



Inferring Density

RECAST ACTIVITY

Show the students two large cylinders of the same volume, but different materials such that they have dramatically different masses, for instance, aluminum and copper. Say,

“Here I have two cylinders. What do you notice about them?”

Make sure students notice that the objects are the same size and shape, so the cylinders therefore have the same volume. Then hand the cylinders to a student and ask, “What do you notice?” *[Most students are surprised by the difference in mass.]*

Pass the cylinders around so all of the students get to hold them. Notice how much their arms drop with the mass of the copper one and whether their other arm (with the aluminum cylinder) goes up.

Ask the students to think about what is going on and to draw a diagram or model that explains how two objects that take up the same amount of space can have such different weights. They should think about what they might see if they could zoom in microscopically to compare each material. Circulate while they are drawing and talk with students about their ideas. If students use the word “density,” ask them what they think it means.



PREPARATION

Materials

- Equal-sized aluminum and copper cylinders (at least four inches tall and two inches in diameter)
- Journals or individual white boards or paper
- Markers

Prep Steps

1. Gather materials.

RECAST ACTIVITY ANALYSIS

What makes this work as a RECAST activity?

Students typically focus on perceptible characteristics and quantities that can be directly measured. Density must be inferred by the relationship between mass and volume and cannot be directly measured. By controlling for one variable, it helps to make the other variable more obvious. Further, when reasoning about changes in density, students often focus on changes to one variable or the other. They focus on the weight (mass) or the volume, but don't hold both in their heads to reason about the relationship between them. This activity helps students develop mental models of density.