Activity: **BUILDING A MODEL DNA**

**Class Copy**

**Purpose:** To help you understand how sugars, phosphates and bases fit together to form DNA, you and your partner will make a model of DNA using K’Nex.

**Objectives:** Students will be able to

1. Understand that the genetic code is transmitted biochemically through molecules call deoxyribonucleic acid (DNA).
2. Construct a model of DNA from the nucleotide monomers.

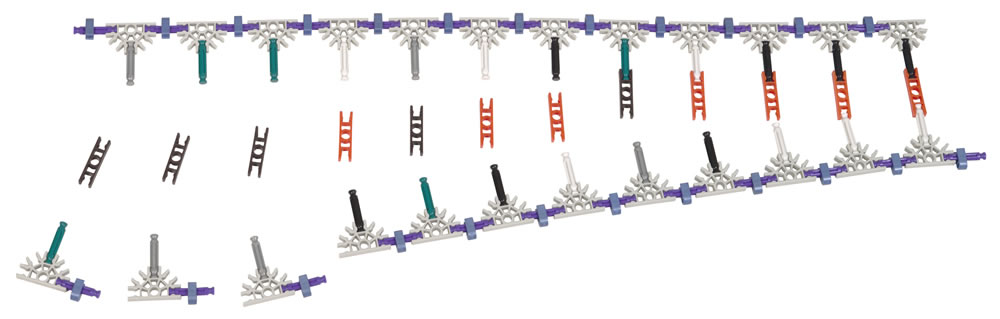
**Materials:** For each *pair* of students:

* One K’Nex DNA kit
* One Instruction booklet

***Procedures***

**Before building:**

1. Read the “Component Parts” page of the instruction book (Page 3).
   * Be sure you recognize which pieces represent each part of the DNA!
   * Careful: some parts are shaped the same, but different colors. **This color** **is important!**



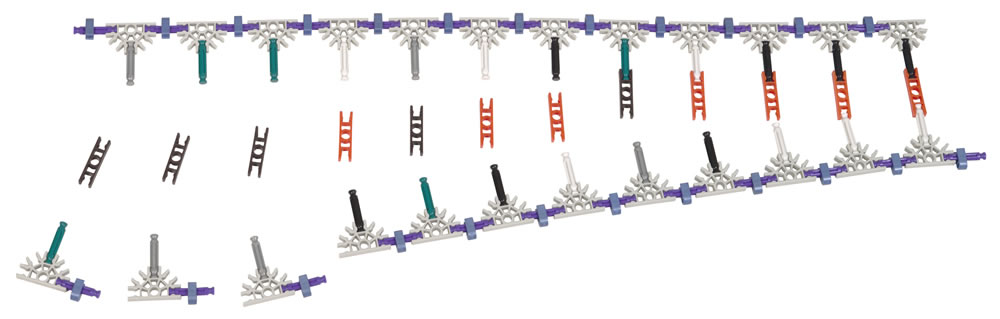
**Building the Basic DNA Model (page 4-5)**

1. Using the Key on Page 5 and the Component Parts on Page 3, **build all the nucleotides you will need**
   * Be sure to build all nucleotides **first!**
   * **Write “Built All Nucleotides” and get a stamp from your teacher!**
2. Build the first strand of DNA, using 12 nucleotides
   * Use **5** that use either **Cytosine or Guanine**, and **7** that use either **Adenine or Thymine**
   * **Write “Built First Strand” and get a stamp from your teacher!**



**Building the Complementary Strand (page 4-5)**

1. Connect the complementary nucleotides to the first strand, **one at a time**
   * Be sure to use the correct number of Hydrogen bonds! (different color connecters for each number of bond)
2. Connect all the sugar and phosphates of the new strand
   * **Write “Built Double Helix” and get a stamp from your teacher!**



**Analysis:** Note- #1 & 2 must be done before class ends for successful completion of the rest of the analysis.

1. Draw a picture of your final model of DNA. Label the following:
   * A phosphate molecule and what kind of K’Nex piece represents it.
   * A sugar molecule and what kind of K’Nex piece represents it.
   * What base does each color represent?
2. Using the letters A, T, G, C, give the sequence of bases on one side of your DNA molecule.
3. How do the bases pair up in a DNA molecule? How does your model help you figure this out?
4. What differentiates one DNA molecule from another (compare your DNA model to another group’s DNA model)? How could you change your DNA model to reflect changes among DNA molecules?
5. What is the relationship between DNA molecules and genes and between chromosomes and genes?
6. What does “complimentary base pairing” mean?
7. How many individual sugar-phosphate strands did you make when creating your DNA?
8. Give the sequence of bases for the strand that is complimentary to the strand in #2.
9. Draw a picture of one nucleotide. Us the shapes of the K’Nex pieces to represent the different structures of the nucleotide. Label each part.

Note: Do a little research online to help you answer questions 10 and 11.

1. In 1999, scientists finished mapping the sequence of the human genome (all of the genes in a human)-that is, all the instructions needed for making a human being. Aptly call the “Human Genome Project,” it is considered one of the biggest milestones in scientific history. Why do you think this project is so important? What types of information could it provide?
2. In 1997, scientists were able to clone a sheep. What do you think the potential of cloning is?