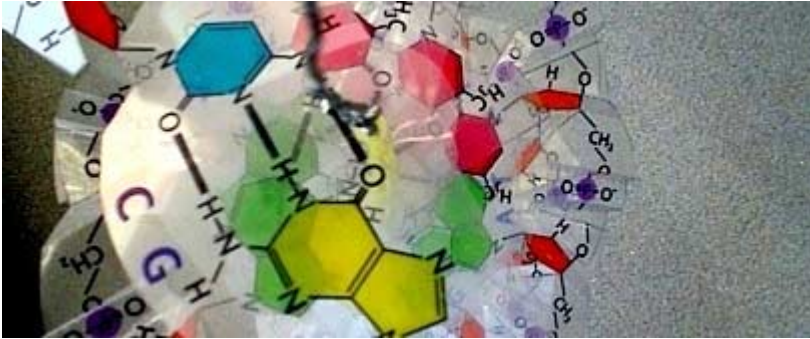


# Cut-out 3-D model of DNA

Adapted from a model by  
Van R. Potter, 1958



This cut-out 3-D model of DNA can be used by students to learn about the structure of DNA. It will take the average person about 90 minutes to assemble a model of 16 nucleotide units. However this activity is better-suited to an entire class, where each student can assemble one base-pair. If the nucleotide pairs are photocopied onto overhead transparency sheets instead of card, these can be assembled to make a particularly attractive model.

## EQUIPMENT & MATERIALS

Needed by each person or group

Nucleotide templates, copied onto card (from PDF file, right)

Scissors

Bodkin or strong needle, for punching holes through card

Paper glue

Drinking straws

Fine string

**OPTIONAL:** Sharp craft knife and cutting board; crayons

## PROCEDURE

Make several copies of the nucleotide templates on card. Ten nucleotide pairs are required for a complete turn of the double helix. To see the major and minor grooves in the double helix clearly, the model needs to have at least 16 nucleotide pairs.

If desired, colour in the pieces appropriately. The colours that are often used in sequencing markers for DNA bases are: Cytosine=Blue; Guanine=Yellow; Adenine=Green; Thymine=Red.

Cut out the nucleotide pairs around the thicker, outer lines. Make two small cuts into the card by the phosphate groups where indicated. **OPTIONAL:** Use a sharp craft knife to make cuts above the deoxyribose molecules where shown.

Carefully punch a small hole in each cut-out where shown. This will be the axis of the DNA model through which the string will be threaded. Do not make these holes too big!

Fold the sugar-phosphate 'backbones' where indicated by dotted lines. These folds must be made in the directions shown on the diagram in the PDF file. Take care not to make left-handed DNA!

Cut 25 mm lengths of drinking straw. You will need one less piece of straw than you have nucleotide pairs.

Glue the phosphate group on one cut-out onto the deoxyribose on the next. Do the same with the opposite sugar-phosphate strand. Remember that the sugar-phosphate chains run in opposite (anti-parallel) directions. The orientation of the letters on the card should help you to assemble the model correctly.

Hold a piece of drinking straw between the holes in the cut-outs, and thread the string through them.

Repeat steps 5-8 for as many nucleotide pairs as desired.

Cut out the genetic code, and glue the two sides together onto the string at the bottom of the model. This will help the model to stand vertically.

#### **ACKNOWLEDGEMENTS**

The model upon which this one is based was brought to the John Schollar's attention by Dr Cheong Kam Khoo of the Singapore Science Centre. It was devised by Van Rensselaer Potter in 1958 and appeared the following year in his book *Nucleic Acid Outlines*. Sadly, Dr Potter, a bioethicist and oncologist at the **University of Wisconsin-Madison**, died in 2001 before we learnt that he had devised the original model. Many thanks to Kevin Fraser for alerting us to the origin of the model.