

Multiple Choice

Write the letter that best answers the question or completes the statement on the line provided.

- ____ 1. What did Griffith observe when he injected into mice a mixture of heat-killed disease-causing bacteria and live harmless bacteria?
- The disease-causing bacteria changed into harmless bacteria.
 - The mice developed pneumonia.
 - The harmless bacteria died.
 - The mice were unaffected.
- ____ 2. Which of the following is a nucleotide found in DNA?
- ribose + phosphate group + thymine
 - ribose + phosphate group + uracil
 - deoxyribose + phosphate group + uracil
 - deoxyribose + phosphate group + cytosine
- ____ 3. DNA replication results in two DNA molecules,
- each with two new strands.
 - one with two new strands and the other with two original strands.
 - each with one new strand and one original strand.
 - each with two original strands.
- ____ 4. During mitosis, the
- DNA molecules unwind.
 - histones and DNA molecules separate.
 - DNA molecules become more tightly coiled.
 - nucleosomes become less tightly packed.
- ____ 5. Unlike DNA, RNA contains
- adenine.
 - uracil.
 - phosphate groups.
 - thymine.
- ____ 6. Which type(s) of RNA is(are) involved in protein synthesis?
- transfer RNA only
 - messenger RNA only
 - ribosomal RNA and transfer RNA only
 - messenger RNA, ribosomal RNA, and transfer RNA
- ____ 7. During transcription, an RNA molecule is formed
- that is complementary to both strands of DNA.
 - that is complementary to neither strand of DNA.
 - that is double-stranded.
 - inside the nucleus.

- ___ 8. How many codons are needed to specify three amino acids?
 - a. 3
 - b. 6
 - c. 9
 - d. 12
- ___ 9. Which of the following terms is LEAST closely related to the others?
 - a. intron
 - b. tRNA
 - c. polypeptide
 - d. anticodon
- ___ 10. Which type of RNA functions as a blueprint of the genetic code?
 - a. rRNA
 - b. tRNA
 - c. mRNA
 - d. RNA polymerase
- ___ 11. Which of the following is NOT a gene mutation?
 - a. inversion
 - b. insertion
 - c. deletion
 - d. substitution
- ___ 12. Which of the following statements is true?
 - a. A promoter determines whether a gene is expressed.
 - b. An expressed gene is turned off.
 - c. Proteins that bind to regulatory sites on DNA determine whether a gene is expressed.
 - d. RNA polymerase regulates gene expression.
- ___ 13. A *lac* repressor turns off the *lac* genes by binding to
 - a. the promoter.
 - b. tRNA.
 - c. the operator.
 - d. the *lac* genes.
- ___ 14. Gene regulation in eukaryotes
 - a. usually involves operons.
 - b. is simpler than in prokaryotes.
 - c. allows for cell specialization.
 - d. includes the action of DNA polymerase.
- ___ 15. Which of the following statements is NOT true?
 - a. Mutations do not occur in hox genes.
 - b. Hox genes that are found in different animals are very different from each other.
 - c. Hox genes control the normal development of an animal.
 - d. Hox genes occur in clusters.

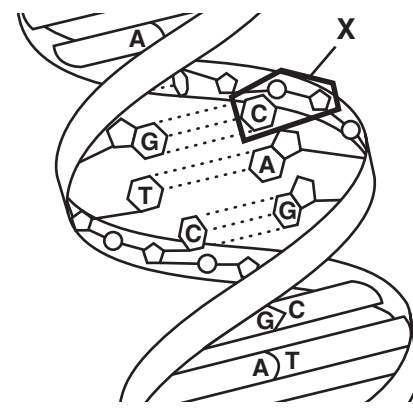


Figure 1

Completion

Complete each statement on the line provided.

- 16. The structure labeled X in Figure 1 is a(an) _____ .

17. The order of nitrogenous bases in DNA determines the order of _____ in proteins.
18. There is no _____ that is specified by a stop codon on an mRNA molecule.
19. The *lac* repressor releases the operator in the presence of _____.
20. In eukaryotes, proteins that attract RNA polymerase bind to _____ sequences in DNA.

Short Answer

In complete sentences, write the answers to the questions on the lines provided.

