

Chapter 02 The Molecular Nature of Genes

Multiple Choice Questions

1. Experiments conducted by Frederick Griffith laid the foundation for
- A. elucidation of mRNA structure.
 - B.** DNA as the genetic material.
 - C. the virulence of *S. pneumoniae*.
 - D. the discovery of the capsule on *S. pneumoniae*.
 - E. elucidation of tRNA structure.

Bloom's Level: 2. Understand
Section: 02.01

2. In experiments conducted by Griffith, the inability of the avirulent strain to produce a lethal infection was due to
- A. the presence of a protective coat.
 - B.** destruction by the host's white blood cells.
 - C. the presence of a gene for a polysaccharide coat.
 - D. the high body temperature of the host.
 - E. none of the choices are correct.

Bloom's Level: 2. Understand
Section: 02.01

3. The analytic tools used to show that DNA was the transforming substance include all of the following except
- A. ultracentrifugation.
 - B. electrophoresis.
 - C. UV absorption spectrophotometry.
 - D.** heat inactivation.
 - E. chemical analysis.

Bloom's Level: 2. Understand
Section: 02.01

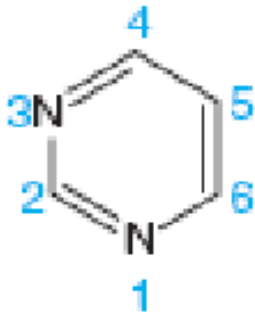
4. Which of the following would be the substance of choice to destroy the DNA in a solution?
- A. ribonuclease
 - B. trypsin
 - C. chymotrypsin
 - D.** deoxyribonuclease
 - E. none of the choices are correct.

Bloom's Level: 3. Apply
Section: 02.01

5. All of the following are found in RNA except
- A. adenine.
 - B.** deoxyribose.
 - C. cytosine.
 - D. guanine.
 - E. uracil.

Bloom's Level: 1. Remember
Section: 02.01

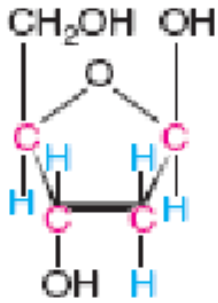
6. The structure in the figure below is an example of



- A. a pyrimidine.
- B. a purine.
- C. guanine.
- D. adenine.
- E. ribose.

Bloom's Level: 1. Remember
Figure 02.05
Section: 02.01

7. The following structure is an example of



- A. deoxyribose.
- B. ribose.
- C. adenine.
- D. guanine.
- E. thymine.

Bloom's Level: 1. Remember
Figure 02.06
Section: 02.01

8. The bonds that connect adenine to thymine in a DNA double helix are

- A. ionic.
- B. hydrophobic.
- C. hydrogen.
- D. covalent.
- E. none of the choices are correct.

Bloom's Level: 2. Understand
Section: 02.01

9. An experiment was conducted to determine the base content of DNA. Results are shown in the table below. Determine which sample of DNA is the most stable.

	DNA1	DNA2	DNA3	DNA4	DNA5
%G+C	25	75	80	90	20
%A+T	75	25	20	10	80

- A. DNA1
- B. DNA2
- C. DNA3**
- D. DNA4
- E. DNA5

Bloom's Level: 4. Analyze
Section: 02.01

10. The C-value paradox can be explained by
- A. the number of cytosine and guanine in DNA.
 - B. the number of mutations in each gene.
 - C. the amount of noncoding DNA in an organism.**
 - D. the number of extra genes in the genome.
 - E. hyperchromic shift.

Bloom's Level: 2. Understand
Section: 02.03

11. Rapid cooling of DNA following heating at high temperature will cause
- A. the strands to break.
 - B. rapid renaturation of the strands.
 - C.** the strands to remain separated.
 - D. the double helix to form rapidly.
 - E. mismatching between the strands.

Bloom's Level: 3. Apply
Section: 02.03

12. The overall length of one full turn of the B-DNA helix is
- A. 33.32 angstroms.
 - B. 33.20 angstroms.
 - C.** 3.32 nanometers.
 - D. 0.332 nanometers.
 - E. 0.032 nanometers.

Bloom's Level: 1. Remember
Section: 02.03

13. Phosphodiester bonds are examples of
- A. hydrophobic interactions.
 - B. hydrogen bonds.
 - C.** covalent bonds.
 - D. noncovalent bonds.
 - E. ionic bonds.

