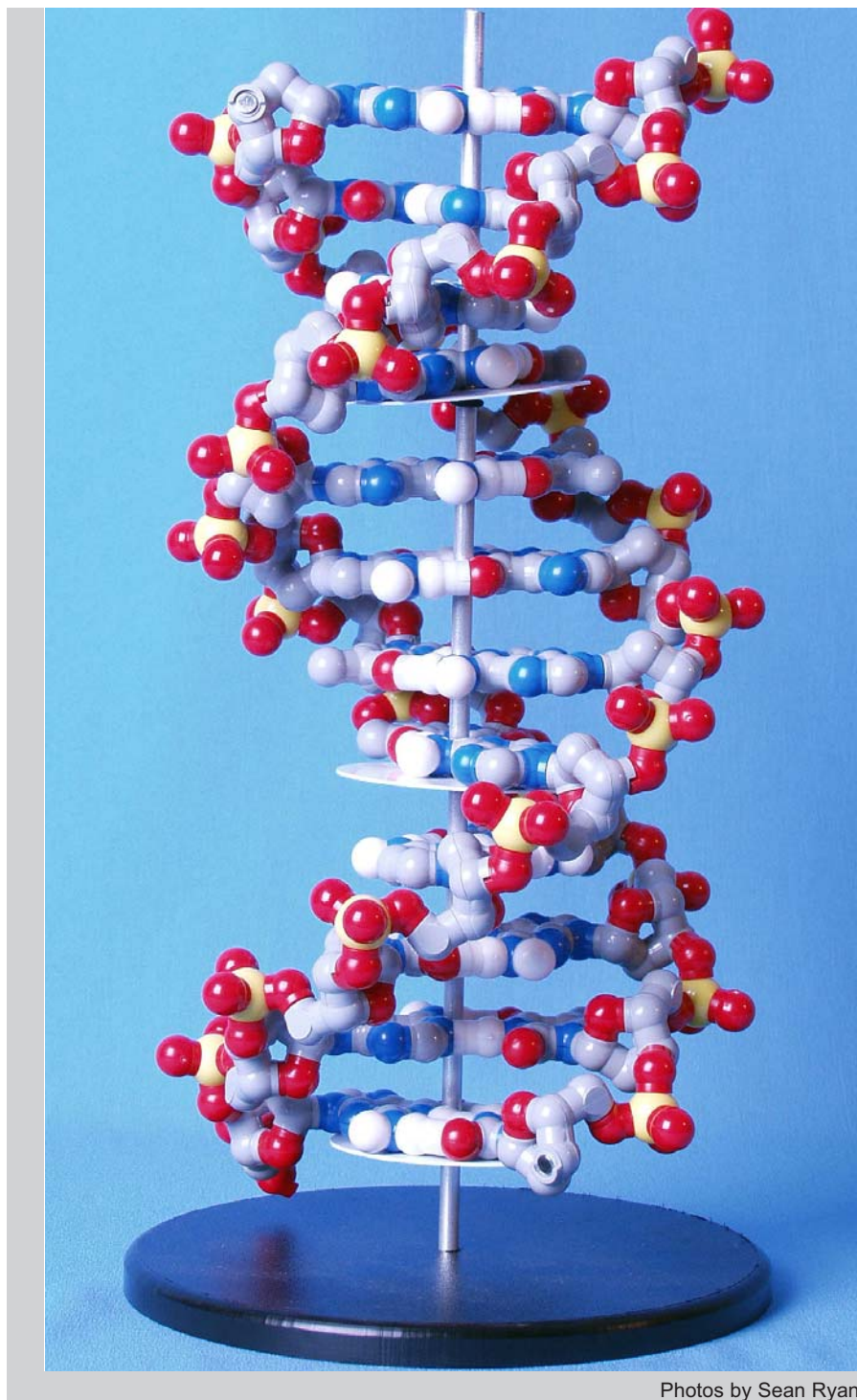


The DNA Discovery Kit®

Contents & Assembly Instructions



Photos by Sean Ryan



The DNA Discovery Kit®

Contents of The DNA Discovery Kit® – 12 Base Pair Kit

6 each of Adenosine, Thymine, Guanine and Cytosine Nucleotides	3 Black O-Rings
48 Nucleotide Labels	Metal Rod Guide
2 Mini-Toobers	Assembly Instructions and DNA Puzzle Assembly Guide
Dowel to Form Helix	DNA Puzzle Punch-Outs
Base	Glue Dots
Metal Rod	CD with Activities & Teacher Notes
3 White Support Disks	

Contents of The DNA Discovery Kit® – 2 Base Pair Kit

1 Each: Adenosine, Guanine, Thymine and Cytosine Nucleotides	Assembly Instructions
8 Nucleotide Labels	CD with Activities & Teacher Notes

Contents of CD

Contents & Introduction Folder

DNA Discovery Kit® Introduction
DNA Contents & Assembly Directions

DNA Activities & Teacher Notes Folder

DNA Activities Folder

The Discovery Approach
The Guided Discovery Approach
Student Handout
Three Frequently Asked Questions

