Name_____ Class_____ Date _____

Section 13–2 Manipulating DNA (pages 322–326)

Key Concept

- How do scientists make changes to DNA?

The Tools of Molecular Biology (pages 322–323)

1. What is genetic engineering? _____

_____

_____

2. Is the following sentence true or false? Making changes to the DNA code is similar to changing the code of a computer program. _____

3. Scientists use their knowledge of the _____ of DNA and its _____ properties to study and change DNA molecules.

4. List four steps that molecular biologists use to study and change DNA molecules.

a. _____

b. _____

c. _____

d. _____

5. Explain how biologists get DNA out of a cell. _____

_____

_____

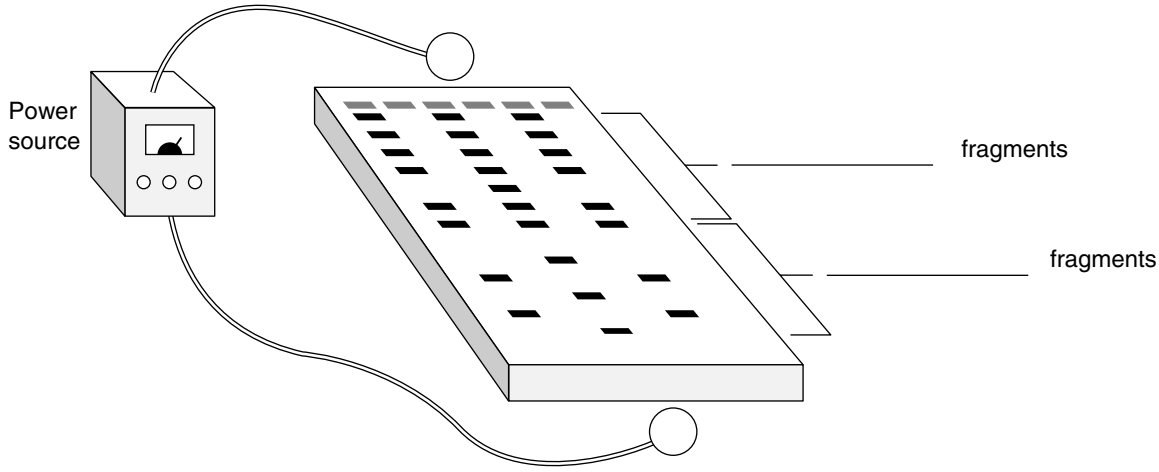
6. Biologists use _____ to cut DNA molecules at a specific sequence of nucleotides to make smaller fragments.

7. Circle the letter of the process by which DNA fragments are separated and analyzed.

a. gel electrophoresis **c.** transformation

b. extraction **d.** restriction

8. In the diagram below, label the positive and negative ends of the gel and identify the location of longer and shorter fragments.



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9. Circle the letter of each sentence that is true about gel electrophoresis.

a. An electric voltage applied to the gel separates the DNA fragments.

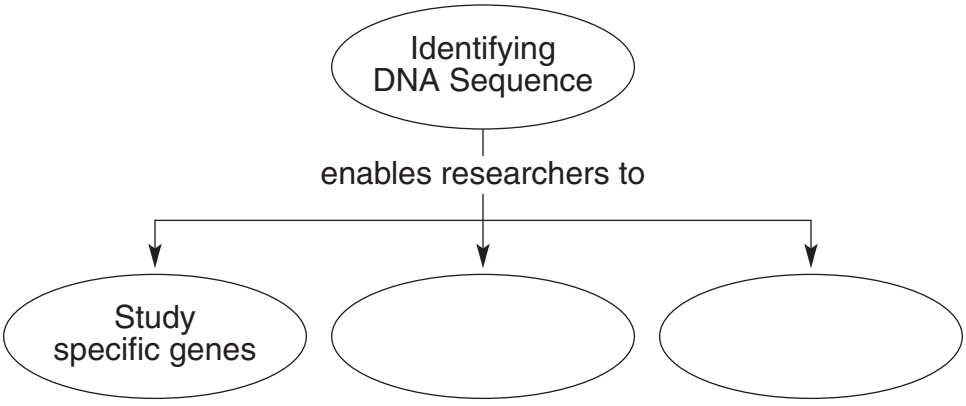
b. DNA molecules are positively charged.

c. Gel electrophoresis is used to compare the genomes of different organisms.

d. Gel electrophoresis can be used to locate and identify one particular gene in an individual's genome.

Using the DNA Sequence (pages 323–326)

10. Complete the concept map to show how researchers use the DNA sequence of an organism.



11. List four "ingredients" added to a test tube to produce tagged DNA fragments that can be used to read a sequence of DNA.

a. _____

b. _____

c. _____

d. _____

12. What does the reaction in the test tube generate when complementary DNA is made for reading DNA? _____

_____

_____

_____

13. Is the following sentence true or false? The pattern of colored bands on a gel tells the exact sequence of bases in DNA. _____

14. Enzymes that splice DNA together can also be used to join _____ DNA sequences to natural DNA sequences.

15. How is recombinant DNA produced? _____

_____

_____

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16. What is polymerase chain reaction (PCR)? _____

_____

_____

17. What is the role of the primers in PCR? _____

_____

_____

_____

18. Circle the letter of the first step in the polymerase chain reaction.

a. The copies become templates to make more copies.

b. The DNA is cooled to allow the primers to bind to the single-stranded DNA.

c. The DNA is heated to separate its two strands.

d. DNA polymerase makes copies of the region between the primers.

Reading Skill Practice

A flowchart is useful for organizing the steps in a process. Make a flowchart that shows the steps molecular biologists use to determine the order of bases in a segment of a DNA molecule.