

DNA Replication

Copying the Code Each strand of the double helix has all the information needed to reconstruct the other half by the mechanism of base pairing. Because each strand can be used to make the other strand, the strands are said to be complementary. DNA copies itself through the process of replication:

- The two strands of the double helix unzip, forming replication forks.
- New bases are added, following the rules of base pairing (A with T and G with C).
- Each new DNA molecule has one original strand and one new strand.
- DNA polymerase is an enzyme that joins individual nucleotides to produce a new strand of DNA.
- During replication, DNA may be lost from the tips of chromosomes, which are called telomeres.

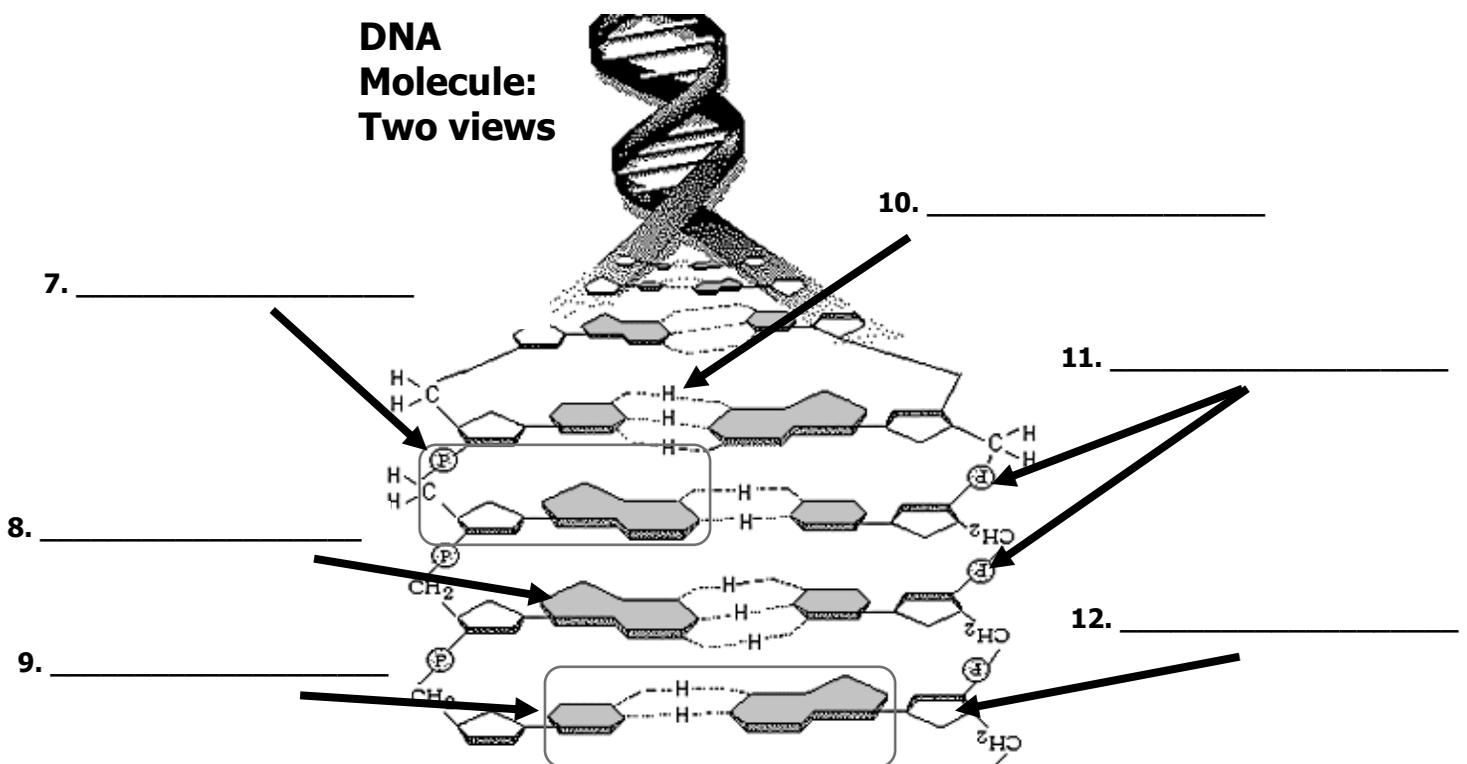
Replication in Living Cells The cells of most prokaryotes have a single, circular DNA molecule in the cytoplasm. Eukaryotic cells have much more DNA. Nearly all of it is contained in chromosomes, which are in the nucleus.

- Replication in most prokaryotic cells starts from a single point and proceeds in two directions until the entire chromosome is copied.
- In eukaryotic cells, replication may begin at dozens or even hundreds of places on the DNA molecule, proceeding in both directions until each chromosome is completely copied.

Copying the Code (new 350, old 299)

1. The strands of a DNA molecule are said to be _____ because each strand can be used to make the other strand.
2. The first step in eukaryotic DNA replication is for the ____ strands of the double helix to _____.
3. What is formed where DNA strand unzips? _____
4. What enzyme joins nucleotides to produce the new strand of DNA? _____
5. Telomeres, which are the tips of _____, are sometimes lost during DNA replication.
6. On complimentary DNA strands, T pairs with ____ and C pairs with ____.

Label the diagram with the following terms (**new 348, old 294**): *Nucleotide, Base pair, Deoxyribose, Hydrogen bond, Phosphate group, Nitrogenous base*



What would happen if the complementarity of nucleotides did not exist, and nucleotides paired up randomly instead? _____

14. Briefly describe what happens during replication. _____

15. What occurs at the replication fork? _____

16. How does replication in eukaryotes differ from replication in prokaryotes? _____

Replication in Living Cells

17. Complete the table to compare DNA replication in prokaryotes and eukaryotes.

| | Prokaryotes | Eukaryotes |
|--|-------------|------------|
| Location of DNA | | |
| Amount of DNA (more or less) | | |
| Starting Point(s) for Replication (single or dozens) | | |

18. Is DNA replication always a foolproof process? Explain your answer. _____

19. Why is the pairing of bases during replication essential for the transmission of inherited traits from parent to offspring? _____

20. Explain why DNA replication must occur before mitosis starts? _____

21. Complete the complimentary side to this DNA section by writing A, T, G, or C.

A T C C G A T C C A A T A G C

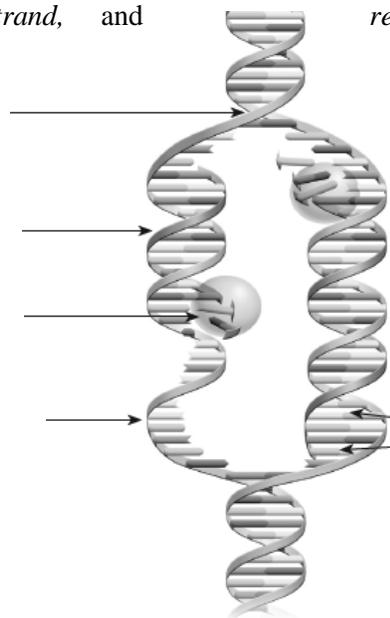
Label the diagram with the following terms (**new 351, old 298**): *DNA polymerase*, *new strand*, *nitrogenous bases*, *original strand*, and *replication fork*.

22. _____

23. _____

24. _____

25. _____



26. _____

27. Which part of a DNA molecule is responsible for the direct coding of specific traits in an organism?

- F** The number of hydrogen bonds that hold the strands of DNA together.
- G** The number of carbons in the DNA molecule.
- H** The sequence of nucleotide bases in the DNA molecule.
- J** The sequences of phosphates along each DNA strand.