**Review Assignment – Biology 3201 Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. Complete the following chart that compares the structure of DNA and RNA:

|  |  |  |  |
| --- | --- | --- | --- |
|   |  | **DNA**  | **RNA**  |
| **Sugar in nucleotide**  |   |  |   |
| **# of strands in molecule**  |   |  |   |
| **Nitrogen bases**  | 1. 2. 3. 4.  |  | 1. 2. 3. 4  |
| **Location(s) in the cell**  |    |  |   |

1. Complete the following table by identifying the scientist or scientists that made the following contributions to genetic knowledge:

|  |  |
| --- | --- |
| **Scientist(s)**  | **Important contributions**  |
|   | Used X-ray technology to uncover important information about the DNA structure  |
|   | Their experiment involved infecting bacteria with viruses. Their work showed that DNA and not proteins were the genetic material  |
|   | In his experiment with mice and bacteria he discovered what he described as a “transforming principle  |
|   | These scientists first described the double helix shape of a DNA molecule  |
|   | This scientist incorrectly concluded that nitrogen bases in a DNA molecule were found in equal amounts.  |
|   | This scientist correctly described the proportions of nitrogen bases in a DNA molecule  |

1. Using Chargaff’s rule, complete the following table:

Proportion of Nucleotides in a DNA sample

|  |  |  |  |
| --- | --- | --- | --- |
| **Adenine**  | **Guanine**  | **Thymine**  | **Cytosine**  |
|   |   | **22%**  |   |

1. Given the following sequence of nitrogen bases within a segment of a DNA molecule, complete the diagram by filling in the complimentary strand. Then use a series of diagrams to show how the DNA replicates.

# A

# T

T

C

C

# G

C

A

T

1. At what stage during a cell’s cycle does DNA replication take place?

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1. Why is the process of DNA replication described as being “**semi conservative**”?

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1. What are **replication bubbles**? How does their formation affect the speed at which DNA molecules can replicate? Explain.

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1. Complete the following table that describes the role played by various enzymes in the DNA replication process.

|  |  |
| --- | --- |
| **Enzyme**  | **Function**  |
|   | Breaks the bonds between nitrogen bases allowing the molecule to “unzip”  |
| DNA ligase  |    |
|   | Facilitates the bonding of nucleotides to the exposed bases  |

1. Distinguish between the **leading** and **lagging strands** in the process of DNA replication.

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1. Describe the significance of the **proof-reading** and **correction** processes of DNA replication.

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1. With respect to DNA, what is a gene?

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1. Distinguish between the terms **gene and genome.**

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1. Describe the **One gene-one polypeptide theory.**

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1. Briefly describe how DNA molecules are arranged to form structures called

 chromosomes.

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1. Explain the difference between the processes of transcription and translation as they relate to gene expression.

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1. Would a molecule of RNA be similar in length to a molecule of DNA? Explain.

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1. Complete the following table that compares the processes of transcription and translation.

|  |  |  |
| --- | --- | --- |
|   | **Transcription**  | **Translation**  |
| Location of process  |   |   |
| Product of process  |   |   |

1. Explain Transcription with the aid of a diagram. Use the following DNA code

T[C](#_Toc14649) A G

19. Sketch the **DNA segment** that would be transcribed to form the following RNA segment. Label the sense and anti-sense strand.

## UCAGCCCAUAGU

20. By reading the following RNA segment left to right, sketch the amino acids that would be bonded together as a result of the translation of this RNA segment.

## UACGCCCAUAGU

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|     |    |     |    |     |    |     |
|   |   |   |

1. If the above RNA (**UACGCCCAUAGU)** was translated from right to left would it matter? Explain

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1. Distinguish between **introns** and **exons.**

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1. Using the information from question 20, **describe** the effects of the following mutations. (be sure to identify the type of mutation)

## mRNA - UACGCCCAUAGU

|  |  |  |
| --- | --- | --- |
| Change  | Type of Mutation  | Effect on Protein Being Built  |
|  The cytosine in the third position is substituted with an adenine   |   |   |
|  The cytosine in the third position is substituted with a uracil   |   |   |
|  A uracil is added between the first and second position   |   |   |

1. Why is it that frame-shift mutations often have greater overall effects than point mutations?

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1. Mutations are often portrayed in movies and TV as being bad. Is this always the case? Explain.

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1. Describe the role of the various types of RNA involved in the translation process.

|  |  |
| --- | --- |
| tRNA  |    |
| mRNA  |    |
| rRNA  |    |

1. Are all genes in the genome of a cell translated? Explain. What factors might effect what genes are translated by a particular cell.

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1. DNA contains the code for producing proteins in a cell. This is how our genes are expressed. What other major factor affects the expression of many genes? Explain.

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1. Distinguish between germ mutations and somatic mutations. Which are most important for future generations?

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A. What are genetically modified (transgenic) organisms?

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B. State two reasons why food organisms might be genetically modified.

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