**DNA, RNA, PROTEIN SYNTHESIS, AND MUTATIONS UNIT GUIDE**

**DUE 12/10/15**

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| **Monday** | **Tuesday** | **Wednesday** | **Thursday** | **Friday** |
| 11/16  **\*CBA**  \*Test Corrections | 11/17  \*History of DNA | 11/18  \*History of DNA | 11/19  \*DNA model and  analysis  **RG 1-7 due** | 11/20  \*DNA model and  analysis |
| 11/30  \*DNA replication  **RG 8-11 due** | 12/1  \*DNA replication | 12/2  \*RNA  **RG 9-15 due** | 12/3  \*Transcription | 12/4  \*Translation  **RG 16-18 due** |
| 12/7  \*Mutations | 12/8  \*Protein synthesis  activity  **\*Vocabulary Quiz** | 12/9  \*Protein synthesis  activity | 12/10  \*Review  **COMPLETED UNIT GUIDE DUE** | 12/11  \*Test |

**Read:** Chapter 8 **UNIT TEST:** 12/11/15

**Watch (Supplemental Resource):**

* DNA structure and replication: Crash Course Biology #10
* Bozeman Science – DNA and RNA parts 1 and 2

**Book online at :** [**http://my.hrw.com**](http://my.hrw.com)

Use your username and password to get to the biology book or

* Username: student26761 Password: n8j2x
* Mrs. Wheatley’s website: www.wheatleybiology.weebly.com

**What the state of Texas wants you to know!**

* **TEKS 3F:** Research and describe the history of biology and contributions of scientists.
* **TEKS 4B:** Investigate and explain cellular processes, including the synthesis of new molecules.
* **TEKS 6A:** Identify components of DNA, and describe how information for specifying traits of an organism is carried in the DNA.
* **TEKS 6B:** Recognize that components that make up the genetic code are common to all organisms.
* **TEKS 6C:** Explain the purpose and process of transcription and translation using models of DNA and RNA.
* **TEKS 6E:** Identify and illustrate changes in DNA and evaluate the significance of these changes.

VOCAB QUIZ:

12/8/2015

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| --- |
| * **Nucleus**: organelle composed of double membrane that acts as the storehouse for most of a cell’s DNA. * **DNA**: Deoxyribonucleic Acid-molecule that stores genetic information in all organisms. * **RNA:** Ribonucleic Acid-molecule that allows for transmission of genetic information and protein synthesis. * **Nucleotide:** monomer that forms DNA and has a phosphate group, sugar and nitrogen-containing base. * **Double Helix:** model that compares the structure of a DNA molecule, in which two strands wind around one another, to that of a twisted ladder. * **Replication:** process by which DNA is copied. * **DNA polymerase:** enzyme that makes bonds between nucleotides, forming an identical strand of DNA during replication. * **DNA strand:** DNA side * **Complementary side/strand:** either of the two sides that make up a double helix of DNA. * **Adenine:** nitrogenous base found in DNA- matches with Thymine and Uracil. * **Guanine:** nitrogenous base found in DNA- matches with Cytosine. * **Cytosine:** nitrogenous base found in DNA- matches with Guanine. * **Thymine:** nitrogenous base found in DNA- matches with Adenine. * **Uracil:** nitrogenous base found in RNA- matches with Adenine * **Purine:** Type of nitrogenous base, has two circular ring structures, A,G match with a pyrimidine. * **Pyrimidine:** type of nitrogenous base, has one circular ring structure, C,T match with a purine. * **Ribosome:** organelle that links amino acids together to form proteins. * **Transcription:** process of copying a nucleotide sequence of DNA to form a complementary strand of mRNA. * **Translation:** process by which mRNA is decoded and a protein is produced. * **RNA polymerase:** enzyme that catalyzes the synthesis of a complementary strand of RNA from a DNA template. * **Messenger RNA:** form of RNA that carries genetic information from the nucleus to the cytoplasm, where it serves as a template for protein synthesis. * **Ribosomal RNA:** RNA that is in the ribosome and guides the translation of mRNA into a protein; also used as a molecular clock. * **Transfer RNA:** form of RNA that brings amino acids to ribosomes during protein synthesis. * **Codon or triplet codon:** sequence of three nucleotides that codes for one amino acid. * **Anticodon:** set of three nucleotides in a tRNA molecule that binds to a complementary mRNA codon during translation. * **Amino Acid:** molecule that makes up proteins, composed of carbon, hydrogen, oxygen, nitrogen and sometimes sulfur. * **Protein:** polymer composed of amino acids linked by peptide bonds; folds into a particular structure depending on bonds between amino acids. |

