

## Bio12-Q2W7-Test1--Biotechnology

### Completion

Complete each statement.

- |                        |                         |
|------------------------|-------------------------|
| A. human genome        | B. homozygous recessive |
| C. Gene therapy        | D. inbreeding           |
| E. test cross          | F. Transgenic organisms |
| G. cell culture        | H. hybrids              |
| I. Restriction enzymes | J. Heterozygous         |
| K. Plasmid             | L. Vectors              |
| M. linkage map         |                         |

1. Usually the parent with the known genotype is \_\_\_\_\_ for the trait in question.
2. \_\_\_\_\_ is used to develop pure breeds.
3. The entire collection of genes within human cells is referred to as the \_\_\_\_\_.
4. \_\_\_\_\_ is an application of the Human Genome Project that involves the insertion of normal genes into cells with defective genes in an attempt to correct genetic disorders.
5. For the diagnosis of a genetic disorder, many cells are required, but only a few need to be taken from the individual. These cells are grown in a \_\_\_\_\_ so that enough DNA can be obtained to run the necessary tests.
6. \_\_\_\_\_ are produced when DNA from another species is inserted into the genome of an organism, which then begins to produce the protein encoded on the recombinant DNA.
7. To determine if an individual with a dominant phenotype is homozygous or heterozygous, \_\_\_\_\_ is used.
8. When two cultivars are crossed, their offspring will be \_\_\_\_\_.
9. \_\_\_\_\_ are used to cleave DNA into fragments.
10. Many crop plants such as wheat and corn have been developed as \_\_\_\_\_ in order to develop larger and stronger plants.
11. A(n) \_\_\_\_\_ is a small ring of DNA found in a bacterial cell.
12. Organisms that are homozygous dominant and those that are \_\_\_\_\_ for a trait controlled by Mendelian inheritance have the same phenotype.
13. A gene gun and a virus may both be classified as \_\_\_\_\_ because they are mechanisms by which foreign DNA may be transferred into a host cell.
14. A(n) \_\_\_\_\_ shows the relative location of genes on a chromosome.
15. A \_\_\_\_\_ determines whether an organism is heterozygous or homozygous dominant for a trait.

## Multiple Choice

Identify the choice that best completes the statement or answers the question.

- \_\_\_\_ 16. A small amount of DNA obtained from a mummy or from frozen remains of a human may be cloned. In order to clone small amounts of DNA, \_\_\_\_\_ needs to be used to generate larger quantities of the DNA.
- DNA fingerprinting
  - gene splicing
  - polymerase chain reaction techniques
  - gel electrophoresis
- \_\_\_\_ 17. In 1974, Stanley Cohen and Herbert Boyer inserted a gene from an African clawed frog into a bacterium. The bacterium produced the protein coded for by the inserted frog gene. This insertion of a small fragment of frog DNA into the DNA of another species can most accurately be called \_\_\_\_\_.
- electrophoresis
  - genetic engineering
  - gene therapy
  - cloning
- \_\_\_\_ 18. What must be on either end of any genetic material that is inserted into the cleaved DNA in Figure 13-5?

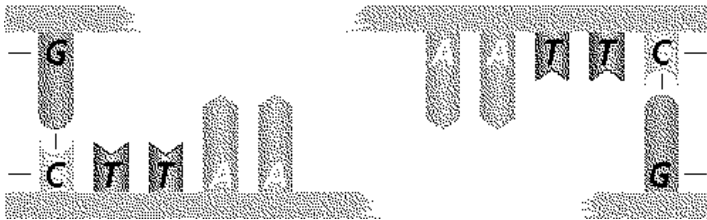


Figure 13-5

- ATAT
- AATT
- CGCG
- CCGG

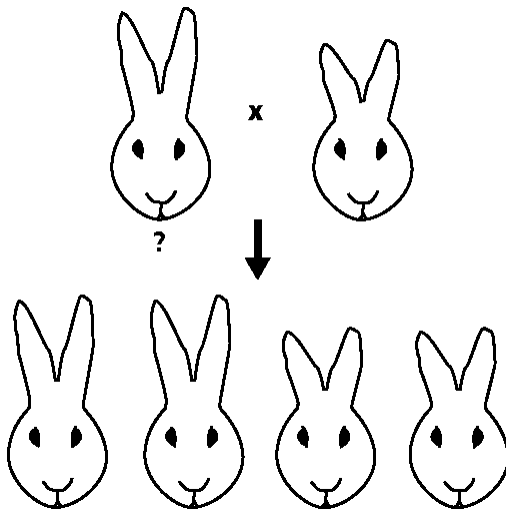


Figure 13-4

- \_\_\_\_ 19. What is the genotype of the unknown rabbit in Figure 13-4?
- homozygous long ears
  - heterozygous
  - recessive
  - homozygous short ears

