Name_____Hour_____

# Section 12–1 DNA (pages 291–294)

The Structure of DNA (pages 291–294)

1. List the three critical things that genes were known to do.

a. _____

_____

b. _____

_____

c._____

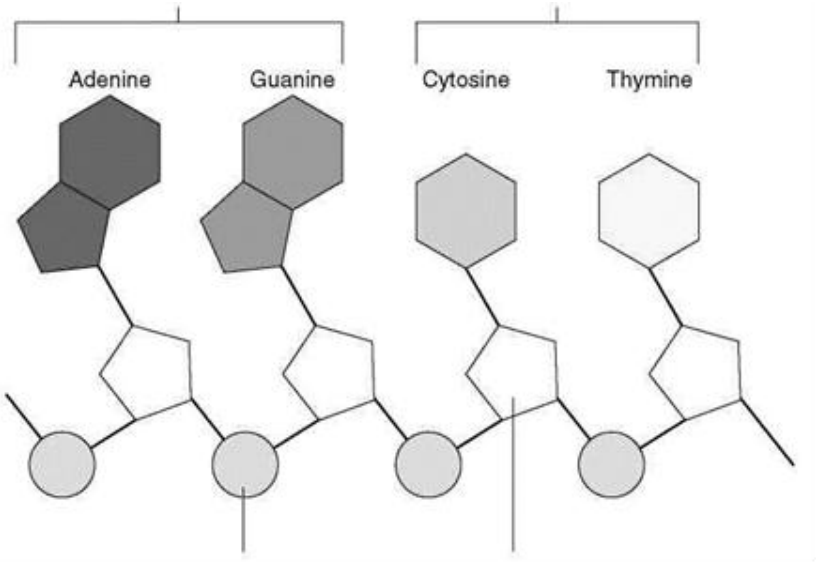
_____

2. What is the makeup of a nucleotide? _____

_____

3. Adenine, guanine, cytosine, and thymine are four kinds of _____ bases in DNA.

4. Identify the components of a molecule in the diagram below. Label the bases as purines or pyrimidines.




5. Is the following sentence true or false? Adenine and guanine are larger molecules than cytosine and thymine because they have two rings in their structure. _____

6. What forms the backbone of a DNA chain? _____

_____

7. Is the following sentences true or false? The nucleotides must be joined together in a specific order. _____

8. According to Chargaff's rules, the percentages of _____ are equal to those of thymine and the percentages of _____ are equal to those of guanine in the DNA molecule.

9. Rosalind Franklin's work with X-ray diffraction showed that the DNA molecule is shaped like a(an) _____ and contains _____strands.

10. How did Francis Crick and James Watson try to understand the structure of DNA? _____

_____

11. How did Watson and Crick describe the structure of DNA? _____

_____

_____

12. Is the following sentence true or false? According to the principle of base pairing, hydrogen bonds could form only between adenine and cytosine. _____

Name_____Hour_____

# Section 12–2 Chromosomes and DNA Replication (pages 295–299)

## DNA and Chromosomes (pages 295–296)

1. Circle the letter of the location of DNA in prokaryotic cells.

a. nucleus b. mitochondria c. cytoplasm d. vacuole

2. Is the following sentence true or false? Most prokaryotes contain a single, circular DNA molecule. _____

3. Eurkaryotic DNA is generally located in the cell _____ in the form of a number of chromosomes.

4. Is the following sentence true or false? All organisms have the same number of chromosomes. _____

5. Is the following sentence true or false? The *E. coli* chromosome is longer than the diameter of an individual *E. coli* bacterium. _____

6. Circle the letter of each sentence that is true about chromosome structure.

a. The DNA in eukaryotic cells is very loosely packed.

b. Prokaryotic cells contain more DNA than eukaryotic cells.

c. A human cell contains more than 1 meter of DNA.

d. The DNA of the smallest human chromosome is nearly 10 times as long as many bacterial chromosomes.

7. Eukaryotic chromosomes contain both DNA and protein, packed together to form _____.

8. What are histones?_____

_____

9. Why are individual chromosomes visible only during mitosis? _____

_____

_____

_____

10. Is the following sentence true or false? Changes in chromatin structure and histone-DNA binding may be associated with changes in gene activity. _____

