Measurement

The National Council of Teachers of Mathematics (NCTM) recommends (and researchers concur) that a hands-on approach is necessary for teaching measurement.

It is unlikely that children can gain a deep understanding of measurement without handling materials, making comparisons physically, and measuring with tools (NCTM, 2000, p. 43).

In *Houghton Mifflin Math*, students learn about measurement by making measurements, not just by reading about them. Here are just a few examples. In kindergarten, students learn about capacity by estimating and then measuring the number of cups of beans needed to fill a mug, a box, a soup can, and a bowl. In grade 3, students are estimating whether objects weigh more or less than a pound and then using a balance scale to check. In grade 5, students are using rulers to measure to the nearest half inch.
NCTM also recommends that “measurement concepts should grow in sophistication and breadth across the grades and that instructional programs should not repeat the same curriculum year after year” (NCTM, 2000, p. 43).

To see how measurement concepts in *Houghton Mifflin Math* are developed throughout the grades, consider the concept of volume. The approach is systematic and builds on the use of concrete materials. It reflects the findings of the National Research Council.

Understanding the development of volume formulas provides an additional challenge since students must now grasp 3D concepts. However, it is helpful to build an understanding of volume as the product of area and height (NRC, 2001).

In grade 3, students explore volume by estimating and then counting the number of cubes needed to fill a box. By grade 4, students are using a standard unit of measurement for volume. In grade 5, the formula for the volume of prisms is derived by having students count the number of cubes in one layer (to get the area of the base) and then multiplying by the number of layers (the height). In grade 6, students’ use of volume formulas extends to cylinders, pyramids, and cones.

Another recommendation of NCTM concerns the teaching of both customary and metric units. NCTM (2000) advises that “students should learn both the customary and metric systems and should know some rough equivalence between the metric and customary systems.” *Houghton Mifflin Math* provides opportunities for students to make approximate conversions.