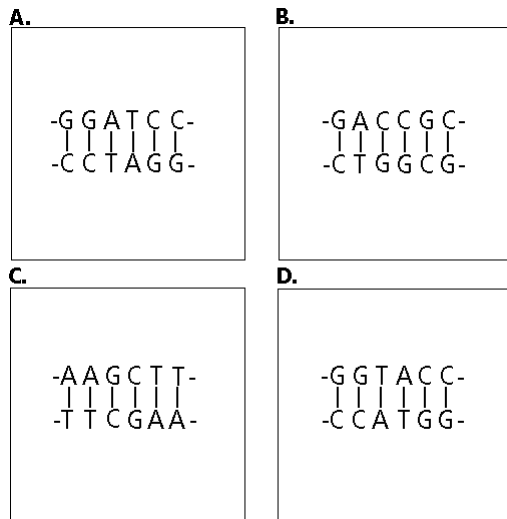
- \_\_\_\_ 20. What would be the result of the test cross in Figure 13-4 if the unknown were homozygous long ears?
- 1/4 of the offspring would have short ears
  - 1/2 of the offspring would have long ears
  - all of the offspring would have short ears
  - all of the offspring would have long ears
- \_\_\_\_ 21. An application of using DNA technology to help environmental scientists would be \_\_\_\_.
- make transgenic bacteria that can be used to clean up oil spills more quickly than do the natural bacteria
  - use PCR to analyze DNA at a crime scene
  - create a tobacco plant that glows in the dark
  - clone the gene for human growth hormone to treat pituitary dwarfism
- \_\_\_\_ 22. According to Figure 13-7, which DNA sequence will be cleaved by EcoRI, which cuts AATT/TTAA?



**Figure 13-7**

- |      |      |
|------|------|
| a. D | c. A |
| b. B | d. C |
- \_\_\_\_ 23. Recombinant DNA are currently used to produce \_\_\_\_.
- human antibodies and vaccines
  - crops that test better and stay fresh longer
  - clothing dye, cheese, and laundry products
  - all of these
- \_\_\_\_ 24. The Human Genome Project has involved sequencing and mapping the human genome. The most important benefit of this information has been the diagnosis of genetic disorders. Once a genetic disorder is diagnosed, \_\_\_\_\_ can be used as a possible treatment.
- |                 |                       |
|-----------------|-----------------------|
| a. gene therapy | c. DNA fingerprinting |
| b. PCR          | d. cell cultures      |
- \_\_\_\_ 25. Listed below are procedures involved in the production of a transgenic organism. From the choices provided, select the sequence that represents the proper order of events.
- Recombinant DNA is transferred into a bacterial cell.
  - A specific gene is identified in a DNA sequence.
  - The DNA fragment is recombined into a vector.
  - The DNA fragment to be inserted is isolated.
- |               |               |
|---------------|---------------|
| a. 1, 2, 3, 4 | c. 2, 4, 3, 1 |
| b. 4, 1, 2, 3 | d. 2, 3, 1, 4 |

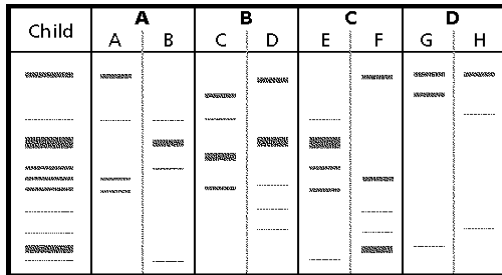
- \_\_\_\_ 26. The process used to separate DNA segments of different lengths is \_\_\_\_.
- PCR
  - gel electrophoresis
  - gene amplification
  - all of these
- \_\_\_\_ 27. Gel electrophoresis is a technique used to \_\_\_\_.
- cut DNA into fragments of various sizes
  - separate DNA fragments by charge and length
  - clone chromosomes of various species
  - inject foreign DNA into animal and plant cells