11. What do nucleosomes do? _____

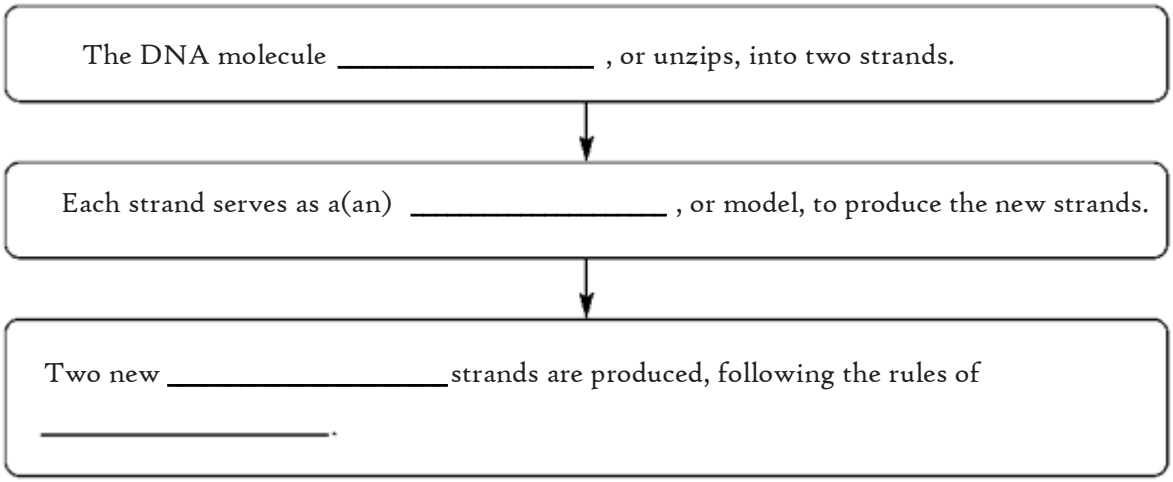
_____

## DNA Replication (pages 297–299)

**12.** What occurs during the process of replication? _____

_____

13. Complete the flowchart to describe the process of DNA replication.




14. Is the following sentence true or false? In eukaryotic chromosomes, DNA replication begins at a single point in the chromosome and proceeds in two directions. _____

15. The sites where DNA replication and separation occur are called_____ _____.

16. What occurs when a molecule of DNA is "unzipped"? _____

_____

17. What is the complimentary strand of bases for a strand with the bases TACGTT? _____

18. Is the following sentence true or false? Each DNA molecule resulting from replication has one original strand and one new strand. _____

19. List two major roles of DNA polymerase in the process of DNA replication.

a. _____

b. _____

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# Section 12–3 RNA and Protein Synthesis (pages 300-306)

The Structure of RNA (page 300)

1. List the three main differences between RNA and DNA.

   a. _____

   b. _____

   c. _____

2. What is the importance of the cell's ability to copy a single DNA sequence into RNA? _____

_____

3. What is the one job in which most RNA molecules are involved? _____

_____

Types of RNA (pages 300-301)

4. Complete the table about types of RNA.

| Type | Function |
|---|---|
| | Carries copies of the instructions for assembling amino acids from DNA to the rest of the cell |
| Ribosomal RNA | |
| | Transfers each amino acid to the ribosome to help assemble proteins |

Transcription (page 301)

5. Circle the letter of each sentence that is true about transcription.

   a. During transcription, DNA polymerase binds to RNA and separates the DNA strands.
   b. RNA polymerase uses one strand of DNA as a template to assemble nucleotides into a strand of RNA.
   c. RNA polymerase binds only to DNA promoters, which have specific base sequences.
   d. Promoters are signals in RNA that indicate to RNA polymerase when to begin transcription.

RNA Editing (page 302)

6. Many RNA molecules from eukaryotic genes have sections, called _____ edited out of them become functional. The remaining pieces, called _____, are spliced together.

7. Is the following sentence true or false? RNA editing occurs in the cytoplasm of the cell. _____

8. What are two explanations for why some RNA molecules are cut and spliced?

a. _____

_____

b. _____

_____

_____

The Genetic Code (pages 302-303)

9. Proteins are made by joining _____ into long chains called polypeptides.

10. How can only four bases in RNA carry instructions for 20 different amino acids? _____

_____

_____

11. What is a codon? _____

_____

_____

12. Circle the letter of the number of possible three-base codons.

a. 4 b. 12 c. 64 d. 128

13. Is the following sentence true or false? All amino acids are specified by only one codon. _____

14. Circle the letter of the codon that serves as the "start" codon for protein synthesis.

a. UGA b. UAA c. UAG d. AUG

Translation (pages 303-305)

15. What occurs during the process of translation? _____

_____

_____

16. Where does translation take place? _____

_____

17. Circle the letter of each sentence that is true about translation.

a. Before translation occurs, messenger RNA is transcribed from DNA in the nucleus.
b. Translation occurs in the nucleus.
c. It is the job of transfer RNA to bring the proper amino acid into the ribosome to be attached to the growing peptide chain.
d. When the ribosome reached a stop codon, it releases the newly formed polypeptide and the mRNA molecule.

18. What is an anticodon? _____

_____

The Roles of RNA and DNA (page 306)

*Match the roles with the molecules. Molecules may be used more than once.*

| **Roles** | **Molecules** |
|---|---|
| _____19. Master plan | a. DNA |
| _____20. Goes to the ribosomes in the cytoplasm | b. RNA |
| _____21. Blueprint | |
| _____22. Remains in the nucleus | |

Genes and Proteins (page 306)

23. Many proteins are _____, which catalyze and regulate chemical reactions.

24. Is the following sentence true or false? Genes are the keys to almost everything that living cells do. _____