Procedures

1. Ask students to brainstorm traits they have that are passed on from their parents, such as eye color, hair texture, and facial characteristics. Then ask them how these traits are passed on from one generation to the next. The answer is *DNA*, or *deoxyribonucleic acid*. Explain that all organisms carry an elaborate blueprint containing the information necessary to develop and maintain life. This "manual of instructions" is located in a chemical molecule called DNA. DNA is found within a person's *genes*. Genes are small structures found in *chromosomes*, structures within the nucleus of cells.
2. Tell students that DNA works something like the alphabet. While the alphabet has 26 letters, DNA's "alphabet" has only four letters. These letters are guanine (G), adenine (A), cytosine (C), and thymine (T). Just as the 26 letters of the alphabet can be used to form millions of words for communication, DNA's alphabet can be combined to form codes with more than five billion combinations of G's, A's, T's, and C's. The differences in these combinations result in differences among human beings.
3. The DNA molecule consists of two strands that form a double helix, a spiraling shape much like a twisted ladder. The DNA molecule has a sugar component, a phosphate component, and four different bases—adenine, thymine, cytosine, and guanine. To help students understand how these components fit together to form DNA, have each student make a model of DNA with fishing line, dried pasta, and different-colored pipe cleaners.
4. First, give each student 2 pieces of line, 18 pieces of pinwheel pasta, 16 pieces of ziti pasta, and different-colored chenille stems (pipe cleaners). Explain that the pinwheel pasta represents the sugar component, the ziti pasta the phosphate, and the chenille stems each of the bases.

Building a Model DNA

Grade level: 6-8 Subject: Animals Duration: Two class periods

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students to start with the pinwheel pasta and alternate with the ziti pasta as they thread the pasta on the line. On each line, they should string nine pieces of pinwheel pasta alternating with eight pieces of ziti. Wrap the line around the final piece of pasta at the end of each line so that the pasta does not fall off. After pasta has been strung on both lines, each line should have a total of 17 alternating pieces of pasta.

6. Have students lay the two lines side by side.
Then give students the "code" for the chenille stems—the blue stem represents adenine; the green stem, thymine; the purple stem, cytosine; and the orange stem, guanine. Explain that the bases in DNA are found in pairs and that adenine always pairs with thymine and cytosine always pairs with guanine.
7. Have students represent these base pairs with twisted chenille stems. First, have them twist the eight blue stems and eight green stems together, making a total of eight blue-green stems, about 2 inches long. Likewise, have them twist the eight purple and eight orange stems together, making a total of eight purple-orange stems, about 2 inches long. Students will find that the chenille stems twist together easily.
8. Now, have students create a "ladder" using the pasta lines as the sides and the twisted chenille stems as steps. Beginning at the top, students should connect the two ends of a twisted chenille stem to the top pasta pieces on the two lines. Then use a second chenille stem to connect the next two pasta pieces directly across from each other. They should continue building their ladder, one step at a time, until they have connected the bottom two pieces of pasta. Remind them
place the twisted chenille stems in any order
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