

## Study Guide Chapter 5

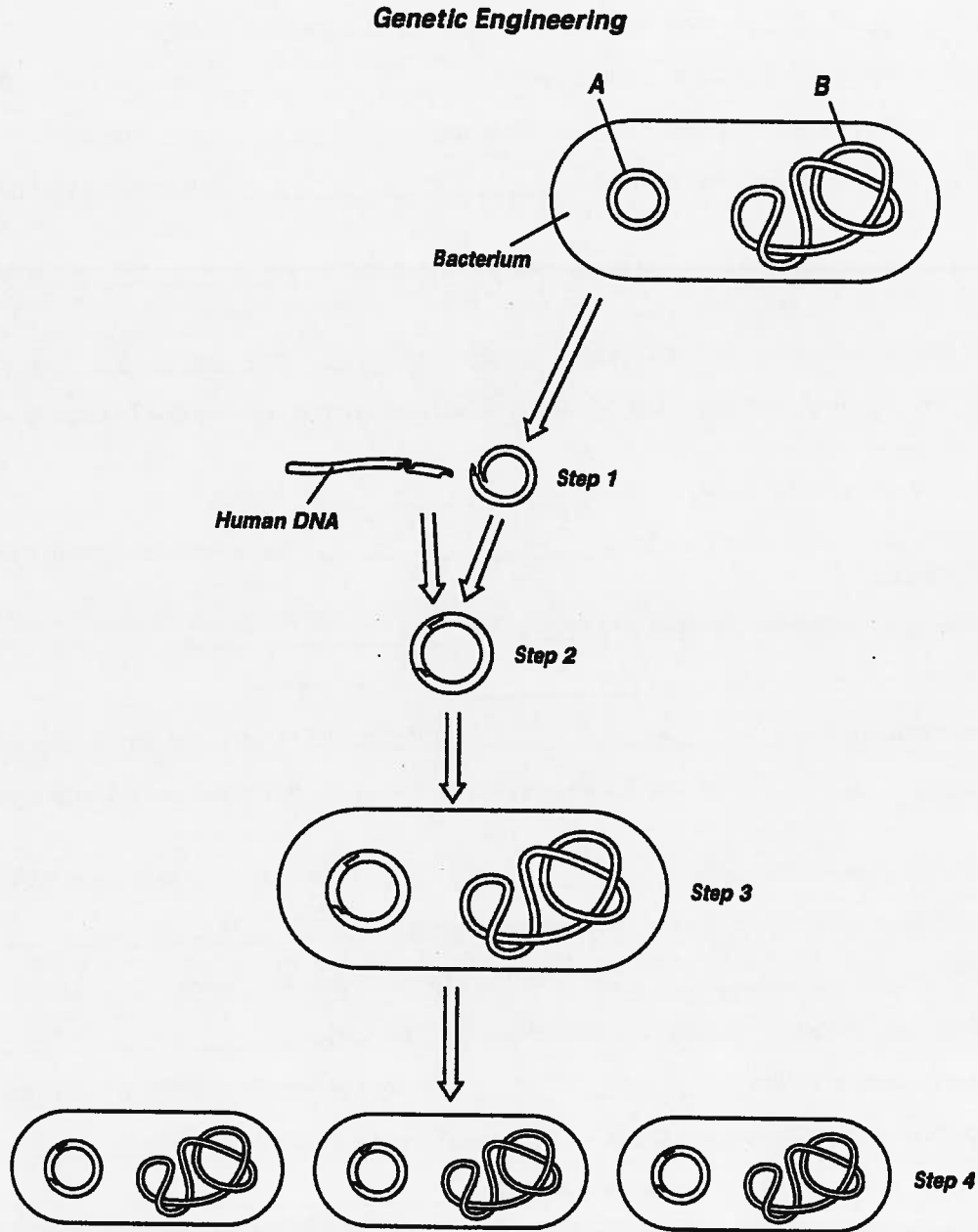
### Completion

Complete each sentence or statement.

1. A(n) \_\_\_\_\_ is used to track the occurrence of a trait in a family.
2. A karyotype can be used to determine the number of \_\_\_\_\_ in a person's cells.
3. A gene is said to have multiple alleles if it has more than \_\_\_\_\_ alleles.
4. An egg that is fertilized by a sperm cell with a(n) \_\_\_\_\_ chromosome will develop into a female.
5. Scientists in the Human Genome Project are working to identify the \_\_\_\_\_ sequence of every human gene.
6. A karyotype can be used to diagnose the genetic disorder called \_\_\_\_\_.
7. A gene from one organism is inserted into the DNA of another organism in the process known as \_\_\_\_\_.
8. A person who has the genetic disorder called \_\_\_\_\_ bleeds easily.
9. People who have the genetic disorder called \_\_\_\_\_ suffer from abnormally low levels of oxygen in the blood.
10. Down's syndrome is caused by the presence of an extra \_\_\_\_\_.
11. A carrier is a person who has one \_\_\_\_\_ allele for a trait.
12. A person's surroundings, or \_\_\_\_\_, can change the effects of a person's genes.
13. A(n) \_\_\_\_\_ helps couples understand their chances of having a child with a genetic disorder.
14. A selective breeding technique called \_\_\_\_\_ has been used to breed purebred racehorses.
15. When many genes control a trait, the trait will show a large number of \_\_\_\_\_.
16. Improvements in \_\_\_\_\_ can alter the effects of genes on height.
17. The three alleles on the single gene that controls blood type are said to be \_\_\_\_\_ alleles.
18. Breeders use a technique called \_\_\_\_\_ to cross genetically different individuals.
19. A pattern produced from fragments of the DNA of a specific person is called a(n) \_\_\_\_\_.
20. All of the DNA in one cell of an organism is called a(n) \_\_\_\_\_.

