Supplemental Test Items to accompany OpenStax College *Concepts of Biology*. Note that not all chapters of OpenStax College *Concepts of Biology* have accompanying test items. Building on the community-oriented nature of OpenStax College resources, we invite you to submit items to be considered for future inclusion.

**Chapter 09: Molecular Biology**

1. Which of the following is not a component of nucleotides, the building blocks of DNA? (Outcome #IIIb) (DOK 1)
2. deoxyglucose\*
3. inorganic phosphate
4. nitrogenous base
5. Experiments with bacteriophage by Chase and Hershey demonstrated that DNA replication is which of the following? (Outcome #IIIb) (DOK 1) (Paired Item 1)
6. ultra-conservative
7. semi-conservative\*
8. moderate-to-liberal

3’

5’

1. In reference to the figure above depicting a DNA replication fork, which of the following is a true statement? (Outcome #IIIb) (DOK 2) (Paired Item 2)
2. The strand labeled “5’” is the template strand.
3. The strand labeled “3’” is the lagging strand.
4. The strand labeled “3’” is the leading strand.\*

3’

5’

1. The strand of DNA in the figure above that will be copied first as a series of fragments later joined together by DNA ligase is labeled how? (Outcome #IIIb) (DOK 2) (Paired Item 3)
2. The leading strand is labeled with 5’.
3. The lagging strand is labeled with 3’.
4. The lagging strand is labeled with 5’.\*
5. If a strand of DNA of sequence 5’-AATAGCGCGGTATTC-3’ is replicated, which of the following accurately represents the newly synthesized DNA strand? (Outcome #IIIb) (DOK 2)
6. 3’-TTATCGCGCCATAAG-5’\*
7. 5’-TTATCGCGCCATAAG-3’
8. 3’-CCACTGTGTTACAAG-5’
9. What proteins are crucial for creating and maintaining DNA replication forks? Choose the best explanation. (Outcome #IIIb) (DOK 2)
10. Helicase creates the replication fork; primase keeps the single strands from closing shut.
11. Helicase creates the replication fork; single-strand binding proteins keep the single strands from reuniting.\*
12. Ligase creates the replication fork; DNA polymerase II keeps the single strands from reuniting.
13. The nitrogenous base thymine is what type of base? (Outcome #IIIc) (DOK 1)
14. monoamine
15. purine
16. pyrimidine\*
17. Which of the following accurately shows DNA base pairing and hydrogen bond number? (Outcome #IIIc) (DOK 2)
18. Adenine—Thymine, 2 hydrogen bonds\*
19. Adenine—Thymine, 3 hydrogen bonds
20. Cytosine—Guanine, 2 hydrogen bonds
21. What molecule connects the sugars in a strand of DNA? (Outcome #IIIc) (DOK 1)
22. ribose
23. phosphate\*
24. deoxyribose
25. What is a key difference between prokaryotic and eukaryotic chromosomes? (Outcome #IIIc) (DOK 1)
26. Prokaryotic chromosomes are coiled on histones; eukaryotic chromosomes are supercoiled
27. Prokaryotic chromosomes are linear; eukaryotic chromosomes are circular
28. Prokaryotic chromosomes are circular; eukaryotic chromosomes are linear\*
29. Which of the following accounts for most repair of mistakes made during DNA replication? (Outcome #IIIc) (DOK 1) (Paired Item 1)
30. proofreading by DNA polymerase\*
31. proofreading by telomerase
32. mismatch repair
33. Which of the following is true when proofreading by DNA polymerase? (Outcome #IIIb) (DOK 1) (Paired Item 2)
34. it takes place long after a DNA strand has been replicated
35. it takes place as a DNA strand is being replicated\*
36. it is primarily possible because of mismatch repair enzymes
37. Transition and transverse substitutions are (Outcome #IIIc) (DOK 2)
38. mutations only caused by chemicals such as benzene or radiation such as x-rays.
39. purine-to-purine and pyrimidine-to-pyrimidine, respectively.
40. purine-to-purine/pyrimidine-to-pyrimidine and purine-to-pyrimidine/pyrimidine-to-purine replacement, respectively.\*
41. Gene expression refers to what process? (Outcome #IIId) (DOK 1)
42. the process of transcribing DNA into RNA and translating RNA into protein\*
43. the process of transcribing RNA into DNA and translating DNA into protein
44. the process of transcribing DNA into RNA and translating RNA into chromatin
45. The flow of molecular information from genes to RNA to proteins is referred to as what? (Outcome #IIId) (DOK 1)
46. the Central Limit Theorem
47. the Central Dogma\*
48. the Peripheral Doctrine
49. The three types of RNA involved in gene expression are: (Outcome #IIId) (DOK 1)
50. mRNA, tRNA, and trRNA
51. mRNA, xRNA, and tRNA
52. mRNA, tRNA, and rRNA\*
53. What does it mean when we say the genetic code is “degenerate?” (Outcome #IIId) (DOK 1)
54. a given amino acid can be coded or “called” by no more than one nucleotide codon triplet
55. it behaves badly, and acts as a parasitic entity
56. a given amino acid can be coded or “called” by more than one nucleotide codon triplet\*
57. What type of bond keeps each individual DNA strand together? (Outcome #1) (DOK 1)
58. covalent bonds\*
59. ionic bonds
60. hydrogen bonds
61. Which of the following is found in eukaryotic genes but not prokaryotic genes? (Outcome #3) (DOK 1)
62. introns\*
63. repressors
64. operons
65. What enzyme is responsible for adding nucleotides to a growing DNA chain during replication? (Outcome #3) (DOK 1)
66. RNA polymerase
67. RNA primase
68. DNA polymerase\*
69. Which enzyme is responsible for putting together new DNA segments produced on the lagging strand during DNA replication? (Outcome #3) (DOK 1)
70. DNA ligase\*
71. RNA primase
72. DNA polymerase
73. The process of producing RNA using a gene as a template is called: (Outcome #3) (DOK 1)
74. transcription\*
75. translation
76. transposition
77. What is a possible function of introns in eukaryotic DNA? (Outcome #3) (DOK 2)
78. to act as the coding part of the gene
79. to break up the gene
80. to increase recombination of gene segments by crossing over\*
81. Explain how homologues chromosomes can prevent disease. (Outcome #3) (DOK 3)
82. One homologue can replace the other homologue
83. One homologue can mask the presence of a disease-causing homologue\*
84. Having two versions of a gene always prevents disease
85. Which type of enzyme can repair DNA damage in eukaryotes? (Outcome #3) (DOK 1)
86. DNA ligase
87. RNA primase
88. DNA polymerase\*
89. The part of the gene where the DNA polymerase first binds during transcription is called the: (Outcome #3) (DOK 1)
90. promoter\*
91. repressor
92. operon