Introduction to Genetic Analysis Digital Update 12th edition Griffiths Test Bank

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Name:_____ Class:_____ Date:_____

Chapter 01: The Genetics Revolution

1. The 20th century was an important period for genetics due to which of the following major events?
   a. the rediscovery of Gregor Mendel's scientific findings
   b. Watson and Crick solving the structure of DNA
   c. Walter Sutton and Theodor Boveri hypothesizing that chromosomes are the hereditary elements
   d. Thomas H. Morgan demonstrating experimentally that Mendel's genes are located on chromosomes
   e. All of the answer options are correct.

ANSWER: e

2. In one strand of DNA, the nucleotide sequence is 5′-ATGC-3′. The complementary sequence in the other strand must be
   a. 3′-ATGC-5′.
   b. 3′-TACG-5′.
   c. 5′-ATCG-3′.
   d. 5′-CGTA-3′.
   e. 5′-TACG-3′.

ANSWER: b

3. Which of the following is/are TRUE about genes?
   a. Genes are located on chromosomes.
   b. Genes come in variants known as alleles.
   c. Genes usually encode protein products.
   d. All of the answer options are correct.
   e. None of the answer options is correct.

ANSWER: d

4. Which of the following is a component of DNA?
   a. alanine
   b. arginine
   c. cysteine
   d. guanine
   e. tyrosine

ANSWER: d

5. Which of the following is/are TRUE of the DNA structure solved by Watson and Crick?
   a. It is a double-helical structure.
   b. The sugar–phosphate backbone is always toward the outside of the DNA.
   c. There are two hydrogen bonds between A and T and three hydrogen bonds between C and G.
   d. There are four types of nitrogenous bases.
   e. All of the answer options are correct.

ANSWER: e

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6. Which of the following is a CORRECT representation of the central dogma?
   a. RNA → DNA → protein
   b. protein → DNA → RNA
   c. DNA → RNA → protein
   d. DNA → protein → DNA
   e. None of the answer options are correct.

ANSWER: c

7. You have come across a dog named Cindy that does not have a tail. Interestingly, none of Cindy's puppies have a tail. If the lack of tail is caused by a genetic mutation, where has this mutation most likely taken place?
   a. in Cindy's gametes
   b. in the cells that should normally have given rise to Cindy's tail
   c. in the cells that should normally have given rise to Cindy's and her puppies' tails
   d. in all of Cindy's cells, including her gametes
   e. in a gamete of one of Cindy's parents

ANSWER: e

8. Which of the following features makes a species suitable as a model organism?
   a. small organism
   b. short generation time
   c. small genome
   d. produce large number of offspring
   e. All of the answer options are correct.

ANSWER: e

9. Who originated the one-gene–one-enzyme hypothesis?
   a. Tatum and Beadle
   b. Gregor Mendel
   c. Watson and Crick
   d. Franklin and Wilkins
   e. Hershey and Chase

ANSWER: a

10. What are alleles?
   a. gene variants
   b. enzymes
   c. regulatory elements
   d. *de novo* mutations
   e. quantitative trait loci

ANSWER: a

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11. Which enzyme cuts DNA at a specific location?
    a. polymerase
    b. ligase
    c. nuclease
    d. allele
    e. ribosome

ANSWER: c

12. Which type of mutation is a unique DNA variant that exists in a child but in neither of its parents?
    a. point mutation
    b. *de novo* mutation
    c. quantitative trait locus
    d. single nucleotide polymorphism
    e. dominant allele

ANSWER: b

13. Which enzyme is responsible for DNA replication?
    a. polymerase
    b. ligase
    c. nuclease
    d. allele
    e. ribosome

ANSWER: a

14. Which scientists offered the first compelling experimental evidence that genes are made of deoxyribonucleic acid (DNA)?
    a. Oswald Avery, Colin MacLeod, and Maclyn McCarty
    b. John Gurdon and Shinya Yamanaka
    c. François Jacob and Jacques Monod
    d. James Watson and Francis Crick
    e. Barbara McClintock and Erwin Chargaff

ANSWER: a

15. The central dogma describes
    a. the hypothesis of how DNA is packaged into small molecules.
    b. the process by which RNA is processed within a cell.
    c. the flow of genetic information within cells from DNA to RNA to protein.
    d. how model organisms are used in experiments.
    e. the method of gene transfer between organisms.

ANSWER: c

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16. The process of inserting foreign DNA molecules into the genomes of a recipient organism is called
    a. replication.
    b. transformation.
    c. transcription.
    d. translation.
    e. ligation.

ANSWER: b

17. Adenine and thymine are held together by two hydrogen bonds, while guanine and cytosine are held together by three hydrogen bonds. If you were to slowly heat a piece of DNA rich in GC base pairs—in order to denature it—would you expect the melting temperature to be higher or lower than a piece of DNA rich in AT base pairs?

ANSWER: The melting temperature would be higher for DNA rich in GC, owing to the three hydrogen bonds that must be broken in order for it to denature.

18. Mutations are often viewed as negative events, and they are nearly always bad for an organism. Paradoxically, without mutations there would be no evolution, and so they are essential. Explain how this is so.

ANSWER: Variation is introduced. So even though mutations are often viewed as negative events, all variation that we see around us originally came from mutations.

19. Describe the purpose and function of DNA polymerase, nuclease, and ligase.

ANSWER: DNA polymerase, nuclease, and ligase are tools for characterizing and manipulating DNA, RNA, and proteins. They each have a different function. DNA polymerase copies DNA, nucleases cut DNA molecules in specific locations or degrade an entire DNA molecule into single nucleotides, and ligases join two DNA molecules.

20. Why does the age of the father matter, while that of the mother seems to have no effect on the frequency of new point mutations?

ANSWER: Eggs are made prior to a woman's birth, while sperm production occurs throughout a man's life. From the point of conception until formation of egg cells, there are about 23 rounds of cell division and DNA replication. Because egg formation occurs prior to birth, as a woman ages there is no chance for additional point mutations. By comparison, the cell divisions that produce sperm continue throughout a man's life and with each cell division there is greater risk of introducing new point mutations.

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