

## How to Clone a Gene

Read Chapter 10.1-10.4

Fill in the blanks

1. \_\_\_\_\_ is the use of living things to produce biological products, such as using bacteria to produce cheese.
2. Moving DNA sequences from one species to another is called \_\_\_\_\_.
3. A hybrid DNA sequence contains sequences of DNA from 2 different organisms; hybrid DNA is also called \_\_\_\_\_.
4. A \_\_\_\_\_ is all the genes in an organism. A \_\_\_\_\_ is all the proteins in an organism.
5. Any kind of alteration of a genome, such as inducing mutations with radiation or chemicals is called genetic \_\_\_\_\_.
6. "Ingredients" required to create recombinant DNA include:
  - a. A gene of interest
  - b. Restriction \_\_\_\_\_ and the enzyme that forms phosphodiester bonds \_\_\_\_\_
  - c. A \_\_\_\_\_ that carries the inserted gene
  - d. A \_\_\_\_\_ cell, usually bacteria or yeast that will take up the recombinant DNA
7. The first genetically engineered gene medication, produced in 1982, was \_\_\_\_\_.

### Restriction Enzymes

8. Restriction enzymes cut DNA at special sequences called \_\_\_\_\_.
9. Check which one(s) of the following is(are) a palindrome.
  - a. 5' AATTAA 3'
  - b. 5' GAATTC 3'
  - c. 5' AAAGGG 3'
10. Restriction enzymes were originally isolated from \_\_\_\_\_.
11. Many restriction enzymes cut DNA so that there are overlapping ends of unpaired nucleotides called \_\_\_\_\_ ends.

## Vectors

12. Vectors are DNA molecules that can carry extra inserted pieces of (DNA/ RNA/ protein) \_\_\_\_\_.

13. The most common types of vectors are:

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_

14. For vectors to be useful, they must contain the following characteristics:

- a. Must be able to \_\_\_\_\_ within the host cells
- b. Must contain \_\_\_\_\_ cut sites
- c. Should carry a \_\_\_\_\_ that allows for identification of host cells that contain it
- d. Must contain a \_\_\_\_\_ so the inserted gene can be transcribed

15. \_\_\_\_\_ are small pieces of DNA in bacterial cells that contain approximately 2000-5000 nucleotides.

16. Vectors that are viruses that can infect bacteria are called \_\_\_\_\_.

17. Vectors that are constructed from combining features of plasmids and bacteriophages are called \_\_\_\_\_.

18. Vectors that can be grown in yeast cells and are eukaryotic are called \_\_\_\_\_.

## Cloning

19. Bacteria are easy to grow and easily take up plasmids by a process called \_\_\_\_\_.

20. Restriction enzyme cut sites are located in plasmids in the \_\_\_\_\_.

21. Two important selectable markers found in plasmids include:

- a. \_\_\_\_\_ - which allows only cells containing the plasmid to grow
- b. \_\_\_\_\_ - which identifies bacteria that contain recombinant DNA

22. Using lac Z, bacterial colonies that contain recombinant DNA are (what colour) \_\_\_\_\_ and bacterial colonies that do not contain recombinant DNA are (what colour) \_\_\_\_\_.
23. Making many copies of a specific gene using bacteria is called \_\_\_\_\_.
24. It is important to use a \_\_\_\_\_ when figuring out which restriction enzymes to use to cut out a gene of interest for cloning.
25. When plasmid DNA and the gene of interest are cut with the same restriction enzyme, they can be spliced together forming recombinant DNA using the enzyme \_\_\_\_\_.
26. Growth hormone can be made using recombinant DNA technology. Growth hormone can be given to cows to increase milk production. The recombinant cow hormone is called \_\_\_\_\_.
27. Fill in the following chart:

<b>Recombinant Protein</b>	<b>Condition treated</b>
Insulin	
	Anemia
Growth hormone	
Anticoagulants	
	Hemophilia
	Some autoimmune diseases