

**3-D Molecular Designs**

*...where molecules become real™*

# Genetics Modeling Kit



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**PASCO®**



# Genetics Modeling Kit

## Contents

- 6 Red Foam Adenine Bases (GMK-R-A)
- 6 Blue Foam Cytosine Bases (GMK-R-C)
- 6 Green Foam Guanine Bases (GMK-R-G)
- 6 Yellow Foam Thymine Bases (GMK-R-T)
- 6 White Foam Uracil Bases (GMK-R-U)
- 2 Gray Foam DNA Backbone Pieces (GMK-R-Backbone)
- 1 Bag with 12 each Red, Yellow and White Bands (GMK-R-Bands)
- 1 2' Mini-Toober (GMK-R-MT)
- 1 Bag with Red & Blue Endcaps (GMK-R-Endcaps Set)



***Please contact us if any parts are missing or damaged.***

### **Replacement Parts Available**

*Order replacement parts with the item number in parentheses from the above list in our catalog or online at [www.3dmoleculardesigns.com](http://www.3dmoleculardesigns.com).*

### **⚠ WARNING:**

**CHOKING HAZARD** -- This product contains small parts and should be kept out of the reach of children under the age of 3, because the parts or their pieces may present a choking hazard to small children.

### **CAUTION:**

This is a science education product, not a toy. It is not intended for children under 8 years old.

PASCO Scientific collaborated with 3D Molecular Designs, LLC, to develop this Genetics Modeling Kit to complement the Genetics module of the Sally Ride Science Life Science Curriculum. Please see the Genetics module for the Genetics Modeling Kit instructions. Please see the insert for assembly and care directions.

***Please order Genetic Modeling Kit from PASCO.***

***Please order replacement parts from 3D Molecular Designs.***

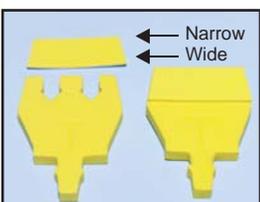
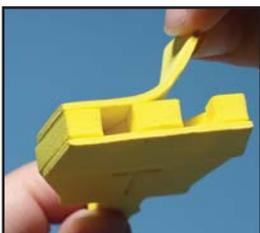
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## Assembly



To complete your pyrimidine bases (blue cytosine, yellow thymine & white uracil) you will attach the sticky-backed foam bands to each side of the base as shown left. (Please remove the paper backing on the bands first.) The prongs of the pyrimidine bases (blue cytosine, yellow thymine & white uracil) should be completely covered by the sticky-backed bands. These sticky-backed bands reduce confusion between base pairs and provide stability for the model.

Match the shape of the band to the shape of the base. Note the angle cut on the bands. Place the narrow end at the outside of the prongs. See photo.

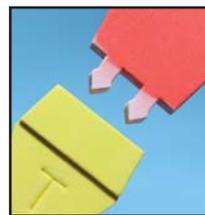
## Recommendation

The adhesive on the bands makes joining and separating the base pairs difficult at first. This stickiness can be eliminated by dipping the purines' exposed prongs into an inert powdery substance, like talcum or baby powder. Then insert the purine into the complementary pyrimidine. The bases should easily attach and detach.

**Note:** *Store your bases disconnected if you have not powdered the bases. Some foam from the purine bases may stick and tear if sticky base pairs are left assembled.*



*Even without powder, the stickiness of the pyrimidines will lessen over time.*

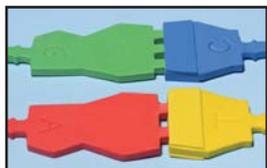


## Misconception Caution

Models are powerful teaching tools, but can cause misconceptions. With this DNA model, students might develop the misconception that DNA is made by simply adding the four DNA bases (A,T,G,C) to a pre-formed sugar-phosphate backbone. To avoid this misconception, teachers are encouraged discuss with their students that each base is actually joined to a deoxyribose sugar and a phosphate group – to form a nucleotide. Individual nucleotide units are then joined together by phosphodiester bonds to build up the alternating sugar-phosphate backbone of DNA as it is synthesized by DNA polymerase enzymes in the cell.

## Assembly continued

### Model Construction



There are two primary ways to build your model. One approach is to pair up the bases and then attach them to the DNA backbone.



The other is to first attach 12 bases to one of the DNA backbones. Then attach the complementary bases to the other DNA backbone.



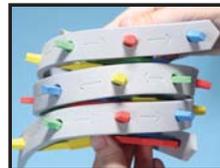
*Note: Pull the base through the DNA backbone hole until flared ends pop through. To remove a base from the DNA backbone, squeeze the flared ends until they fit through the hole.*



To create the double helix, start with your model in a ladder shape as shown left. Notice how the bases are rotated up instead of laying flat.

With your right hand on the top base pair and left on the bottom twist your hand in opposite directions. (Your right hand should twist counterclockwise and your left hand clockwise). Twist until the DNA backbones touch each other in a tight coil.

Release the bases and allow the model to relax into its double-helical shape.



### Care & Maintenance

If over time the bands on the pyrimidines become loose or loosen, or are not sticking to the foam base, you can use super glue to re-attach them.

The foam will tear if too much force is used. Encourage your students to be careful.

Wash with a damp cloth or if necessary, a mild dishwashing detergent.