



Mystery Shapes

Can you see by feeling?

Try this!



Without looking inside, put your hand in the bag. What do you feel?

Draw a picture of what you think is inside the bag.



Now, take the mystery object out of the bag and compare it to your picture. What information does your drawing include? What's missing?

Nano scientists use special tools and equipment. Some of these tools work by “feeling” things that are too small to see, and then making a picture of them—like you just did!

What’s going on?

When you feel a mystery object in the bag and draw a picture of what it looks like, you’re modeling the way that a special tool called a *scanning probe microscope* (SPM) works. Your hand acts like the sensing part of the SPM, while your brain acts like the computer program that creates a picture of what the tool “feels.”

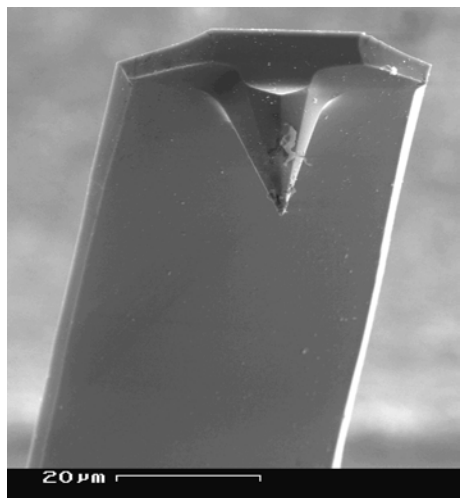
SPMs are very powerful. Some of them can detect and make images of individual atoms! But they still can’t capture every detail about nano-sized objects. Researchers use other tools to learn things that SPMs can’t detect.

Similarly, your fingers can tell a lot—but not everything—about the mystery shapes. When you pulled the object of the bag and looked at it, you probably were able to gather more information about it, such as its color.



Researcher using an SPM

How is this nano?



The tip of an SPM

Scanning probe microscopes (SPMs) allow researchers to detect and make images of objects measured in nanometers—or even smaller. (A nanometer is a billionth of a meter.)

The invention of SPMs was a great breakthrough in the field of nanotechnology. Once scientists could make pictures of things as small as individual atoms, they could begin to manipulate and study things at this super-tiny scale!