# Biology

# OCA - Study Guide: Chapter 12

**Biology: DNA & RNA : Protein Synthesis / Mutations / Gene Regulation**

**Define the following terms.**

anticodon

bacteriophage

base pair

chromatin

codon

differentiation

DNA polymerase

frameshift mutation

Gene

mRNA

mutation

nucleotide

operon

point mutation

polyploidy

promoter

replication

RNA polymerase

rRNA

transcription

translation

tRNA

**Answer all of the following questions on a separate piece of paper:**

**Section 12 - 1 DNA – Discovery and Structure**

1. Briefly describe the work of each of the following scientists: Frederick Griffith, Oswald Avery, Alfred Hershey & Martha Chase, Rosalind Franklin, …. James Watson & Francis Crick
2. How do Chargaff’s rules relate to the structure of DNA?

**Section 12 – 2 DNA Replication**

1. Compare the packaging of DNA in a Bacterium vs. inside of a human cell.
2. Explain the process of Replication; use the following words in your description: - unzip - complementary - base pairs - template
3. What is the role of DNA polymerase?

**Section 12 – 3 Transcription and Translation**

1. Compare the structure of DNA and RNA, by making a table that shows at least 3 differences.
2. What are the 3 types of RNA? Describe each briefly.
3. What is the role of promoters?
4. What are introns and exons? What is the purpose of introns?
5. What is a codon? How many codons are there? What are codons related to proteins.
6. Using the figure on page 303, give the amino acid for each of the following codons:

CGA - AUG - GUU - CCC - AAG - AAA - UGA -

1. Can an amino acid have more than one codon? Which amino acids have the most codons? (page 303 chart)
2. On a piece of DNA, you find the following nucleotide sequence: GACAAGTCCACAATC write the base sequence of the mRNA molecule that would be transcribed. Then write the amino acid sequence that would be translated from the mRNA.
3. Make a chart that compares Replication - Transcription - Translation by looking at: where they take place, what you have to have to start with, and what the end product is
4. Why doesn’t the DNA go into the cell to make proteins directly instead of using RNA to go in and out of the nucleus?
5. Why are proteins so important to living things?

**Section 12 - 4 Mutations**

1. What is the difference between gene and chromosomal mutations?
2. Explain how the following gene mutations occur: point mutation = …… Frameshift mutation =
3. Describe the following chromosomal mutations: deletion, duplication, inversion, translocation
4. What is polyploidy? What are the effects of polyploidy on animals? On plants?.
5. What codon would you expect at the beginning of a gene? What codons might you find at the end of a gene? What kinds of molecules bind to the regulatory sites of genes? What do these proteins do?
6. What turns a lac gene on ond off?
7. Describe differentiation and the hoc genes.