Bloom's Level: 2. Understand
Section: 02.01

14. All of the following conditions promote the denaturation of DNA except
- A. low ionic strength solutions.
 - B. high pH.
 - C. organic solvents.
 - D. high temperature.
 - E. extremely low temperature.**

Bloom's Level: 2. Understand
Section: 02.04

15. Which of the following is the best way to determine the base content of DNA?
- A. density gradient centrifugation**
 - B. gel electrophoresis
 - C. spectrophotometry
 - D. x-ray diffraction
 - E. deoxyribonuclease treatment

Bloom's Level: 5. Evaluate
Section: 02.02

16. Which of the following is not found in RNA?
- A. nitrogen
 - B. oxygen
 - C. carbon
 - D. sulfur**
 - E. hydrogen

Bloom's Level: 2. Understand
Section: 02.01

17. The ability of two polynucleotide strands to hybridize is based on which of the following principles?

- A. double helical nature of DNA
- B. the presence of phosphodiester bonds
- C. complementary base pairing**
- D. the presence of 3' and 5' ends
- E. the presence of covalent bonds

Bloom's Level: 2. Understand
Section: 02.01

18. An ideal way to visualize the shape of DNA is by

- A. light microscopy.
- B. electron microscopy.**
- C. centrifugation.
- D. spectrophotometry.
- E. deoxyribonuclease digestion.

Bloom's Level: 2. Understand
Section: 02.02

19. Which of the following would prevent the formation of a phosphodiester bond in DNA?

- A. removal of a nitrogen from one of the bases
- B. removal of oxygen from carbon 2 of the sugar
- C. removal of an oxygen from carbon 3 of the sugar**
- D. removal of the phosphate from the alpha position of the nucleoside triphosphate
- E. removal of the phosphate at the beta position of the nucleoside triphosphate

Bloom's Level: 3. Apply
Section: 02.01

Fill in the Blank Questions

20. The Hershey-Chase experiments depended on two types of radioactive labels—
_____ for DNA and _____ for proteins.
phosphorous-32, sulfur-35

Bloom's Level: 2. Understand
Section: 02.01

21. The bases and sugars in DNA and RNA are joined together to form units
called _____.
nucleosides

Bloom's Level: 1. Remember
Section: 02.01

22. One of Chargaff's rules states that the amount of cytosine is equal to the amount of
_____ in DNA.
guanine

Bloom's Level: 1. Remember
Section: 02.02

23. The annealing of two different polynucleotide strands is called _____.
hybridization.

Bloom's Level: 1. Remember
Section: 02.04

24. The double helical model of DNA was described by _____ and _____ in 1953.

Watson, Crick

Bloom's Level: 1. Remember
Section: 02.02

True / False Questions

25. Wild *Streptococcus pneumoniae* is virulent because of the absence of a capsule.

FALSE

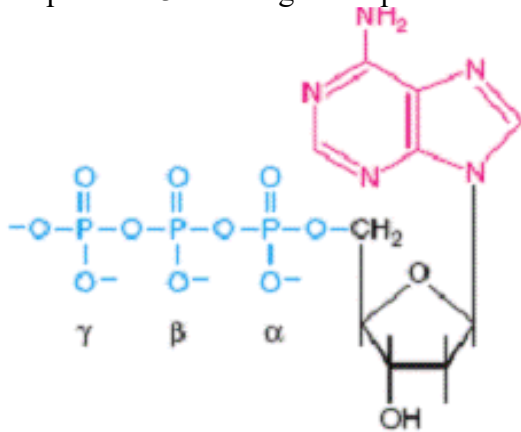
Bloom's Level: 2. Understand
Section: 02.01

26. The phosphodiester bond in DNA is an example of a hydrogen bond.

FALSE

Bloom's Level: 2. Understand
Section: 02.02

27. In a DNA synthesis reaction the use of the following dATP molecule labeled with phosphorous-32 at the gamma position would result in a radioactively labeled DNA strand.



FALSE

Bloom's Level: 4. Analyze
Figure 02.09
Section: 02.01

28. DNA strands absorb more light when the strands are separated by heat, high pH, or organic solvents.

TRUE

Bloom's Level: 2. Understand
Section: 02.04

29. The A- and B-forms of DNA structures are right-handed.

TRUE

Bloom's Level: 1. Remember
Section: 02.04

30. The melting temperature of DNA is the point at which 50% of the strands are denatured.

TRUE

Bloom's Level: 2. Understand
Section: 02.04