**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.

\_\_\_ \_\_\_ \_\_\_

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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