

# HS Lesson 1: A UNIQUE INDIVIDUAL

## (Pre-Exhibit Visit)

### Objectives:

1. Students will know that DNA is the molecule that causes each individual to be different.
2. Students will relate the size and location of DNA to other parts of the body, such as the cell, nucleus, and tissues.

### Curriculum Connection:

This lesson is a great introduction to a unit on DNA and genetics. Students will discuss differences and similarities among members of the class and connect these differences to their DNA. They will build on prior knowledge of DNA and complete an activity where the many words associated with the unit will be put into context. While this lesson will build on students' preconceptions about DNA, it does not require prior knowledge of DNA. However, students should have knowledge about the parts of the cell, enzymes, and organic molecules.



### Exhibit Link:

This lesson connects with *The Secret of You* in the exhibit, by helping to put into perspective the fact that your genes and your DNA are the secret of you.

### Class Time Required:

45 minutes

### Materials Needed:

Enough for each pair of students to have one set of:

- Index Cards with the words: HUMAN BODY, ORGAN, TISSUE, CELL, NUCLEUS, GENOME, CHROMOSOME, GENE
- Index Cards with the words: ENZYME, NUCLEIC ACID, MONOSACCHARIDE, and NUCLEOTIDE

### Focus Activity:

Have students work in pairs to make a list of ten differences between the two of them. This should be purposefully left open-ended. Have students also come up with three reasons behind these differences.

### Lesson Steps:

1. Listen to answers from several sets of partners. If no one gives the answer, lead students to the idea that DNA is the major cause of the differences between them.
2. Have students make a simple DNA circle map. (This is a great way to find out how much students already know about the topic you are about to present.) To make their maps, students should draw a small circle with the word DNA in it and then draw a much larger circle around the first circle. Inside the outer circle, have students write down ten things they associate with DNA. Encourage them to write down any ideas they have, even if they are afraid the ideas might be wrong.
3. Discuss their answers and any misconceptions.
4. Allow students to work with the same partner as previously. Give each pair a set of index cards with the following words on them: HUMAN BODY, ORGAN, TISSUE, CELL, NUCLEUS, GENOME, CHROMOSOME, and GENE. The cards should not be in order.
5. Have students attempt to put them in order from largest to smallest. Students will probably not know ALL the answers, but resist the temptation to help them too much. Instead, answer their questions with questions such as: "Where is the

- nucleus found?” “How big is a cell?” “What is a genome?” “What is a chromosome?” (Remember: A single human cell’s DNA stretched out is 2 meters long so some orders may cause a debate depending on what students know.)
- When students have finished, discuss answers, and have them make any necessary corrections.
  - Now give the groups an additional four cards: ENZYME, NUCLEIC ACID, MONOSACCHARIDE, and NUCLEOTIDE.
  - Instruct students to add the four cards to the other set of cards they have sequenced. This part will be more challenging. Chromosomes are smaller than the nucleus, but most molecules will be larger than enzymes, which are proteins. A chromosome is made up of BOTH nucleic acid and a histone protein. A nucleotide contains a monosaccharide, phosphate group, and a nitrogen base. The monosaccharide should be the smallest of all.
  - When students have finished, discuss correct answers, and again have them make any necessary corrections.
  - Have students define all words that have not been presented previously. (See important terms.)

### **Extensions & Modifications:**

- Students could make a diagram of the human body and illustrate each of the words on the index cards in their diagram with the appropriate sizes, showing where each would be found. You may include a targeted, “zoomed in” section on the diagram that allows students to get to the components in a cell
- For more advanced students, skip Step 7 and instead have them come up with five to six related concepts and terms from previous units they have already studied.
- For lower level students, skip Steps 7 through 9.

Important terms: DNA, genome, chromosome, gene, nucleic acid, nucleotide

### **Writing Prompts/Potential Discussion Questions:**

- The major differences between you and someone else can be attributed to your DNA. However, twins have identical DNA yet do not always exhibit the same behavior and skills. Why?
- When you were first conceived, you were made up of only one cell with only one copy of the DNA that make you who you are today. However, today you are made up of millions of cells, most of which contain copies of your DNA, the same DNA in that first cell. Talk about some things that had to happen to the original cell and DNA molecules from the moment of conception until present day. (Ex: growth, division)
- The DNA that makes you who you are was passed to you by your parents. Discuss some ideas about why you and your brothers and sisters are not identical although you may have the same parents.
- Were there any traits of your partner’s that you had never noticed before? Any of your own traits that you had never noticed before?

### **Additional Resources:**

DNA from the Beginning

<http://www.dnafb.org/dnafb/>

A wonderful educational website containing basic information on DNA and genetics. Contains video clips, animations, and great links.

Textbook — Biology: The Dynamics of Life. Glencoe, 2002

### **National Standards Addressed:**

Standard C – The Molecular Basis of Heredity

In all organisms, the instructions for specifying the characteristics of the organisms are carried in the DNA.