21. At the beginning of DNA replication, what two processes “unzip” the two strands of a DNA molecule?

22. What is the function of tRNA?

23. According to Figure 2, what codons specify the amino acid arginine?

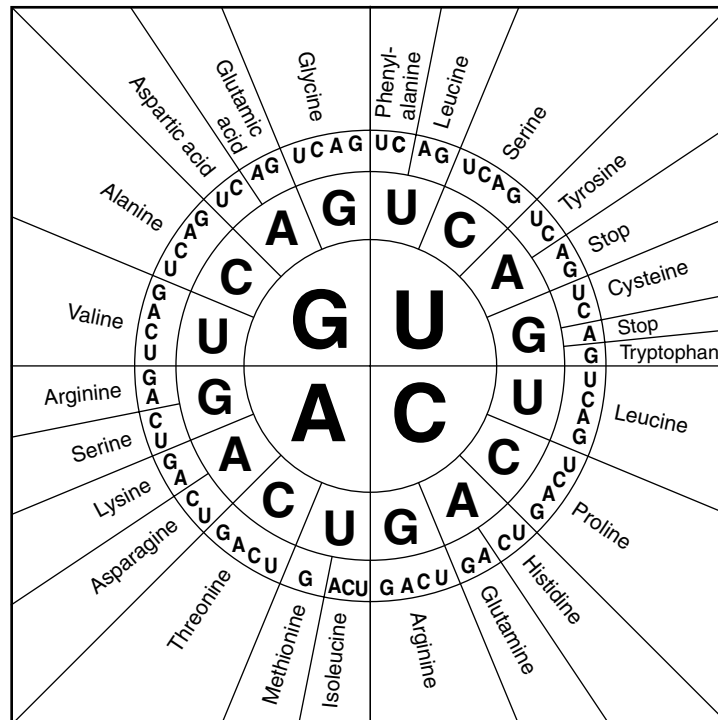


Figure 2

24. What happens to *lac* repressors in *E. coli* when lactose is present?

25. Why are hox genes that are found in different animals very similar to one another?

Using Science Skills

Use the diagram below to answer the following questions on the lines provided.

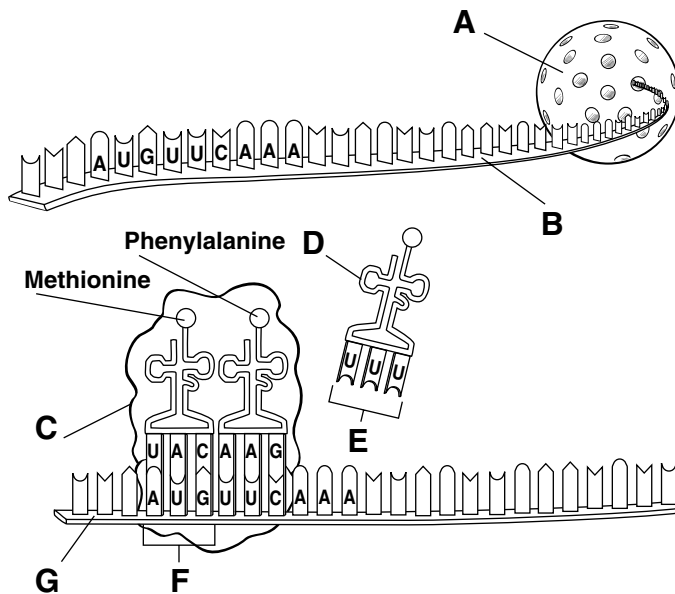


Figure 3

26. Interpreting Graphics What process is illustrated in Figure 3?

27. Interpreting Graphics Identify structure C in Figure 3.

28. Interpreting Graphics Which labeled structure in Figure 3 is a codon?

29. Inferring What is the relationship between the codons and anticodons? How is this relationship important?

30. Predicting In Figure 3, what will happen after the ribosome joins the methionine and phenylalanine?

Essay

Write the answer to each question in the space provided.

31. Describe the Hershey-Chase experiment. Why were the results important?

32. Describe the structure of a DNA molecule.

33. Contrast the functions of the three main types of RNA.

34. Mendel might have been surprised to learn that genes simply contain the instructions for assembling proteins. What do proteins have to do with the phenotype of an organism?

35. Why do some kinds of point mutations cause greater changes in proteins than others?