

14.3 Studying the Human Genome

Manipulating DNA

For Questions 1–4, write True if the statement is true. If the statement is false, change the underlined word to make the statement true.

- _____ 1. Bacteria produce restriction enzymes that cut the DNA molecule into smaller pieces.
 - _____ 2. Restriction fragments are always cut at a particular sequence of proteins.
 - _____ 3. The technique that separates differently sized DNA fragments is gel electrophoresis.
 - _____ 4. The enzyme that copies DNA is DNA restrictase.
5. Complete the graphic organizer to summarize the steps used to determine the sequences of bases in DNA.

Purpose	Tool or Technique Used	Outcome
Cutting DNA		
Separating DNA		
Reading DNA		

For Questions 6–10, complete each statement by writing in the correct word or words.

- 6. By using tools that cut, separate, and then replicate DNA, scientists can now read the _____ sequence in DNA from any cell.
- 7. Restriction enzymes cut pieces of DNA sometimes called restriction _____.
- 8. Each restriction enzyme cuts DNA at a different sequence of _____.
- 9. The smaller the DNA, the _____ and farther it moves during gel electrophoresis.
- 10. After chemically dyed bases have been incorporated into a DNA strand, the order of colored _____ on the gel reveals the exact sequence of bases in DNA.

The Human Genome Project

For Questions 11–16, write the letter of the correct answer on the line at the left.

- _____ 11. What technology made the Human Genome Project possible?
- A. DNA sequencing
 - B. RNA replication
 - C. protein synthesis
 - D. enzyme activation
- _____ 12. What were the “markers” that the researchers of the Human Genome Project used?
- A. restriction enzymes
 - B. gel electrophoresis
 - C. base sequences
 - D. restriction fragments
- _____ 13. What does “shotgun sequencing” do?
- A. separate fragments using gel electrophoresis
 - B. find overlapping areas of DNA fragments
 - C. cut DNA into millions of “puzzle pieces”
 - D. bind colored dyes to base sequences
- _____ 14. What are SNPs?
- A. points where a restriction enzyme cuts a DNA molecule
 - B. missing sequence of base pairs in a restriction fragment
 - C. proteins formed by a mutated gene
 - D. differences in a base between two individuals
- _____ 15. Bioinformatics would not have been possible without
- A. microscopes.
 - B. genes.
 - C. computers.
 - D. genomics.
- _____ 16. In humans, single-base differences
- A. occur at about 3 million sites.
 - B. occur rarely in the sex chromosomes.
 - C. seldom occur in normal DNA.
 - D. cannot be identified from DNA analysis.

17. What were the goals of the Human Genome Project?
