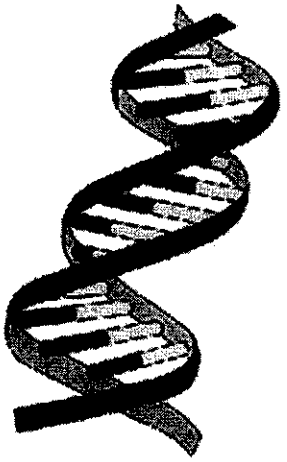
DNA - The Double Helix



Read the following information about DNA. On the back side follow the directions to color the components of DNA.

The nucleus of the cell is often called the "control center" because it controls all the activities of the cell including cell reproduction, and heredity. The nucleus controls these activities by the chromosomes. Chromosomes are microscopic, threadlike strands composed of the chemical DNA (short for **deoxyribonucleic acid**. In simple terms, DNA controls the production of proteins within the cell. These proteins in turn, form the structural units of cells and control all chemical processes within the cell.

Chromosomes are composed of genes. A **gene** is a segment of DNA that codes for a particular protein, which in turn codes for a trait. Hence you hear it commonly referred to as the gene for baldness or the gene for blue eyes. Meanwhile, DNA is the chemical that genes and chromosomes are made of. It stands for deoxyribonucleic acid. DNA is called a nucleic acid because it was first found in the nucleus. We now know that DNA is also found in organelles, the mitochondria and chloroplasts, though it is the DNA in the nucleus that actually controls the cell's workings.

In 1953, James Watson and Francis Crick established the structure of DNA. The structure is a double helix, which is like a twisted ladder. The sides of the ladder are made of alternating sugar and phosphate molecules. The sugar is deoxyribose. Color all the **phosphates** red (one is labeled with a "R"). Color all the **deoxyriboses** blue (one is labeled with a "D").

The rungs of the ladder are pairs of 4 types of **nitrogen bases**. Two of the bases are **purines** - adenine and guanine. The **pyrimidines** are thymine and cytosine. The bases are known by their coded letters A, G, T, C. These bases always bond in a certain way. Adenine will only bond to thymine. Guanine will only bond with cytosine. This is known as the **Base-Pair Rule**. The bases can occur in any order along a strand of DNA. The order of these bases is the code the contains the instructions. For instance ATGCACATA would code for a different gene than AATTACGGA. A strand of DNA contains millions of bases. (For simplicity, the image only contains a few.) Note that the bases attach to the sides of the ladder at the sugars and not the phosphate.

1.) Use Diagram B to color the bases the following colors.

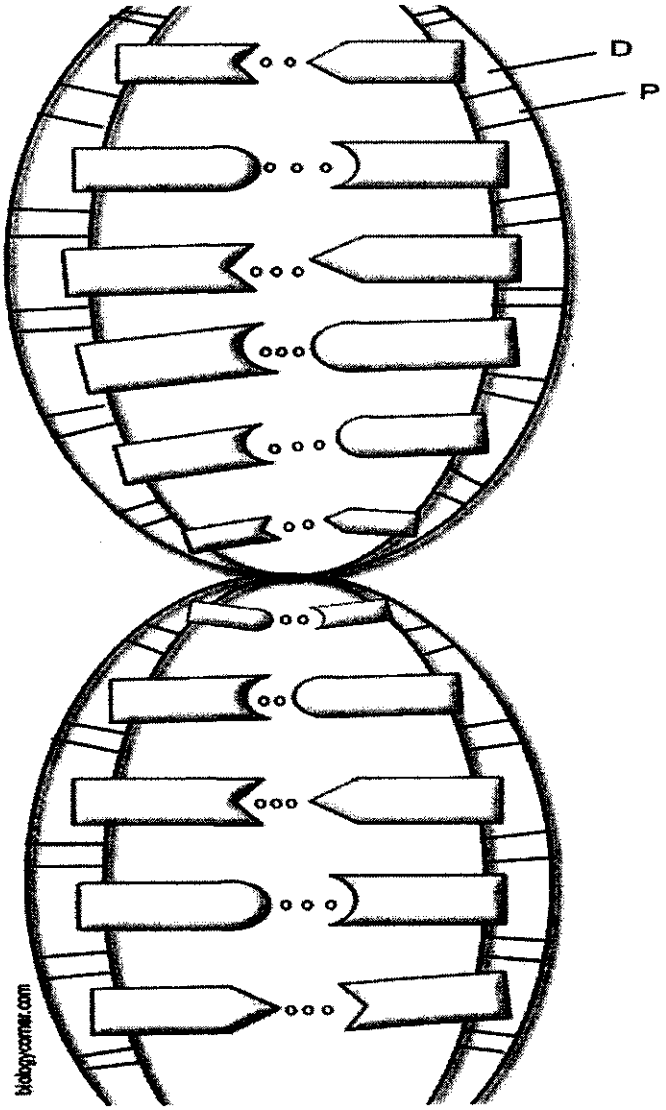
Color the thymines orange. Color the adenines green.
Color the guanines purple. Color the cytosines yellow.

Note that that the bases attach to the sides of the ladder at the sugars and not the phosphate.

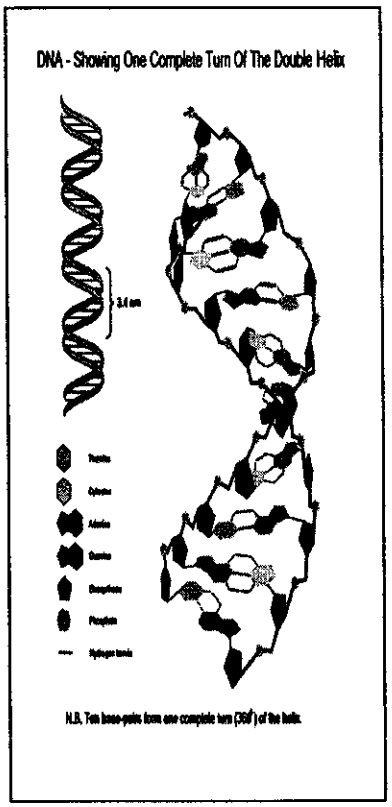
The combination of a single base, a deoxyribose sugar, and a phosphate make up a **nucleotide**. DNA is actually a molecule or repeating nucleotides. Examine the nucleotides closer in diagram B. Two of the bases are purines - adenine and guanine. The pyrimidines are thymine and cytosine. Note that the pyrimidines are single ringed and the purines are double ringed.

2.) Color the nucleotides using the same colors as you colored them in the double helix in Diagram A.

DNA: DOUBLE HELIX-Diagram A



DNA Visual



NUCLEOTIDES-Diagram B