11B The Structure of DNA

How does a DNA molecule carry information?

DNA is found in all living creatures we know. This complex molecule contains the information on how to build every protein used in your body. DNA is like a blueprint for building a living creature. The DNA molecule itself is a fascinating structure, as you will see in this activity.

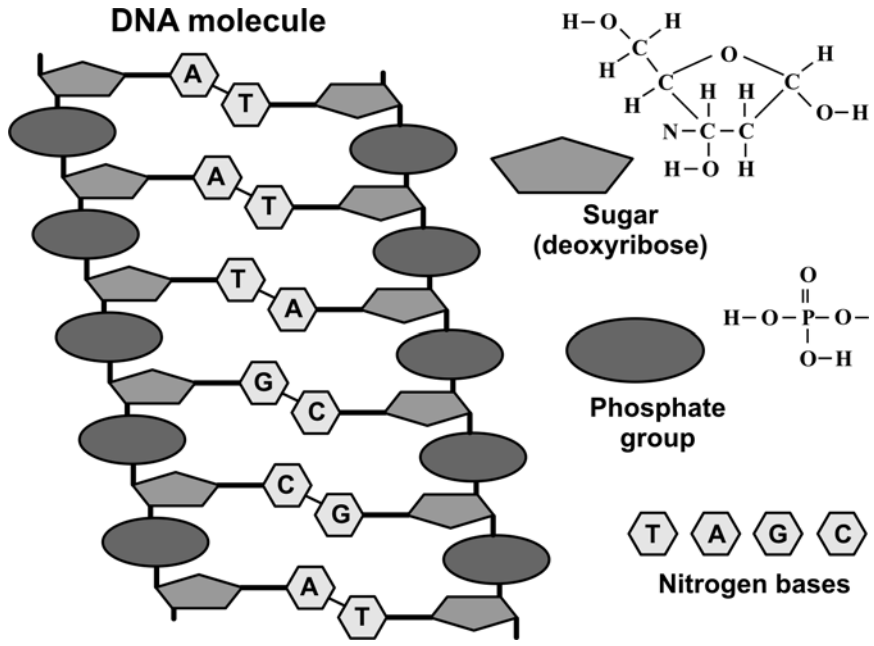
Materials

- Licorice sticks (about 6" long)
- Round toothpicks
- Colored gum drops

1 About the DNA molecule

A DNA molecule is put together like a twisted ladder, or double helix. Each side of each rung of the ladder is made of a 5-carbon sugar called deoxyribose, a phosphate group, and a nitrogen base. Two nitrogen bases are paired in the center of the ladder so each rung is composed of two similar groups.

The genetic code in a DNA molecule is stored in the sequence of the nitrogen bases. For example the sequence AATGCA is coded in the DNA molecule in the diagram.



2 Building a DNA molecule out of gum drops

There are four different nitrogen base groups in a DNA molecule. Each should be represented with a different color of gum drop. Choose the color you want to use to represent each nitrogen base (A, G, C, T).

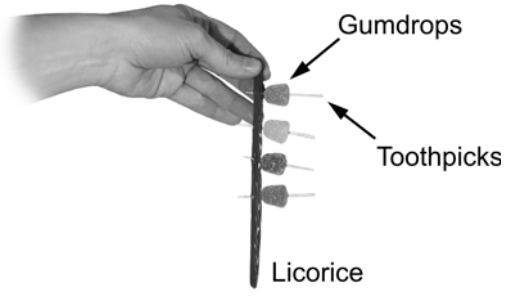


Table 1: Nitrogen base colors

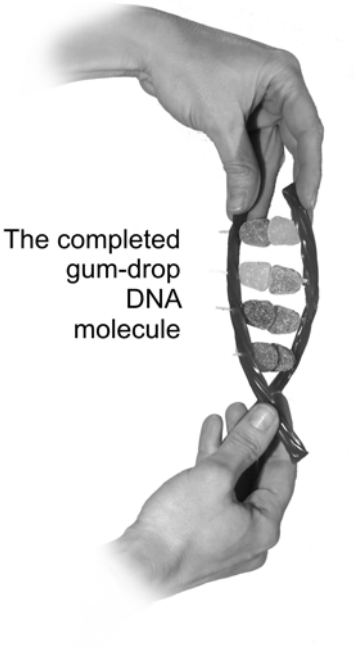
Adenine (A)	Guanine (G)	Cytosine (C)	Thymine (T)

1. The licorice will be the backbone of sugar and phosphate. Put 8 toothpicks through the licorice (evenly spaced) and push a gum drop past the middle of each toothpick.
2. The color sequence of your gum drops will be your DNA code!

3 Pairing up the nitrogen bases

The nitrogen bases in a DNA molecule pair up with each other. Adenine pairs with thymine and guanine pairs with cytosine.

1. Use Table 2 to record the 8-letter genetic code for the left side of your DNA molecule. Put the colors in row 1 and the letter codes in row 2.
2. Use the pairing of the nitrogen bases (A-T or C-G) to complete row 3 for the right side of your DNA molecule.
3. Use Table 1 to determine which gum drop colors correspond to the nitrogen bases in row 3.
4. Complete your DNA molecule by building the opposite half of the ladder! You can give your DNA ladder a gentle twist so it looks like the real double helix shape.



The completed gum-drop DNA molecule

Table 2: The DNA code

1	Colors								
2	Letters (A, G, C, T)								
3	Letters (A, G, C, T)								
4	Colors								

4 How DNA is reproduced

When a living creature reproduces, its genetic code is passed on to its offspring through DNA. On the molecular level, reproduction starts when the DNA strand divides down the center, splitting apart the nitrogen bases.

a. Research and describe how an identical new DNA molecule is created once the original DNA molecule has been split down the center.

b. Suppose one side of a DNA molecule had the nitrogen base sequence TAGGCCA. What nitrogen base sequence must be on the other side of the DNA molecule?

c. Research approximately how many base pairs are in a typical DNA molecule such as might be found in a human cell.