**Notes Part I: The Nucleus and Role of DNA**

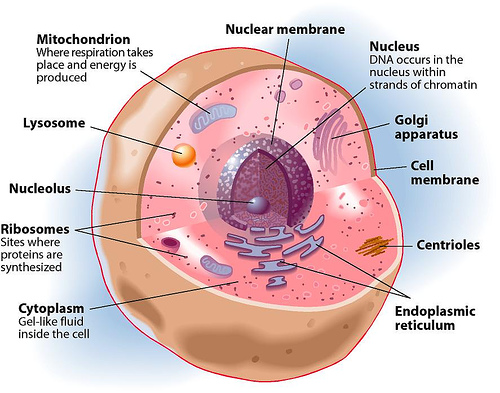
*(Refer to pgs. 125 – 132 in textbook)*

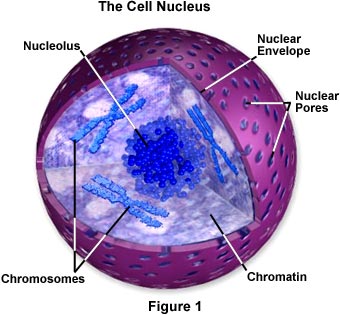
*To understand the process of cell reproduction it is necessary to learning about the parts of the nucleus that play a key roll in*

*controlling cell activities such as cell division, cell function and protein production.*

**Nucleus Role**

Each \_\_\_\_\_\_\_\_ in your body has one nucleus. The nucleus contains genetic material in the form of \_\_\_\_\_\_\_ molecules that together code for proteins, which in turn determine the structure and function of each cell.   
This is why we say that the nucleus is the **control centre of the cell.**

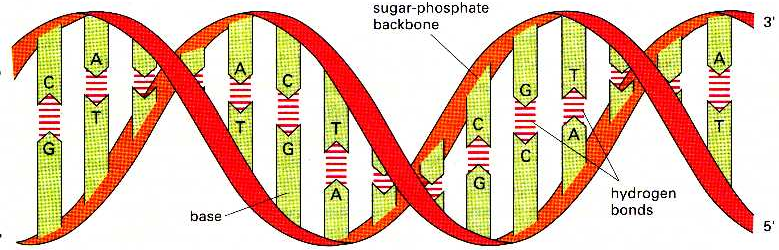




**DNA carries the master set of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for cell function**

**What is DNA?**

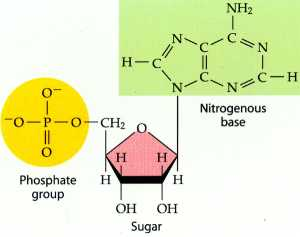
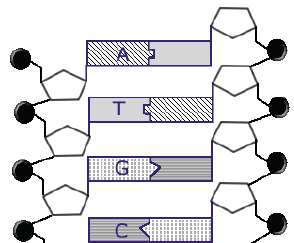
DNA stands for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_. The DNA molecule looks like a twisted ladder that can be described as a double \_\_\_\_\_\_\_\_\_\_\_. The 3 basic parts that make up this ladder are \_\_\_\_\_\_\_\_\_\_\_\_ and phosphate on the sides and four nitrogen bases combine in pairs to make the steps.



**Nitrogen Bases**

There are \_\_\_\_\_ different types of bases: A (\_\_\_\_\_\_\_\_\_\_\_), G (\_\_\_\_\_\_\_\_\_\_\_), C(\_\_\_\_\_\_\_\_\_\_\_),  
 and T (\_\_\_\_\_\_\_\_\_\_\_). The order of the bases forms the “genetic code” and determines the types of proteins created. The bases are always paired along the steps of the ladder in a specific way.   
Adenine always joins with \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_ always joins with Cytosine.

The diagram that follows shows an example of a segment of a DNA molecule (***please fill in the missing bases***):

An example of a sequence of bases which form part of the genetic code is   
(write the matching base below each letter):



The arrangement of these bases provides a set of instructions coded for by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   
  
It is this set of instructions that determines which \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are produced by each cell.

The proteins in turn determines the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of every part of every living creature. The code differs depending on the species.

Role of DNA in Inheritance:

1. Video -What are Traits? <https://learn.genetics.utah.edu/content/basics/traits/>

**What are inherited traits? Give two examples**

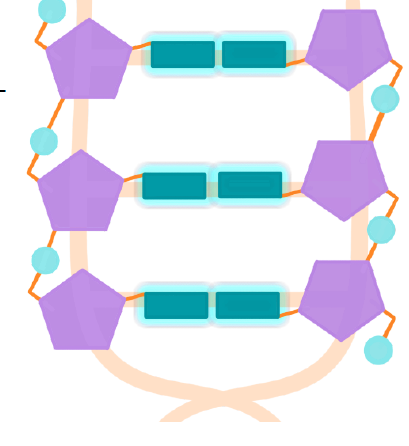
Traits or characteristics can be affected by both genes and the environment.

**What is an example of a trait influenced by the environment?**

1. Video - What are DNA and Genes? <https://learn.genetics.utah.edu/content/basics/dna/>

**What is an organism’s genome?**

1. Refer to Expii Link: <https://www.expii.com/t/dna-role-in-inheritance-overview-importance-10171> -   
   Amoeba Sisters Video - DNA, Chromosomes, Genes and Traits: An introduction to Heredity (2:05 min)

In the diagram below label the parts of a nucleotide (A, B and C)

(A) –deoxyribose (sugar) (B) – phosphate (C) – Nitrogen containing base

**How many nucleotides are shown here?   
   
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Where is DNA found in living things?**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

The DNA in all living organisms is made up of only four bases. The sequence and number of these bases determine all the different traits or characteristics of living things.