DNA Puzzle Folder

DNA Discovery Kit® Puzzle
DNA Discovery Puzzle Template
DNA Discovery Puzzle Directions
Create Your Own Discovery Puzzle PDF Template

Watson & Crick Papers Folder

Watson & Crick – April 1953
Watson & Crick – May 1953
Annotated Version of
Watson & Crick Paper

DNA Resource Information Folder

Read Me First
DNA Background – Teacher Notes
Student Worksheet
Student Answersheet

DNA Websites Folder

Additional DNA Resources

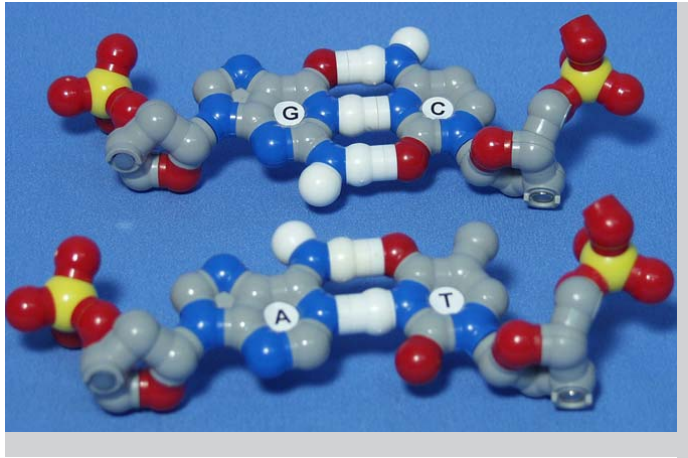
The DNA Discovery Kit®

Assembly Instructions

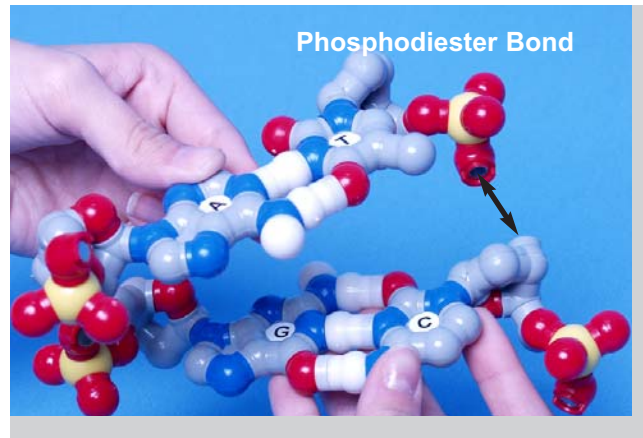
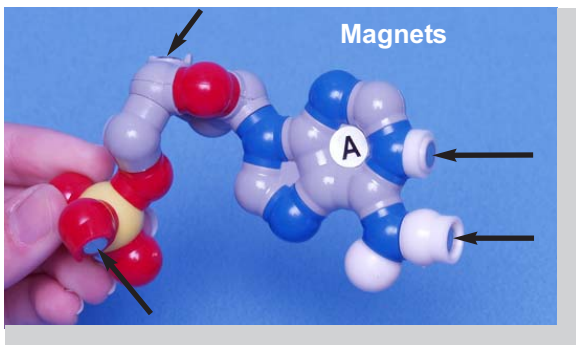
Nucleotides Assembled

The nucleotides are preassembled.

You have the option of using labeled or unlabeled nucleotides. To label a nucleotide, peel a letter from its protective backing and press it into the depression on a corresponding base. After placing the label on one side, flip the base over and repeat with another label. Use the photo to correctly place the labels on the nucleotides. (Labels only fit inside the larger depression on the Adenosine and Guanine nucleotides.)



Magnets Simulate Bonding



The nucleotide models have magnets embedded in them to simulate the spontaneous bonding that occurs between complementary base pairs (hydrogen bonds) and between the phosphate group of one nucleotide to the deoxyribose of another nucleotide (phosphodiester bonds).

Arrows in the photo above point to the magnetic(s) in each piece.



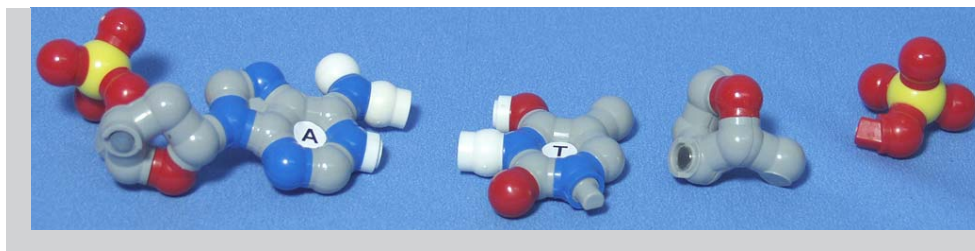
You can break the hydrogen bonds by pulling apart the G-C and A-T base pairs.

When examining the deoxyribose and phosphate groups, you will see the single magnet embedded in the deoxyribose group and one embedded in the phosphate group.