**Recall and Review: ANSWER ALL THE QUESTIONS IN COMPLETE SENTENCES.**

Use the video and your textbook to help you answer the following questions in your binder.

**A. Chapter 8 (Section 1)**

1. Transform means “to change.” **Predict** why Griffith called the mystery material the “transforming

principle”?

2. **State** three reasons Avery concluded that the mystery material was DNA, not protein.

3. **Explain** how Hershey and Chase’s research with bacteriophages helped to confirm that DNA was the

genetic material.

**B. Chapter 8 (Section 2)**

4. **Draw** a nucleotide and label the phosphate group, the nitrogen-containing base, and the deoxyribose

sugar.

5. **Describe** how the four DNA nucleotides differ in structure.

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6. **Draw** a DNA double helix. Label the sugar-phosphate backbone, the nitrogen-containing bases, and the

hydrogen bonds.

7. **State** which part of a DNA molecule carries the genetic instructions that are unique for each individual?

**Explain.**

**C. Chapter 8 (Section 3)**

8. **State** the end product of replication.

9. **Explain.** What does it mean that a DNA strand is used as a template in replication.

10. **List** two examples of how enzymes and other proteins help in the process of replication.

11. **Infer.** Why is it important that human chromosomes have many origins of replication?

**Chapter 8 (Section 4)**

12. **Compare and contrast** DNA and RNA.

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| --- | --- | --- |
| DNA | Both | RNA |
|  |  |  |

13.  **Explain** why transcription occurs in the nucleus of eukaryotes.

14. **Compare and contrast** transcription and replication.

|  |  |  |
| --- | --- | --- |
| Transcription | Both | Replication |
|  |  |  |

15. **Apply.** If a DNA segment has the nucleotides AGCTTAT, predict the sequence of the mRNA strand that results after transcription.

**Chapter 8 (Section 5)**

16**. Explain** the relationship between a codon and an amino acid.

17. **Calculate.** Suppose an mRNA molecule in the cytoplasm had 300 nucleotides. How many amino acids would be in the resulting protein? Explain

18. **Explain** the role of tRNA in translation.

**Chapter 8 (Section 7)**

19. **Differentiate** between gene and chromosome mutations. Provide an example of each

20.  **Explain** the difference between a point and frameshift mutation.

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| Point Mutation | Frameshift Mutation |
|  |  |

21. **Describe** one mutation that would not have an effect on an organism’s phenotype.

**22-Sample Questions**

1. Who first proposed the double-helix structure of the DNA molecule?
   1. Pauling
   2. McClintock
   3. Watson and Crick
   4. Harris and Watkins
2. Scientists have developed a way to analyze and compare DNA sequences between humans. Using this genetic information would be most beneficial for
   1. Identifying individuals
   2. Dating the age of fossils
   3. Creating new gene sequences
   4. Determining proteins produced in skin cells
3. If the DNA strand sequence is ATCGATCGA, what is the complementary stand’s sequence?
   1. ATCGATCGA
   2. TAGCTAGCT
   3. AUCGAUCGA
   4. GCTAGCYAG
4. Which of these shows the steps by which proteins are coded and synthesized?
   1. RNA🡪DNA🡪 protein
   2. DNA🡪RNA🡪 protein
   3. Protein🡪RNA🡪DNA
   4. Protein🡪DNA🡪RNA