**Short Answer**

*Use the diagram to answer each question.*

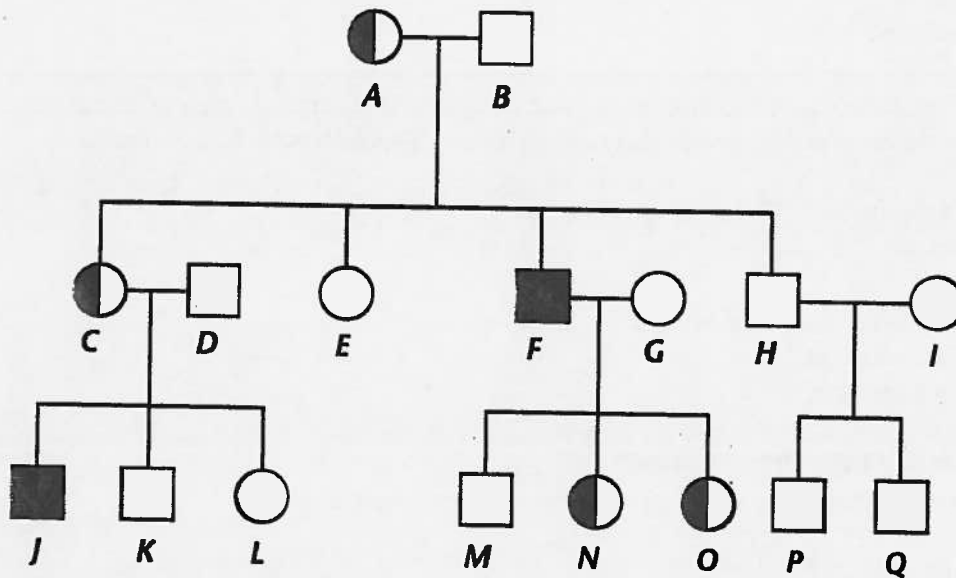


21. Identify structures A and B. What do these structures contain?
22. Explain what is happening in Step 4.
23. Why are bacteria often used in genetic engineering?

24. Explain what is happening in Step 2.
25. Explain what is happening in Step 3.
26. Explain what is happening in Step 1.

Use the diagram to answer each question.

### Pedigree



27. What do the circles in the pedigree represent? What do the squares represent?
28. Which individuals are carriers of the trait that is traced by the pedigree?
29. Which pairs of individuals in the pedigree have children?
30. Could the trait that is traced by this pedigree be sex-linked? Explain why or why not.
31. Which individuals have the trait that is traced by the pedigree?
32. Which individuals neither have the trait nor are carriers?

### Essay

33. A plant breeder clones a plant with beautiful flowers. Define cloning and explain how the cloned offspring compare to the parent plant.
34. Contrast hybridization and inbreeding.
35. Explain how you can tell the sex of a person by looking at that person's karyotype.
36. What factors determine human height?

37. Explain what causes cystic fibrosis and describe its effects on the body.
38. A person with blood type AB has the alleles  $I^A$  and  $I^B$ . A person with blood type O has the alleles  $ii$ . Is it possible for a person with blood type AB to have a child with blood type O? Explain why or why not.

**Multiple Choice**

*Identify the letter of the choice that best completes the statement or answers the question.*

- \_\_\_\_\_ 39. Which of these traits is controlled by a gene with multiple alleles?
- blood type
  - widow's peak
  - straight hairline
  - smile dimples
- \_\_\_\_\_ 40. In an attempt to produce a potato that tastes good and also resists disease, plant breeders crossed a potato variety that tastes good with a variety that resists disease. This technique is an example of
- cloning.
  - genetic engineering.
  - hybridization.
  - inbreeding.
- \_\_\_\_\_ 41. What factors can affect a person's height?
- a person's blood type
  - a person's karyotype
  - genes only
  - both genes and environmental factors
- \_\_\_\_\_ 42. Many characteristics are affected by interactions between genes and
- carriers.
  - the environment.
  - chromosomes.
  - alleles.
- \_\_\_\_\_ 43. Why does height in humans have such a wide variety of phenotypes?
- The gene for height has only two alleles.
  - Height is controlled by a recessive allele.
  - Height is controlled by at least four genes.
  - Height is controlled by sex-linked genes.
- \_\_\_\_\_ 44. What is a genome?
- all the DNA in one cell of an organism
  - all the plasmids produced from inserting DNA into a cell
  - all the karyotypes in a cell
  - all the cells produced during meiosis
- \_\_\_\_\_ 45. Both parents of a child have type A blood. What might their child's blood type be?
- Type A or type AB
  - Type A only
  - Type A or type O
  - Type A or type B

