

## Microscopy & Scale

**Objective:** Students will observe organisms under three different magnifications and then draw the organisms to scale (in relation to one another) in a one-meter box.

**National Science Education Standards:** Life Science Standards, Levels K-4, Characteristics of organisms; Life Science Standards, Levels 5-8, Diversity of organisms

**NYS MST Learning Standards:** Standard 4.1, Living things are both similar to and different from each other and nonliving things. Standard 5, The grouping of magnitudes of size, time, frequency, and pressures or other units of measurement into a series of relative orders provides a useful way to deal with the immense range and the changes in scale that affect the behavior and design of systems.

**Materials:** microscopes (preferably 4), 1 human hair slide, 1 red blood cell microscope slide, 1 E. coli slide, 1 vaccina virus slide, sidewalk chalk, meter stick, metric rulers

**Variation of materials:** You can purchase dry erase board from a lumber store and cut it to 1 meter x 1 meter. Then, use dry erase markers instead of chalk to draw the organisms.

**Check for prior learning:** Which organism is biggest: hair, red blood cell, virus, or bacterium? Which is smallest?

### **New learning:**

Students look at the human hair, red blood cell, E. coli, and vaccina virus under the microscope at various magnifications. Students are encouraged to adjust the settings on the microscope using proper procedure.

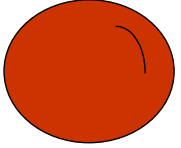
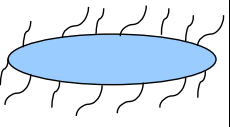
After looking at the organisms, students stand on a one-meter square box on the sidewalk (or dry erase board). The box represents the width of a human hair, and students imagine that they are standing on the hair. Students draw each organism to scale in the box and label it.

### **Check for learning:**

Students complete their drawings. If anything is represented inaccurately, students redraw to correct the mistake.

### **Extension:**

If we shrink the hair down to 10 centimeters, what is the size of each organism in relation to the hair? [blood cell = 1 mm; E. coli = 200 micrometers; virus = 2 micrometers]

<b>ORGANISM</b>	<b>EFFECT ON THE BODY</b>	<b>ACTUAL SIZE</b>	<b>MODEL SIZE</b>	<b>SHAPE</b>
<b>human red blood cell</b>	carries oxygen	10.0um (0.01 mm)	10 cm	
<b>E. coli</b>	causes diseases and helps digestion	2.0 um (0.002 mm)	2 cm	
<b>vaccina virus</b>	cowpox	200 nm (0.20 um) (0.0002 mm)	2 mm	