

Biology Ch 11 Notes Handout

Ch 11 DNA and GENES

I. Ch 11 Section 1: DNA the Molecule of Heredity

A. What is DNA?-

- 1) Although the environment influences how an organism develops, the \_\_\_\_\_ that is held in the molecules of DNA ultimately determines an organism's \_\_\_\_\_
- 2) DNA achieves its control by determining the \_\_\_\_\_
- 3) All actions, such as eating, running, and even thinking, depend on \_\_\_\_\_ called \_\_\_\_\_
- 4) Enzymes are critical for an organism's function because they control \_\_\_\_\_ needed for life
- 5) Within the structure of DNA is the information for life—the complete instructions for manufacturing all the proteins for an organism

B. DNA as genetic Material-

- 1) Who were the scientists that studied virus' entering into bacteria?
- 2) What was there conclusions?

C. The structure of nucleotides-

- 1) DNA is a polymer made of repeating subunits called \_\_\_\_\_
- 2) Nucleotides have three parts:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

- 3) A \_\_\_\_\_ is a carbon ring structure that contains one OR more atoms of nitrogen

In DNA, there are four possible nitrogenous bases:

1.

2.

3.

4.

- 4) In DNA, the amount of adenine is always equal to the amount of \_\_\_\_\_, and the amount of guanine is always equal to the amount of \_\_\_\_\_

D. The Structure of DNA- In 1953, \_\_\_\_\_ proposed that DNA is made of two chains of nucleotides held together by nitrogenous bases

- 1) Watson and Crick also proposed that DNA is shaped like a long \_\_\_\_\_ that is twisted into a coil like a spring
- 2) Because DNA is composed of two strands twisted together, its shape is called \_\_\_\_\_
- 3) The sequence of nucleotides forms the unique genetic information of an organism. The closer the relationship is between two organisms, \_\_\_\_\_

Why is this last point IMPORTANT:

Scientists use nucleotide sequences to determine evolutionary relationships among organisms, to determine whether two people \_\_\_\_\_, and to \_\_\_\_\_ of crime victims

E. Replication of DNA- Before a cell can divide by mitosis or meiosis, it must first make \_\_\_\_\_.

- 1) The DNA in the chromosomes is copied in a process called \_\_\_\_\_
- 2) DNA is copied during \_\_\_\_\_ prior to mitosis and meiosis
- 3) It is important that the new copies are \_\_\_\_\_ like the \_\_\_\_\_
- 4) Review DNA replication Handout.

## Section 2: From DNA to Protein

### A. Genes and Proteins:

1. The \_\_\_\_\_ of nucleotides in DNA contain information, that code for and make \_\_\_\_\_
2. What do these proteins become? (List below)
3. What do enzymes control in the body? Why is that important?

Thus, by encoding the instructions for making proteins, DNA

\_\_\_\_\_

4. You learned earlier that proteins are \_\_\_\_\_ of \_\_\_\_\_

The sequence of nucleotides in each gene contains information for assembling \_\_\_\_\_ that make up a \_\_\_\_\_

\_\_\_\_\_

### B. RNA-

1. RNA like DNA, is a nucleic acid. RNA structure differs from DNA structure in three ways
  - a. First, RNA is single stranded—it looks like one-half of a zipper —whereas DNA is \_\_\_\_\_
  - b. The sugar in DNA is \_\_\_\_\_; DNA's sugar is deoxyribose

c. Both DNA and RNA contain \_\_\_\_\_ nitrogenous bases, but rather than thymine, RNA contains a similar base called \_\_\_\_\_.

Uracil forms a base pair with \_\_\_\_\_ in RNA, just as thymine does in DNA

2. DNA provides workers with \_\_\_\_\_ for making the proteins, and workers \_\_\_\_\_ the proteins. The workers for protein synthesis are \_\_\_\_\_

What is the work that RNA does? Build \_\_\_\_\_

They take from DNA the instructions on how the protein should be assembled, then—amino acid by amino acid—they \_\_\_\_\_

3. There are \_\_\_\_\_ types of RNA that help build proteins

a. \_\_\_\_\_ (mRNA), brings instructions from DNA in the nucleus to the cell's factory floor, the cytoplasm

b. The ribosome, made of \_\_\_\_\_ (rRNA), binds to the mRNA and uses the instructions to assemble the amino acids in the correct order

c. \_\_\_\_\_ (tRNA) is the supplier. Transfer RNA delivers amino acids to the ribosome to be assembled into a protein

**C. Transcription-** In the nucleus, enzymes make an RNA copy of a portion of a DNA strand in a process called \_\_\_\_\_

1. The main difference between transcription and DNA replication is that transcription results in \_\_\_\_\_ RNA molecule rather than a double-stranded DNA molecule

**D. RNA Processing-**

Intron-  
Exon-

## E. The Genetic Code-

1. The nucleotide sequence transcribed from DNA to a strand of messenger RNA acts as a genetic message, the complete information for the \_\_\_\_\_

As you know, proteins contain chains of \_\_\_\_\_.  
You could say that the language of proteins uses an alphabet of \_\_\_\_\_

2. A code is needed to convert the language of mRNA into the language of proteins. Biochemists began to crack the genetic code when they discovered that a group of three nitrogenous bases in mRNA code for one amino acid. Each group is known as a \_\_\_\_\_

3. \_\_\_\_\_ combinations are possible when a sequence of three bases is used; thus, 64 different mRNA codons are in the genetic code

## F.. Translation: from mRNA to Protein

1. The process of converting the information in a sequence of nitrogenous bases in mRNA into a sequence of amino acids in protein is known as \_\_\_\_\_

2. Translation takes place at the \_\_\_\_\_ in the \_\_\_\_\_

## Section 3: Genetic Changes

A. Mutation: Any change in DNA sequence is called a \_\_\_\_\_  
Mutations can be caused by errors in replication, transcription, cell division, or by external agents

1. Mutations in reproductive cells- Mutations can affect the reproductive cells of an organism by \_\_\_\_\_  
\_\_\_\_\_ of nucleotides within a gene in a sperm or an egg cell

What are some effects of this type of mutation?

## 2. Mutations to body cells-

What are the effects of this type of mutation?

## 3. The effect of point mutations-

A **point mutation** is a change in a single base pair in \_\_\_\_\_

A change in a single nitrogenous base can change the \_\_\_\_\_ because a change in a single amino acid can affect the shape of the protein

## 4. Frameshift mutations: What would happen if a single base were lost from a DNA strand?

As a result, every \_\_\_\_\_ after the deleted base would be \_\_\_\_\_

This mutation would cause nearly every amino acid in the protein after the deletion to be changed

A mutation in which a single base is added or deleted from DNA is called a \_\_\_\_\_ because it shifts the reading of codons by one base

## B. Chromosomal Alterations:

1. Chromosomal mutations occur in all living organisms, but they are especially common in \_\_\_\_\_  
Few chromosomal mutations are passed on to the next generation because the zygote usually \_\_\_\_\_

## C. Causes of Mutations:

1. Some mutations seem to just happen, perhaps as a mistake in base pairing during DNA \_\_\_\_\_
2. Any agent that can cause a change in DNA is called a \_\_\_\_\_

Examples of mutagens are:

3. Repairing DNA:

How does the body do this....

