What's a Genome, Anyway?

A genome is the name for all the DNA and genes in a cell. Every kind of plant and animal has a different genome. There's a chicken genome, a celery genome, and, of course, a human genome. To understand the genome, scientists need to unlock the secrets of DNA.

During the 1950s, scientists James Watson and Francis Crick discovered that DNA is shaped like a twisted ladder, made of four chemicals called bases. These bases are identified by the letters \textsc{a}, \textsc{t}, \textsc{c}, and \textsc{g}. Most genes, which are sections of DNA, are made of at least 1,000 of these base pairs.

The entire human genome is made of more than 3 billion base pairs.

If each A, T, C, and G were a letter or number in a phone book, they would fill 140 big city phone books, which is as tall as a 40-foot building.
All the DNA in a cell is called a genome. Your body contains trillions of copies of the human genome -- one in each of your trillions of cells. A genome contains all the genes that tell the cells how to grow. In fact, all animals, plants, viruses, and bacteria have a genome. However, the genomes' sizes and structures vary among different living creatures.

Saying "deoxyribonucleic acid" is a real mouthful. Luckily, you can call it DNA for short. DNA is found in all living things, including YOU! DNA is in every cell of your body and is shaped like a long, twisted ladder. The steps of this "ladder" are made of only four building blocks, called bases. These bases are known by the letters A, C, G, and T.

What is the Human Genome Project?

The goal of the Human Genome Project is to determine the order of the base pairs in the entire human genome. Remember, there are more than 3 billion base pairs.

Because DNA is super long, thousands of scientists in labs all over the world split up the work. In June of 2000, after about ten years of hard work, scientists completed a rough draft of the human genome. And, in February 2001, they discovered that humans have 30,000 genes.
The work isn't over yet! . . .

Many scientists have joined forces on the Human Genome Project. Their goal is to figure out the order of all "DNA letters" (bases) in our genome. Since the human genome is more than 3 billion "letters" long, this is an insanely huge job! By learning about our genome, scientists will better understand how our bodies work and how diseases develop.

DNA is shaped like a long twisted ladder, and pairs of bases form the ladder's steps. Bases are known by the letters A, T, C, and G. It's the DNA alphabet soup! In DNA, bases only pair in two ways: T only pairs with A, and G only pairs with C. When a cell "reads" a long string of these letters (genes), it gets information on how to grow and develop.

What Does it Mean to Me?

**Toby:** Hi, I'm Toby. Joining us now is genome expert Georgia Dunston, who is the Acting Director of the National Human Genome Center at Howard University.

**Georgia:** Thanks, I'm glad to be here.
Toby: So, Georgia, nobody sequenced my DNA for the Human Genome Project. Does this mean that our genomes are exactly the same?

Georgia: No. Unless you are an identical twin, you have a unique genome. But even so, humans are 99.9% the same genetically. Since we're all so alike, information from even one human genome relates to all of us. Your friends may have different color skin or eyes, but you have thousands of more things in common.

Toby: How will the Human Genome Project affect kids' lives in the future?

Georgia: Our knowledge about the human genome will help us figure out what causes some diseases, such as cancer or diabetes. Sometimes, small changes in the gene sequence can mean the difference between health and illness.

By understanding our genes, we will be better able to diagnose and maybe even prevent many diseases in you, your kids, and your grandkids.

Toby: Wow! Thanks for stopping by.

Georgia: My pleasure. Remember, the most exciting discoveries are yet to come! So stay involved. We all need to be thinking about this-now and in the future.
1. What is a genome?

2. What is the goal of the Human Genome Project?

3. What is the main idea of this text?

4. According to Georgia, what can sometimes mean the difference between health and illness?

5. Why might the Human Genome Project be important to all people?

Support your answer with evidence from the text.