- \_\_\_\_\_ 46. Hemophilia is caused by a(n)  
a. codominant allele.  
b. dominant allele.  
c. recessive allele on the X chromosome.  
d. extra chromosome.
- \_\_\_\_\_ 47. What must occur for a girl to be colorblind?  
a. Each parent must have two codominant alleles for colorblindness.  
b. Each parent must have the dominant allele for colorblindness.  
c. Each parent must have the recessive allele for colorblindness.  
d. Each parent must be colorblind.
- \_\_\_\_\_ 48. Which genetic disorder causes the body to produce unusually thick mucus in the lungs and intestines?  
a. hemophilia  
b. Down syndrome  
c. sickle-cell disease  
d. cystic fibrosis
- \_\_\_\_\_ 49. Which of these human traits is altered by variations in environment?  
a. hairline  
b. smile dimples  
c. height  
d. blood type
- \_\_\_\_\_ 50. Cloning results in two organisms that are  
a. genetically similar.  
b. produced from cuttings.  
c. both adult mammals.  
d. genetically identical.
- \_\_\_\_\_ 51. Which combination of sex chromosomes results in a male human being?  
a. XX  
b. YY  
c. XY  
d. either XX or YY
- \_\_\_\_\_ 52. Down syndrome most often occurs when  
a. chromosomes fail to separate properly during meiosis.  
b. sickle-shaped cells become stuck in blood vessels.  
c. blood fails to clot properly.  
d. a person inherits a recessive allele.
- \_\_\_\_\_ 53. What is a pedigree?  
a. a geneticist who studies the inheritance of traits in humans  
b. a picture of all of the chromosomes in a cell  
c. a chart that tracks which members of a family have a particular trait  
d. an allele passed from parent to child on a sex chromosome
- \_\_\_\_\_ 54. Why are sex-linked traits more common in males than in females?  
a. All alleles on the Y chromosome are recessive.  
b. Any allele on the Y chromosome will be codominant with the matching allele on the X chromosome.  
c. All alleles on the X chromosome are dominant.  
d. A recessive allele on the X chromosome will always produce the trait in a male.

- \_\_\_\_\_ 55. What controls variations in skin color among humans?
- multiple alleles of a single gene
  - a person's diet
  - many genes
  - two alleles of a single gene
- \_\_\_\_\_ 56. Sex-linked genes are genes on
- the Y chromosome only.
  - the X and Y chromosomes.
  - all 23 pairs of chromosomes.
  - the X chromosome only.
- \_\_\_\_\_ 57. Which form of selective breeding crosses parents with the same or similar sets of alleles?
- hybridization
  - cloning
  - inbreeding
  - fertilization
- \_\_\_\_\_ 58. What genetic disorder results in abnormally shaped blood cells?
- hemophilia
  - Down syndrome
  - cystic fibrosis
  - sickle-cell disease
- \_\_\_\_\_ 59. A carrier is a person who has
- two dominant alleles for a trait.
  - two recessive alleles for a trait.
  - more than two alleles for a trait.
  - one recessive and one dominant allele for a trait.
- \_\_\_\_\_ 60. What would be the best way to predict the probability of a baby having cystic fibrosis?
- by studying the parents' karyotypes
  - by studying the family's pedigree chart
  - by determining whether the parents have codominant alleles
  - by exploring new methods of genetic engineering
- \_\_\_\_\_ 61. Which of these is an example of the benefits of genetic engineering?
- growing a new plant from a cutting
  - analyzing karyotypes and pedigree charts
  - creating human insulin to treat people with diabetes
  - cross-breeding to create disease-resistant crops
- \_\_\_\_\_ 62. How does a geneticist use pedigrees?
- to create genetic crosses
  - to prove that sex-linked traits are caused by codominant alleles
  - to trace the inheritance of traits in humans
  - to replicate identical strings of DNA
- \_\_\_\_\_ 63. What is the purpose of the Human Genome Project?
- to cure genetic diseases
  - to inbreed the best genes on every chromosome in human DNA
  - to identify the DNA sequence of every gene in the human genome
  - to clone every gene on a single chromosome in human DNA

Name: \_\_\_\_\_

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- \_\_\_\_\_ 64. What is a karyotype?
  - a. a picture of the chromosomes in a cell
  - b. fluid that surrounds a baby before it is born
  - c. a picture of a baby before it is born
  - d. a sex-linked genetic disorder
  
- \_\_\_\_\_ 65. What are multiple alleles?
  - a. three or more chromosomes that determine a trait
  - b. more than two codominant genes in a chromosome
  - c. three or more forms of a gene that code for a single trait
  - d. more than two genes that control a trait
  
- \_\_\_\_\_ 66. Genetic disorders are caused by
  - a. DNA mutations or changes in chromosomes.
  - b. dominant alleles only.
  - c. recessive alleles only.
  - d. pedigrees.

