

**Southwest Center for Microsystems Education (SCME)
University of New Mexico**

Units of Weights and Measures Learning Module

This booklet contains five (5) units:

Knowledge Probe (Pre-Quiz)
Units of Weights and Measures Primary Knowledge (PK)
Research Activity
Conversion Activity
Assessment

This learning module provides information on the evolution of the current systems of weights and measures, and an overview of the International Standards of Units and metric system. Activities provide the opportunity to learn and practice converting from one unit of measure to another. This information and skill is needed to understand MEMS – how they work, how they are made, and how they are designed.

Target audiences: High School, Community College, University

Made possible through grants from the National Science Foundation Department of Undergraduate Education #0830384, 0902411, and 1205138.

Any opinions, findings and conclusions or recommendations expressed in this material are those of the authors and creators, and do not necessarily reflect the views of the National Science Foundation.

Southwest Center for Microsystems Education (SCME) NSF ATE Center
© 2009 Regents of the University of New Mexico

Content is protected by the CC Attribution Non-Commercial Share Alike license.

Website: www.scme-nm.org

Units of Weights and Measures

Knowledge Probe (Pre-Quiz)

Participant Guide

Introduction

This learning module provides information on the evolution of the current systems of weights and measures, and an overview of the International Standards of Units and metric system. Activities provide the opportunity to learn and practice converting from one unit of measure to another. This information and skill is needed to understand MEMS – how they work, how they are made, and how they are designed.

The purpose of this knowledge probe is to determine your current knowledge of weights and measures history, the content of the International Standards of Units, and your ability to convert from one unit of measurement to another.

Answer the following 15 questions to the best of your knowledge.

1. In what country is it believed that the first units of weights and measures were standardized?
 - a. Egypt
 - b. England
 - c. France
 - d. Italy
 - e. United States
2. Which of the following measurement systems is the International Standard of Units?
 - a. English system
 - b. Metric system
 - c. Roman system
 - d. British system
3. How many base units are in the International Standard of Units (SI)?
 - a. 14
 - b. 10
 - c. 7
 - d. 5

4. Which of the following BEST describes one of the first standardized units – the cubit?
The length of an average...
- person's arm from elbow to the outstretched fingertips
 - person's thigh from the hip joint to the front of the knee
 - person's single stride
 - work horse's face from the tip of the nose to the crown of the head
5. What was one of the main factors that influenced the standardization of units?
- Population growth
 - Increase in commerce and trade
 - The fall of the Roman empire
 - World War I
6. When was the original metric system developed?
- 1910's
 - 1940's
 - 1870's
 - 1790's
7. Which of the following industrial countries has NOT adopted the metric system as its standard measurement system?
- Germany
 - England
 - United States
 - China
8. Which of the following is NOT one of the seven fundamental units of the SI?
- Meter
 - ampere
 - Second
 - Centigrade
9. The metric system is the standard unit of measure for science and technology. Which of the following micro-sized devices would use the metric unit $\mu\text{liters/sec}$?
- Thickness of gold thin film on a micro-sensor
 - Output of an inkjet printer nozzle
 - Tensile strength of a micro-spring
 - Resonance of an oscillating microcantilever
10. Micro is _____ and nano is _____.
- 10^3 , 10^{-6}
 - 10^{-3} , 10^{-6}
 - 10^{-6} , 10^{-9}
 - 10^{-6} , 10^{-12}

11. How many meters is 6.5 feet? (Hint: 1 in = 2.54 cm)
- a. 1.73 meters
 - b. 1.98 meters
 - c. 2.27 meters
 - d. 2.43 meters
12. How many ounces in 32 kg? (Hint: 1 lb = 0.453 kg)
- a. 1130 ounces
 - b. 466 ounces
 - c. 232 ounces
 - d. 7.25 ounces
13. How many kg in 1200 grams?
- a. 1,200,000 kg
 - b. 120 kg
 - c. 1.2 kg
 - d. 0.12 kg
14. How many millimeters (mm) in 0.05 km?
- a. 0.00005 mm
 - b. 50 mm
 - c. 5,000 mm
 - d. 50,000 mm
15. How many micrometers (μm) in 10,700 nanometers (nm)?
- a. 0.0107 μm
 - b. 1.07 μm
 - c. 10.7 μm
 - d. 10,700,000 μm

Support for this work was provided by the National Science Foundation's Advanced Technological Education (ATE) Program through Grants. For more learning modules related to microtechnology, visit the SCME website (<http://scme-nm.org>).