**Figure 13-6**

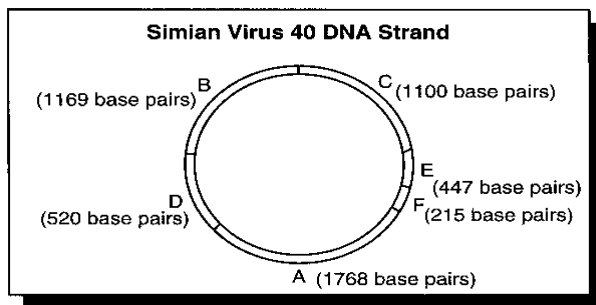
- \_\_\_\_ 28. Which segment in Figure 13-6 is not a palidrome?
- D
  - B
  - A
  - C
- \_\_\_\_ 29. If the segments in Figure 13-6 are mixed with several restriction enzymes, which will not be cleaved?
- A
  - C
  - D
  - B
- \_\_\_\_ 30. Which segment in Figure 13-6 will attach to genetic material with the sequence TCGA?
- C
  - B
  - A
  - D

- \_\_\_\_ 31. The effort to completely map and sequence the human genome will likely result in knowing the sequence of the approximately \_\_\_\_ genes on the 46 human chromosomes.
- 46
  - 10 000
  - 3 billion
  - 35 000 to 40 000



**Figure 13-8**

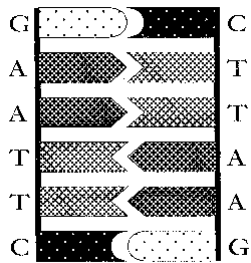
- \_\_\_\_ 32. According to Figure 13-8, which are the parents of the child?
- C
  - D
  - B
  - A
- \_\_\_\_ 33. According to Figure 13-8, which parents might give a false positive if only the longer DNA fragments were analyzed?
- C
  - B
  - D
  - A
- \_\_\_\_ 34. A virus isolated from monkeys contains a circular double strand of DNA. The virus, called Simian Virus 40, interests scientists because it causes cancer in laboratory animals. Using a restriction enzyme, the strand is separated into six unequal segments, as shown in Figure 13-2. A scientist hypothesizes that the segment of DNA causing cancer can contain no fewer than 600 base pairs. Using Figure 13-2, decide which segments of the virus have the highest chance of containing the segment of interest. Identify in DESCENDING order, from the HIGHEST chance to the LOWEST.



**Figure 13-2**

- D, E, F
  - C, B, A
  - F, E, D
  - A, B, C
- \_\_\_\_ 35. A technique that may be employed in the Human Genome Project is \_\_\_\_.
- automated gene sequencers
  - PCR
  - gel electrophoresis
  - all of these
- \_\_\_\_ 36. The historical method used to assign genes to particular human chromosome was to \_\_\_\_.
- use biotechnology
  - study linkage data from human pedigrees
  - use linkage maps
  - conduct mating experiments

- \_\_\_\_ 37. In 1974, Stanley Cohen and Herbert Boyer inserted a gene from an African clawed frog into a bacterium. The bacterium produced the protein coded for by the inserted frog gene. The bacterium containing functional frog DNA would be classified as a \_\_\_\_.
- clone
  - transgenic organism
  - plasmid
  - DNA fingerprint
- \_\_\_\_ 38. The Human Genome Project may make use of which of the following to diagnose genetic disorders before birth?
- cell cultures
  - gel electrophoresis
  - all of the above
  - PCR
- \_\_\_\_ 39. Examine the pieces of DNA represented in Figure 13-1. Why are the nucleotide sequences on both strands referred to as palindromes?



**Figure 13-1**

- the sequences show chromosome mutation
  - the DNA is an example of a transgenic codon
  - the sequences are the same but run in opposite directions
  - each nucleotide is represented
- \_\_\_\_ 40. Which of the following would be an example of gene therapy technology?
- modifying *E. coli* to produce indigo dye for coloring denim blue jeans
  - cutting DNA into fragments with restriction enzymes
  - development of a nasal spray that contains copies of the normal gene that is defective in persons with cystic fibrosis
  - separation DNA fragments using gel electrophoresis

=====