**What is the pneumonic that can help you remember the base pairings?**

**What is a gene? What is a Chromosome?**

Complete DNA Model Activity and questions

DNA Structure – Follow up Questions

1. What chemicals make up the backbone or sides of the DNA molecule?
2. What chemical makes up the rungs (or steps) in the DNA molecule?
3. Which nitrogen base always pairs with guanine? \_\_\_\_\_\_\_\_\_\_\_\_\_ with adenine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. One side of a DNA molecule contains the following sequence of bases **ACCTGCTAT**

Write the sequence of the bases on the other side of the molecule. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. If 20 % of a DNA molecule is adenine, what percent will be guanine? \_\_\_\_\_\_\_\_\_\_\_\_\_

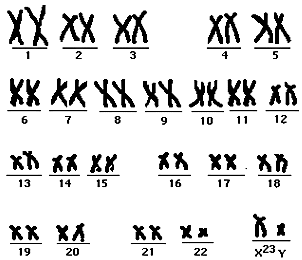
Explain your thinking.

1. When constructing the DNA molecule, what did you notice about the orientation of the two strands?
2. What do you need to do to your segment of DNA to make it look more like a real DNA molecule?
3. When a long DNA is compacted and wrapped around proteins it is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Why is DNA packaged into this structure?

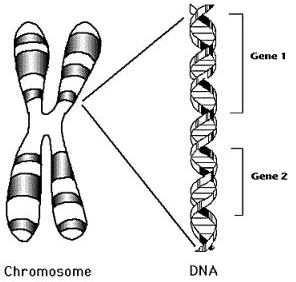
Notes part II: What are Chromosomes, Genes and Proteins?

Understanding Chromosomes

Most of the time, DNA exists in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the form of \_\_\_\_\_\_\_\_\_\_\_\_\_. When a cell is ready to divide, DNA is coiled up into very compact, \_\_\_\_-shaped structures called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Human beings have 23 *pairs* of chromosomes (or \_\_\_\_\_ chromosomes altogether).

The 23rd pair determines the sex of the individual. In males, the 23rd pair is \_\_\_\_\_ while in females, it is XX. Different organisms have different numbers of chromosomes. For Example, corn has \_\_\_\_\_ chromosomes, while a bat has \_\_\_\_\_.

Genes

Genes are \_\_\_\_\_\_\_\_segments of DNA located at specific places on a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. They store the information needed to produce up to 100 000 different \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ used in the cells of your body. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ within a gene determines the protein it produces.

PROTEINS

Two types of proteins produced are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (which speed up chemical reactions in the cell) and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (which act as chemical messengers).

*Every cell in your body contains the same \_\_\_\_\_\_\_\_\_\_\_\_\_, but only certain genes are used to produce specific*

*proteins. For example, in your eye, only the genes relevant to eyesight and structure of your eye are*

*“\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_” to produce the appropriate proteins for that area.*

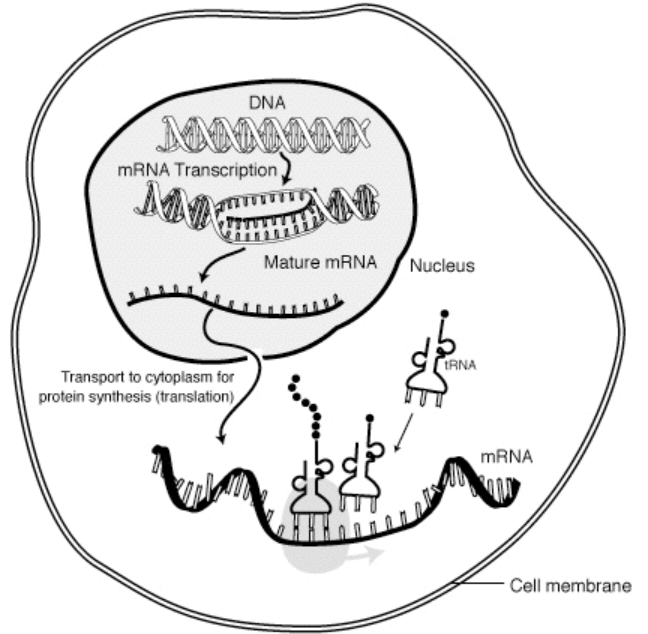
*Refer to the following interactive link to learn more about* ***proteins:*** [*https://learn.genetics.utah.edu/content/basics/proteintypes/*](https://learn.genetics.utah.edu/content/basics/proteintypes/)

1. *Describe four different types of proteins not discussed in notes.*

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

***How does DNA code for proteins?***  <http://www.yourgenome.org/video/from-dna-to-protein>

1. *While viewing the video on protein synthesis – briefly list the steps to form a protein following step 1*

*Step 1: Chemical signal from cell* *nucleus to make a certain protein*

*Last step: Completed protein transported to cells/  
 within cell to perform intended function.*

*What structure translates messenger RNA into a protein? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Where in the cell are proteins made? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*What type of molecules are the building blocks for every protein? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*