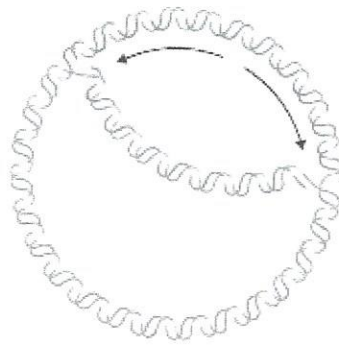


## Replication in Living Cells

During replication, a DNA molecule copies itself. In eukaryotes, DNA is organized into chromosomes within the nucleus. In prokaryotes, DNA is a circular molecule that is free in the cytoplasm.

*Follow the directions.*

1. Label one diagram as Prokaryotic DNA.
2. Label the other as Eukaryotic DNA.
3. Label both drawings with the following terms: unreplicated DNA, replication fork, origin of replication.



*Answer the questions. Circle the correct answers.*

4. In which type of cell is DNA circular?  
prokaryotic      eukaryotic
5. In which type of cell does replication begin at several points?  
prokaryotic      eukaryotic

## Chapter 12 Vocabulary Review

For Questions 1–6, match the term with its definition.

### Definition

- \_\_\_\_\_ 1. In DNA, the fit between thymine and adenine and the fit between cytosine and guanine.
- \_\_\_\_\_ 2. An enzyme that joins individual nucleotides to produce a new strand of DNA
- \_\_\_\_\_ 3. The process that can change a harmless bacterial strain into a disease-causing strain
- \_\_\_\_\_ 4. The tip of a chromosome
- \_\_\_\_\_ 5. The process that copies a DNA molecule
- \_\_\_\_\_ 6. A kind of virus that infects bacteria

### Term

- A. transformation
- B. bacteriophage
- C. base pairing
- D. replication
- E. DNA polymerase
- F. telomere

For Questions 7–15, complete each statement by writing in the correct word or words.

- 7. Each time a chromosome is replicated, some DNA may be lost from the tip of the chromosome, or \_\_\_\_\_.
- 8. Griffith's experiments showed that some chemical compound in cells must be responsible for bacterial \_\_\_\_\_.
- 9. Hershey and Chase studied a \_\_\_\_\_ that was composed of a DNA core and a protein coat.
- 10. The center of the DNA strand exhibits \_\_\_\_\_.
- 11. The enzyme that "proofreads" each new DNA strand so that each molecule is a near-perfect copy of the original is \_\_\_\_\_.
- 12. In eukaryotic cells, \_\_\_\_\_ can begin at dozens or even hundreds of places on the DNA molecule.
- 13. The double-helix model explains Chargaff's rule of \_\_\_\_\_.
- 14. The DNA molecule separates into two strands during \_\_\_\_\_.
- 15. The principal enzyme involved in DNA replication is \_\_\_\_\_.

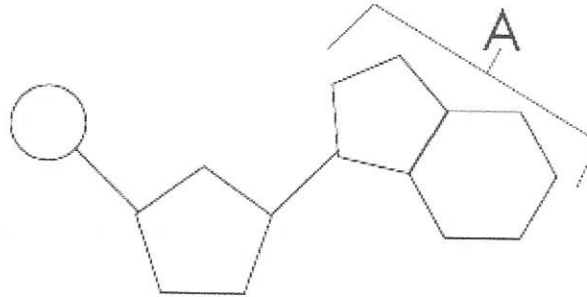
## Chapter 12 Review

Use the clues and words to help you write the vocabulary terms from the chapter in the blanks. You may use a word once or not at all.

<b>bacteriophage base pairing</b>	<b>DNA polymerase replication</b>	<b>telomere</b>
---------------------------------------	---------------------------------------	-----------------

- tip of a chromosome \_\_\_\_\_
- enzyme that joins nucleotides to make a new strand of DNA \_\_\_\_\_
- virus that infects bacteria \_\_\_\_\_
- process of making a copy of DNA \_\_\_\_\_

Answer the following questions. Use the diagram to answer Questions 5 and 6.



- What is the structure shown above?
 

A. replication fork	C. enzyme
B. nucleotide	D. hydrogen bond
- What is the molecule labeled A?
 

A. sugar	C. nitrogen base
B. phosphate group	D. deoxyribose
- Use the terms below to draw a linear graphic organizer in the space below.

<b>adenine bases</b>	<b>cytosine DNA</b>	<b>guanine thymine</b>
--------------------------	-------------------------	----------------------------

**Nucleotides**