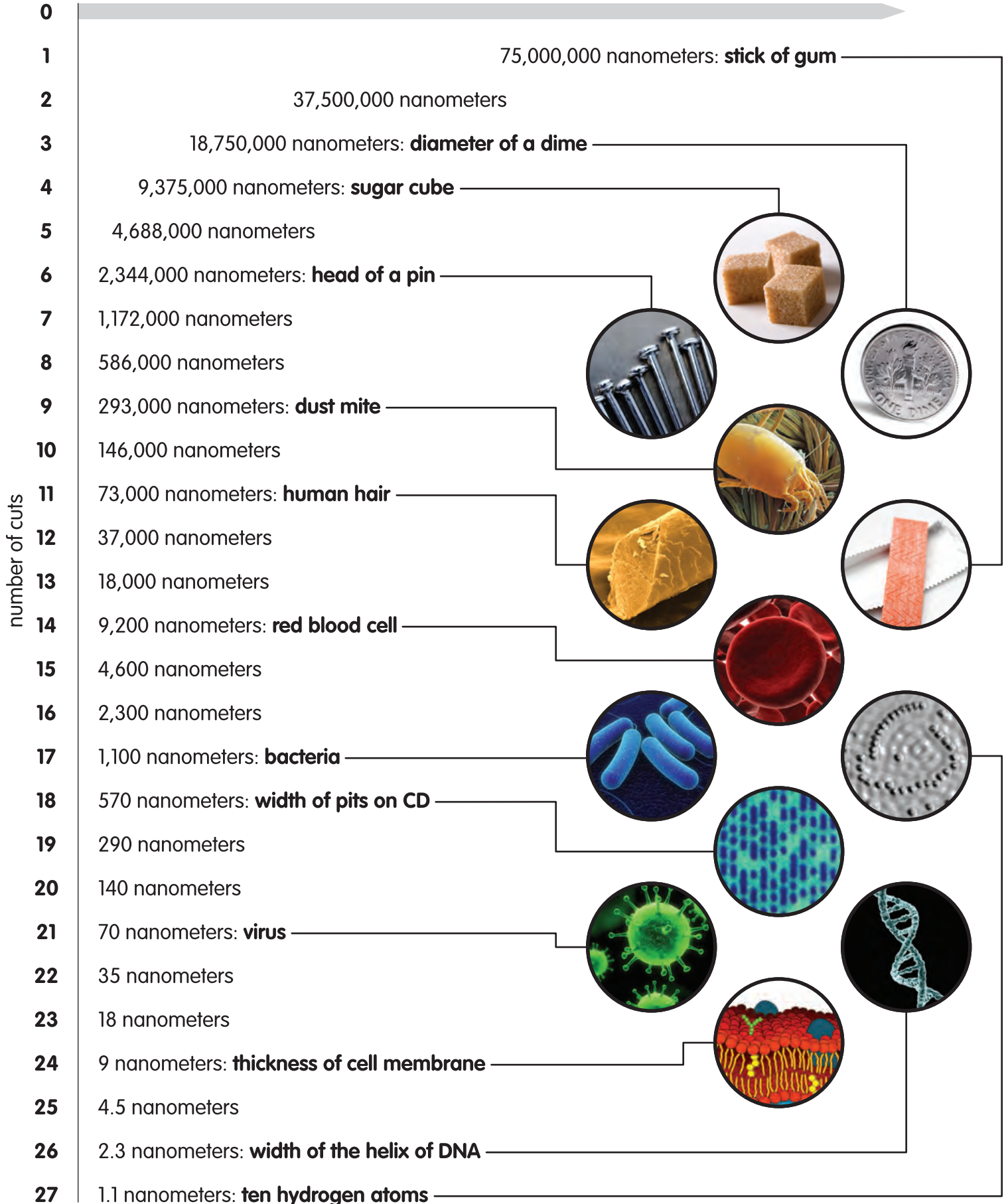


# CUTTING IT DOWN TO NANO

Cut paper strips in half. Tape onto worksheet. Repeat.

150,000,000 nanometers: **pencil**



### **What is a nanometer?**

A nanometer is one billionth of a meter ( $10^{-9}$  meters). This means that if you took a meter stick and cut it into one billion (1,000,000,000) equal pieces, each piece would be one nanometer wide. That's so small that a human hair is about 73,000 nanometers wide. Or, to think of it another way, a nanometer is to the size of a softball as the softball is to the size of the earth.

### **What is nanotechnology?**

Nanoscience is the study and manipulation of materials on the scale of a few to a few hundred nanometers (the "nanoscale"). Nanotechnology involves putting this into use to improve devices and products.

Nanoscale materials can have very different properties than at a larger scale - for example, nanoscale particles of gold actually appear red - and these unique properties can allow them to be used in new and special ways. Scientists have already used nanotechnology to develop stain-resistant pants, self-cleaning windows, and incredibly small computer parts.

### **What is the purpose of this activity?**

We know that a nanometer is really tiny (or really, really, REALLY tiny), but it's still hard to imagine just how small one billionth of a meter is. A nanometer isn't just tiny in the way that a grain of sand or a speck of dust is tiny - it's thousands of times smaller than that.

Look at the curve of your cut pieces of paper on the other side. Notice how much farther that curve extends before you could have a piece of paper that's one nanometer big. This can start to give you an idea of just how incredibly small the size scale that we're talking about is.

You may have also noticed how difficult it was to cut your piece of paper as it got smaller and smaller. The scissors, and our hands, are so big that they make extremely poor tools for cutting such a tiny piece of paper. Likewise, most traditional scientific tools are too big or lack the precision to be useful at the nanoscale. That's why scientists who work in nanotechnology have to use special tools to look at and manipulate materials that are just a few nanometers in size.

### **Where can I get more information?**

You can find lots more information about the nanoscale and nanotechnology at the "Exploring the Nanoworld" Web site, <http://www.mrsec.wisc.edu/Edetc/> .

