



SECTION
8.3

DNA REPLICATION
Reinforcement

KEY CONCEPT DNA replication copies the genetic information of a cell.

Every cell needs its own complete set of DNA, and the discovery of the three-dimensional structure of DNA immediately suggested a mechanism by which the copying of DNA, or DNA **replication**, could occur. Because the DNA bases pair in only one way, both strands of DNA act as templates that direct the production of a new, complementary strand. DNA replication takes place during the S stage of the cell cycle.

The process of DNA replication is very similar in both eukaryotes and prokaryotes, but we will focus on eukaryotes.

- During the S stage of the cell cycle, the DNA is loosely organized in the nucleus. Certain enzymes start to unzip the double helix at places called origins of replication. The double helix unzips in both directions along the strand. Eukaryotic chromosomes are very long, so they have many origins of replication to help speed the process. Other proteins hold the two strands apart.
- The unzipping exposes the bases on the DNA strands and enables free-floating nucleotides to pair up with their complementary bases. **DNA polymerases** bond the nucleotides together to form new strands that are complementary to the original template strands.
- The result is two identical strands of DNA. DNA replication is described as semiconservative because each DNA molecule has one new strand and one original strand.

DNA polymerase not only bonds nucleotides together. It also has a proofreading function. It can detect incorrectly paired nucleotides, clip them out, and replace them with the correct nucleotides. Uncorrected errors are limited to about one per 1 billion nucleotides.

1. Why is DNA replication described as semiconservative?

2. What are two major functions that DNA polymerase performs?