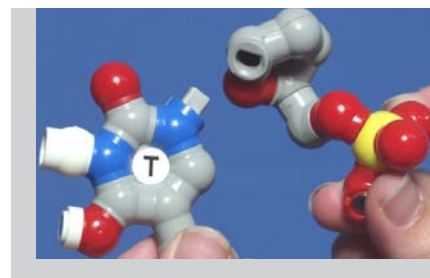
The DNA Discovery Kit®



Nucleotides Separate Into Components

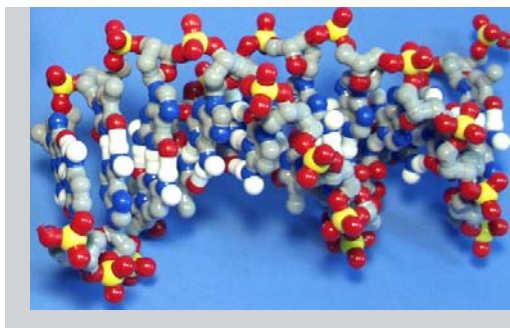
Each nucleotide separates into its three components — the nitrogenous base, deoxyribose group and phosphate group.

To separate the pieces, pull the three pieces apart as shown in the photos. Be sure to pull the pieces apart with a straight motion. **The attachment posts can break if a twisting or bending motion is used to separate the pieces.**



Three Ways to Display DNA Discovery Kit®

We encourage you to leave the DNA Discovery Kit® pieces out on a table for your students to explore in their free time.



You can also easily display or store the fully assembled double helix by setting up the black base, aluminum rod, three white disks and three black o-rings rings that are included in the 12 Base Pair DNA Discovery Kit®.

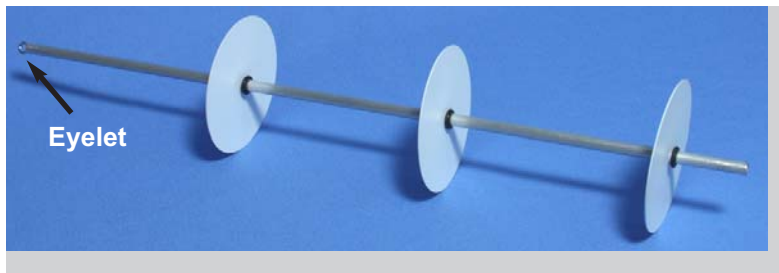
Or you can hang the double helix from a ceiling by threading a strong cord through the eyelet at the top of the rod. **Do not use the black base when hanging the DNA.**



The DNA Discovery Kit®

Setting Up Base & Rod to Displaying DNA

Begin by sliding one white support disk onto the rod and position it on the black mark nearest the end of the rod with the inserted eyelet.



Since the white disks are stamped out of plastic, they slide more easily in one direction than the other. If a disk seems hard to slide onto the rod, remove it, flip the disk over and then slide it back onto the rod.

Next slide a black o-ring onto the rod and position it underneath the white disk to support the disk. Repeat with the remaining two white disks and two black o-rings, placing each white disk on the black mark. (If your rod isn't marked, you will find a paper guide that indicates where the rod should be marked for placing the white disks.)

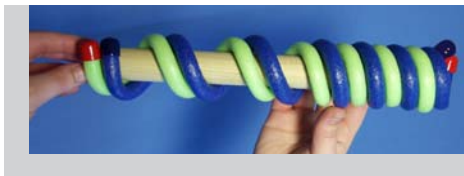
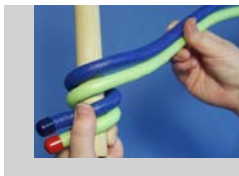
Push the bottom of the rod (end without the eyelet) into the black base. Press down firmly so it rests securely in the base. The lowest white disk will rest about 1/2 to 1 inch above the base.

Before correctly placing the Guanine - Cytosine base pairs around the rod, look carefully at the models. You will see that the Guanine model has two hydrogens that are longer than the third hydrogen. (Refer to page 3 photo labeled, *Hydrogen Bonds*.) The Cytosine model has one hydrogen that is longer and two shorter hydrogens. Adenosine and Thymine each have one longer hydrogen and one shorter hydrogen.

On Guanine, Cytosine and Adenosine, the longer hydrogen indicates that the hydrogen(s) is(are) bonded to a nitrogen that then shares its hydrogen with the oxygen on its complementary nucleotide. On Thymine the nitrogen bonding the hydrogen, shares the hydrogen with a nitrogen on Adenosine. Each Guanine - Cytosine base pair should be placed so that the rod is between the longer and the shorter hydrogen on Guanine and vice versa on Cytosine. Four base pairs fit above each of white disks.



Making Mini-Toober DNA



Hold the dowel perpendicular to your body and place the two Mini-Toobers across the dowel, at a 45 degree angle to the dowel. Wrap the rest of the Mini-Toobers around the dowel. Then separate each pair of coils (about an inch apart) before removing the dowel.

