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| **Following the Big Ideas** | |
| **Big Idea 1** | DNA stores and transmits genetic information in all organisms |
| **Big Idea 3** | Genetic Information in the form of a coded sequence of nucleotides dictates the sequence of amino acids which will make a protein |

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| **Essential Questions** |
| * How did historical experiments identify DNA as the carrier of genetic information? * How does the chemical structure of DNA as defined by the Watson and Crick model determine DNA’s ability to store and transmit genetic information? * How does genetic information stored in DNA flow from a sequence of nucleotides in a gene to a sequence of amino acids in a protein |

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| **Vocabulary** | | |
| 1. Transformation 2. Nucleoside 3. Nucleotide 4. Nucleic Acid 5. Pyrimidine 6. Purine 7. 5 Prime 8. 3 Prime | 1. Semiconservative 2. Conservative 3. Leading Strand 4. Lagging Strand 5. Origin of Replication 6. Okazaki fragments 7. Antiparallel 8. Bacteriophage | 1. Heterochromatin 2. Euchromatin 3. Histone Protein 4. Nucleosomes 5. Thymine Dimer 6. Chromosome 7. Telomere |

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| **Chapter Outline and Reading Guide** | |
| **Section 1**   1. What are the two chemical components of chromosomes? 2. Why did researchers originally think that protein was the genetic material? 3. Distinguish between the virulent and nonvirulent strains of Streptococcus pneumoniae studied by Frederick Griffith. 4. What was the purpose of Griffith’s studies? 5. Summarize the experiment in which Griffith became aware that hereditary information could be transmitted between two organisms in an unusual manner. 6. What did Oswald Avery determine to be the transforming factor 7. Explain his experimental approach 8. Sketch a T2 bacteriophage and label its head, tail sheath, tail fiber, and DNA. 9. How did Hershey and Chase “label” viral DNA and viral protein so that they could be distinguished? 10. Explain why they chose each radioactive tag in light of the chemical composition of DNA and protein. 11. What are Chargaff’s rules? How did he arrive at them? 12. Describe the Watson Crick Model of DNA 13. Describe the role of Rosalind Franklin in the discovery of DNA 14. How did Watson and Crick’s model explain the basis for Chargaff’s rules? 15. Given that the DNA of a certain fly species consists of 27.3% adenine and 22.5% guanine, use Chargaff’s rules to deduce the percentages of thymine and cytosine. 16. Explain what is meant by 5' and 3' ends of the nucleotide. | **Section 2**   1. How did Meselson and Stahl create “heavy” DNA for their experiments? 2. Use Figure 13.11 to explain how Meselson and Stahl confirmed the semiconservative mechanism of DNA replication. 3. Which enzyme does each of the following?    1. untwists and separates strands    2. holds DNA strands apart    3. synthesizes RNA primer    4. adds DNA nucleotides to new strands    5. relieves strain caused by unwinding    6. joins DNA fragments together    7. removes RNA primer and replaces with DNA 4. Make a detailed list of the steps that occur in the synthesis of a new strand. 5. Describe the conditions that generate a Thymine Dimer, why it is a problem, and how it can be corrected 6. Explain the roles of each of the following enzymes in DNA proofreading and repair.    1. DNA polymerase    2. Nuclease    3. Ligase    4. Repair enzymes   **Section 3**   1. Summarize this section in your own words in about 1 paragraph. |

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| **After You Have Read…** |
| 1. How did historical experiments identify DNA as the carrier of genetic information? 2. How does the chemical structure of DNA as defined by the Watson and Crick model determine DNA’s ability to store and transmit genetic information? 3. How does genetic information stored in DNA flow from a sequence of nucleotides in a gene to a sequence of amino acids in a protein? 4. How can alterations in the genetic code result in different physical appearances? 5. How can the central dogma of biology be used to explain common ancestory? |