

## The Metric System

A Position of the National Council of Teachers of Mathematics

### Question

What should schools teach about the metric system?

### NCTM Position

Students need to develop an understanding of metric units and their relationships, as well as fluency in applying the metric system to real-world situations. Because some non-metric units of measure are common in particular contexts, students need to develop familiarity with multiple systems of measure, including metric and customary systems and their relationships.

The International System of Units (SI) is the internationally recognized standard metric system. Almost all countries have adapted SI, although some have retained elements of their non-metric units of measure for use in everyday life. Understanding relationships between SI and customary systems of measure is important to students, who must be able to communicate in a technology-rich world and work in a global economy. In particular, SI is the predominant measurement system in science and prevalent in commerce (Thompson & Taylor, 2008). To participate in integrated science, technology, engineering, and mathematics (STEM) fields, students need to be fluent in applying the metric system.

NCTM Standards, the Common Core State Standards for Mathematics, and the Next Generation Science Standards all describe the need to organize curriculum to ensure that students become proficient in measurement. Students should gradually develop fundamental ideas of measurement that lead to understanding SI and customary systems as two examples of systems of measure. Students first need to develop a concept of the attribute to be measured (e.g., length, mass, volume, time, temperature) by comparing and ordering objects solely on the basis of that attribute. Then they should devise and apply nonstandard units to compare and order objects indirectly on the basis of the attribute. Finally, they should be introduced to standard units of measure (both SI units and non-metric units of measure customarily used in the United States) and systems of measure.

Within the study of a system of measure, learning goals for students should include knowledge of and ability to use referents, or benchmarks, in estimation. Students should select appropriate units for a given task and make reasonably accurate measurements by using standard tools. They should reason proportionally to develop relationships between units in different systems and convert flexibly and fluently among commonly used units within a measurement system.

Students should experience the usefulness of systems of measure for meaningful communication and develop an appreciation for their value. Standard systems of measure allow reliability—repeated measures of an object's attribute within one system yield consistent results. Two or more people who use the same system of units can share a common understanding of measures of an object's attributes, regardless of whether the people are in the same location as the object or as one another. These features allow for shared discoveries and meaningful communication in STEM fields.

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