



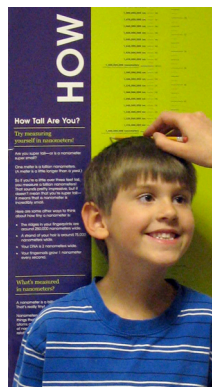
# Exploring Measurement—Human Body

## Try this!

1. Mark your height on the wall chart.
2. How tall are you in nanometers?
3. Are you super tall? Or is a nanometer super small?

## Then try this!

1. Trace your hand on a worksheet.
2. How many nanometers long is it?
3. Is your hand really big? Or is a nanometer really tiny?



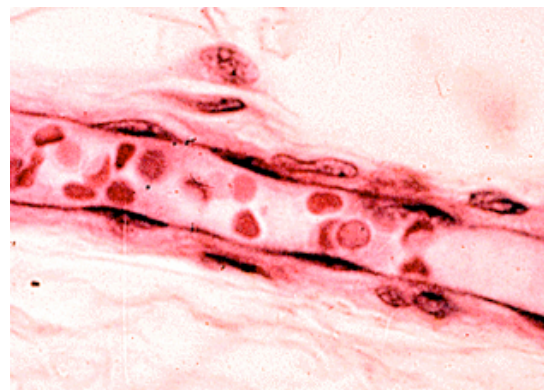
## What's going on?

One meter is a billion nanometers. (A meter is a little longer than a yard.)

So a kid who is a little over three feet tall measures one billion nanometers! Saying that you're a billion nanometers tall sounds pretty impressive, but it doesn't mean that you're super tall—it means that a nanometer is super small.

Here are some other ways to think about how small a nanometer is:

- The ridges in your fingerprints are around 250,000 nanometers wide.
- A strand of your hair is around 75,000 nanometers wide.
- One red blood cell is around 7,000 nanometers wide.
- Your DNA is two nanometers wide.
- Your fingernails grow one nanometer every second.



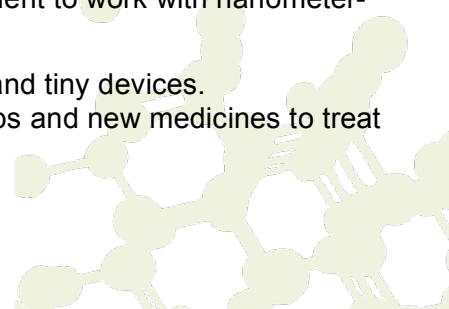
Red blood cells in a human blood vessel

## How is this nano?

**A nanometer is a billionth of a meter.** That's really tiny! Nanometers are used to measure things that are too small to see. It takes a lot of nanometers to measure something relatively big, like you or your hand.

Nanoscale science focuses on things that are measured in nanometers, including atoms and molecules, the basic building blocks of our world. Scientists use special tools and equipment to work with nanometer-sized things. Regular tools like rulers are too big!

In the field of nanotechnology, scientists and engineers make new materials and tiny devices. Nanotechnology allows them to make things like smaller, faster computer chips and new medicines to treat diseases like cancer.



## Learning objective

A nanometer is a billionth of a meter.

## Materials

- “How Tall Are You?” height chart
- “How Big Is Your Hand?” worksheets
- Photocopy master for worksheets
- Pencils
- Masking tape

The height chart and worksheet can be downloaded from [www.nisenet.org/catalog/programs/exploring-measurement-human-body](http://www.nisenet.org/catalog/programs/exploring-measurement-human-body). The height chart requires a large format printer. The worksheets print on regular office paper.

## Notes to the presenter

Before beginning this activity, tape the height chart to a wall. Make sure you choose a location where visitors can easily stand in front of it to measure themselves. The bottom of the chart should touch the floor. (If you're using the two-piece height chart included in the NanoDays kit, you'll need to join the two parts of the height chart together before you tape it to the wall.)

To measure their hands, visitors should place the heel of their palm at the “0 nanometers” line of the worksheet. (See the picture in the instructions.)

If you print the height chart or worksheet from the digital file, be sure you don't allow page scaling.

## Related educational resources

The NISE Network online catalog ([www.nisenet.org/catalog](http://www.nisenet.org/catalog)) contains additional resources to introduce visitors to the nanoscale and nanometers:

- Public programs include *Cutting it Down to Nano* and *Sizing Things Down*.
- Media include the poster *Everything is Made of Atoms*, the poster and book *How Small is Nano?*, *Multimedia Zoom into a Human Hand*, and *Scale Ladder*.
- Exhibits include *At the Nanoscale*.

## Credits and rights

This activity was adapted from “How Many Nanometers Tall Are You?” from *It's a Nano World*, a traveling exhibition was funded by the National Science Foundation and developed by the Sciencenter in Ithaca, NY, the Nanobiotechnology Center at Cornell University, and Painted Universe Inc.

Photo of human blood vessel courtesy Roger Wagner, University of Delaware.



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