DNA, RNA, and Protein Synthesis

In the space provided, write the letter of the description that best matches the term or phrase.

1. anticodon
2. codon
3. deoxyribose
4. double helix
5. nucleotides
6. peptide bond
7. ribosome
8. uracil

Complete each statement by writing the correct term or phrase in the space provided.

9. The information contained in a molecule of mRNA is used to make proteins during the process of ________________.
10. Nucleotide sequences of tRNA that are complementary to codons on mRNA are called ________________.
11. Nucleotides that make up RNA contain the nitrogen bases adenine, guanine, cytosine, or ________________.
12. Avery’s experiments demonstrated that DNA is the ________________.
13. Transcription begins when an enzyme called ________________ binds to the beginning of a gene on a region of DNA called a promoter.
14. The instructions for building a protein are written as a series of three-nucleotide sequences called ________________.
In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

15. Which of the following bonds to one specific type of amino acid?
   a. mRNA  b. tRNA  c. rRNA  d. DNA

16. New mRNA is made through the process of
   a. duplication.  b. transcription.  c. translation.  d. crystallography.

17. Complementary base pairing links
   a. amino acids.  b. nitrogenous bases.  c. phosphate groups.  d. proteins.

18. Damaged DNA is usually repaired by
   a. purines.  b. nucleotides.  c. enzymes.  d. ribosomes.

19. During replication, the two strands of DNA separate at a point called a
   a. helicase.  b. ribosome.  c. replication fork.  d. mutation.

20. A section of one DNA strand has the sequence ACCGAGGTT. What is the sequence of an mRNA transcribed from this section of DNA?
   a. ACCGAGGUU  b. ACCGAGGTT  c. TGGCTCCAA  d. UGGCUCCAA

Refer to the figure at right to answer questions 21–22.

21. In the nucleic acid shown, the structure labeled X represents
   a(n)
   a. nitrogenous base.  b. deoxyribose molecule.  c. amino acid.  d. phosphate group.

22. Which type bond will form at the point labeled Y?
   a. peptide bond  b. covalent bond  c. hydrogen bond  d. nitrogen bond

23. Which type of molecule is shown in the diagram at right?
   a. tRNA  b. mRNA  c. stop codon  d. methionine
Read each question, and write your answer in the space provided.

24. Describe the differences between transcription and translation.

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25. Compare the structure of DNA with the structure of RNA.

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26. Explain the significance of the start codon and the stop codons.

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27. Describe the structure and function of three different types of RNA.

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28. List the steps of DNA replication.

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________________________________________________________________________
________________________________________________________________________

29. Why did Hershey and Chase use radioactive elements in their experiments?

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________________________________________________________________________
________________________________________________________________________
Follow the directions given below.

30. The data in the table below show the amount of each type of nucleotide by percentage found in samples of DNA taken from the organisms listed. Refer to the table as you answer the following questions.

### Distribution (in percent) of Nitrogen-Containing Bases in Various Organisms

<table>
<thead>
<tr>
<th>Organism</th>
<th>G</th>
<th>A</th>
<th>C</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mold</td>
<td>15.2</td>
<td>34.3</td>
<td>14.9</td>
<td>35.1</td>
</tr>
<tr>
<td>Plant</td>
<td>19.7</td>
<td>41.2</td>
<td>19.5</td>
<td>42.1</td>
</tr>
<tr>
<td>Mollusk</td>
<td>17.4</td>
<td>32.3</td>
<td>17.9</td>
<td>34.7</td>
</tr>
<tr>
<td>Reptile</td>
<td>12.9</td>
<td>35.6</td>
<td>13.2</td>
<td>35.7</td>
</tr>
<tr>
<td>Mammal</td>
<td>14.6</td>
<td>39.5</td>
<td>13.8</td>
<td>37.6</td>
</tr>
</tbody>
</table>

**a.** List the terms that the abbreviations G, C, A, and T refer to.

**b.** Describe the pairing behavior of nitrogen-containing bases in DNA and RNA.

**c.** Do the data support the base-pairing rules? Why or why not?

**d.** Do the data support the near-universality of the genetic code? Explain your answer.

**e.** What percentage of uracil would you expect to find in an mRNA molecule isolated from the mollusk referred to in the table? Explain your answer.