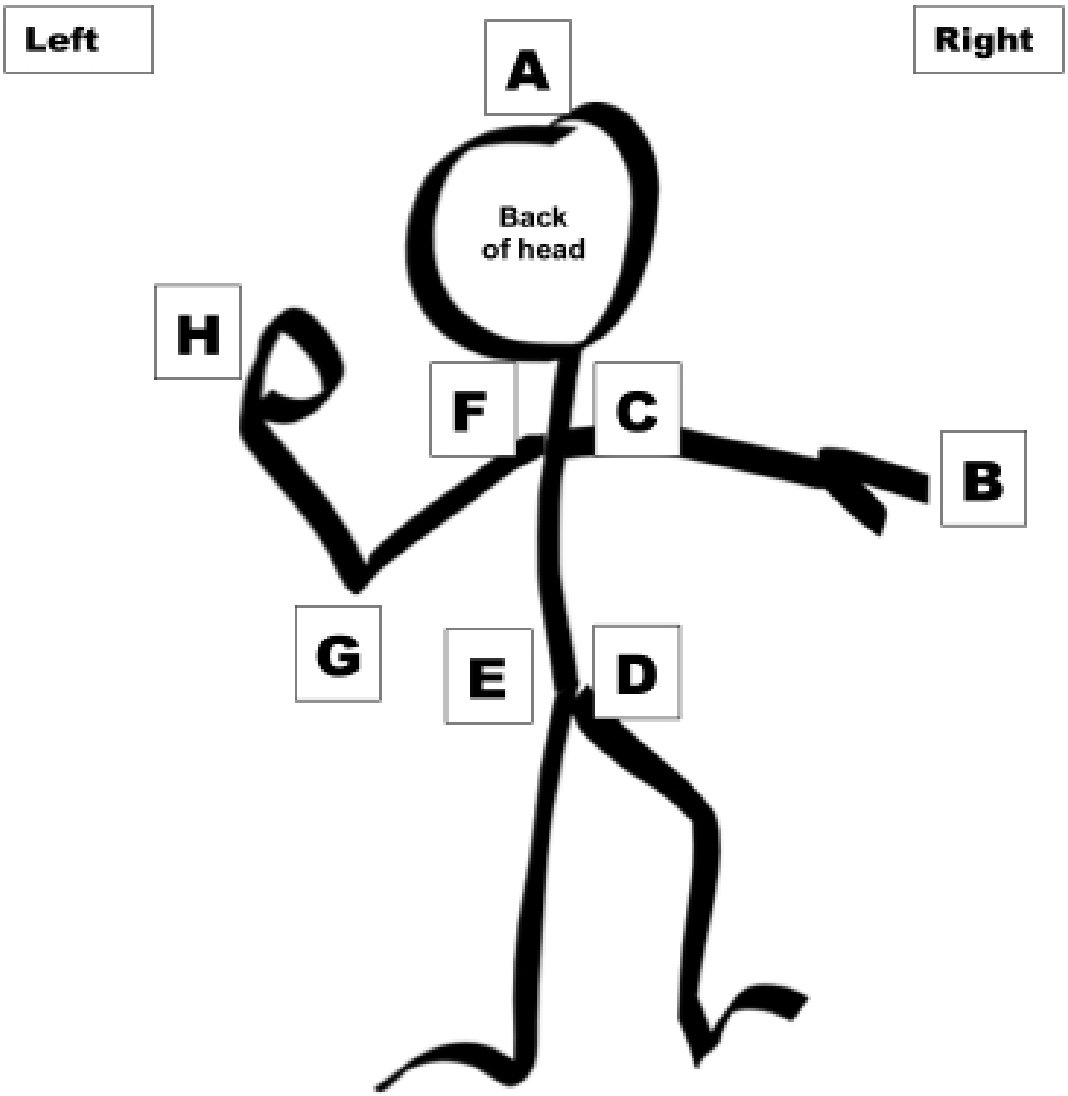
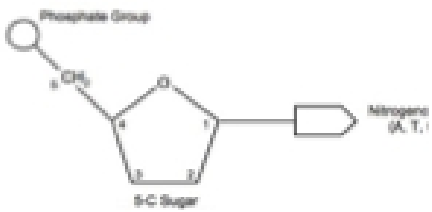
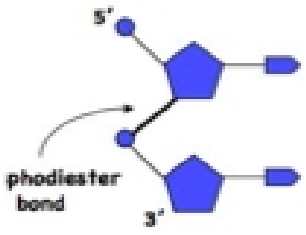
Human Model of a DNA Nucleotide

How might we model a DNA base unit?

The base unit of the DNA molecule is the DNA nucleotide. It consists of a 5-carbon sugar, a nucleotide and a phosphate group. The human body can be used to model these components.







Moving Genes

Letter	Human Body Part	Nucleotide Structure
A	Head	Single oxygen atom at the top of the deoxyribose (5 carbon sugar)
B	Right hand	Nitrogen base (A, T, G, C)
C	Right shoulder	Carbon #1 on the deoxyribose
D	Right hip	Carbon #2 on the deoxyribose
E	Left hip	Carbon #3 on the deoxyribose
F	Left shoulder	Carbon #4 on the deoxyribose
G	Left elbow	Carbon #5 on the deoxyribose
H	Left hand	Phosphate group

Extensions: Have students form double stranded DNA fragments by joining nucleotides together. They will naturally have to form antiparallel strands in order to accomplish this task. Make sure that the phosphate group (left hand) of one student "bonds" to the Carbon 3 (left hip) of the adjoining "nucleotide." (Don't require students to actually touch!)

Students will also observe 3' and 5' ends during this demonstration. The length of the right arm can be adjusted to model the differing sizes of purines (two carbon rings, extended arm – adenine and guanine) and pyrimidines (one carbon ring, shorter arm length -- thymine and cytosine).

Differing bonds may also be illustrated. The fingers on the right hand can be used to show the double bonds of between adenine and thymine and the triple bonds between cytosine and guanine.

The action of restriction enzymes in cutting these fragments can be modeled using these "fragments."

Finally, the differences between the covalent bonds in the sugar-phosphate backbone and the hydrogen bonds that attract one nitrogen base to its complement can be modeled with this demonstration.