4-1980

Metric Units of Measure- Part I *Length, Area and Volume*

Elbert C. Dickey
University of Nebraska - Lincoln, edickey1@unl.edu

Allen R. Rider
University of Nebraska - Lincoln

Gerald R. Bodman
University of Nebraska - Lincoln

NebGuide

PUBLISHED BY COOPERATIVE EXTENSION SERVICE
INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES,
UNIVERSITY OF NEBRASKA - LINCOLN

TEACHING RESEARCH EXTENSION

G 79-468

Metric Units of Measure — Part I
Length, Area and Volume

Elbert C. Dickey, Extension Engineer (Conservation)
Allen R. Rider, Extension Engineer (Power Machinery)
Gerald R. Bodman, Extension Engineer (Livestock Systems)

The metric system was developed by government and scientific groups in 1790 to replace a host of diverse measuring systems used throughout France. By the early 1900's it had been adopted by most European and Latin American nations. By 1970 over 90 percent of the world, including all major industrial nations except the United States, had either adopted the metric system or had undertaken programs to implement it.

Use of the decimal-based metric system was made legal in the United States by Congress in 1866. Although some scientists and educators readily adopted the metric system, little acceptance was made by commerce or by the general public. After more than 100 years of debate and indecision by Congress, implementation of the metric system in the United States has begun. On December 23, 1975, President Gerald Ford signed the Metric Conversion Act, which is Public Law 94-168. This Law declared a national policy of coordinating the increasing use of the metric system in the United States and established a 17-member U.S. Metric Board to assist in the voluntary conversion of the metric system.

The Metric System

The metric system relates the measurements of length, area, volume and mass into a decimalized system. Additions and other numerical operations are simplified. In the U.S. customary system, numerical computations frequently require complicated conversions in length, weight or volume such as inches to feet, ounces to pounds and fluid ounces to gallons. However, except for moving the decimal, no conversion from unit to unit is required with the metric system.

Metric units for any given physical quantity relate to one another in multiples of 10 as does our monetary system. Prefixes are used to designate the amount of multiplication. Commonly used prefixes include kilo (1000), centi (0.01) and milli (0.001). The following example illustrates how the metric units for length relate to each other much as do parts of our monetary system.

meter = 1 m	dollar = $1.00
decimeter = 0.1 m	dime = $0.10
centimeter = 0.01 m	cent = $0.01
millimeter = 0.001 m	mill = $0.001

The basic metric units used in everyday measurement applications are length, area and volume. The relationships between the metric and U.S. customary system for these units are described and illustrated graphically in the following text.

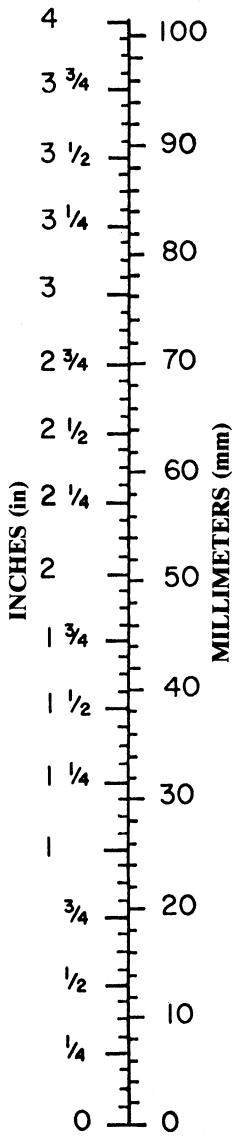
Length — The common metric units of length are the millimeter, centimeter, meter and kilometer. Rainfall, bolt sizes and other small dimensions are commonly expressed as millimeters. The centimeter is used for body dimensions and clothing sizes. Building perimeters, truck lengths and other similar sized objects are measured in meters. Distances between cities and towns are expressed as kilometers.

Area — The common metric measurements for area are square centimeter, square meter and hectare (10,000 square meters). Areas of glass panes are measured in square centimeters. Building and floor areas are measured in square meters. Farm land is expressed in hectares.

Volume — The common metric units of volume are cubic centimeter and cubic meter. Small engine displacements and liquid medicines are expressed as cubic centimeters. Larger volumes used in earthmoving, ventilation and commerce are measured in cubic meters.

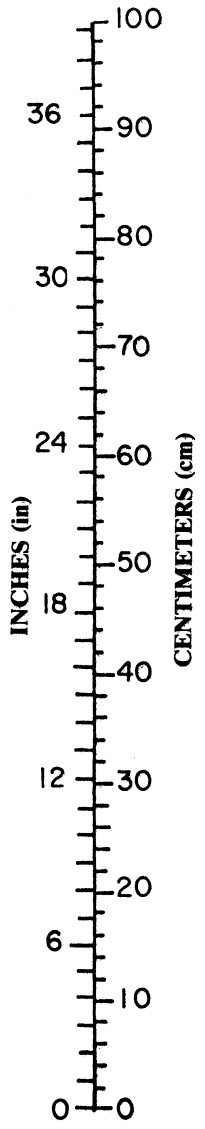
Length

1 inch = 25.4 millimeters



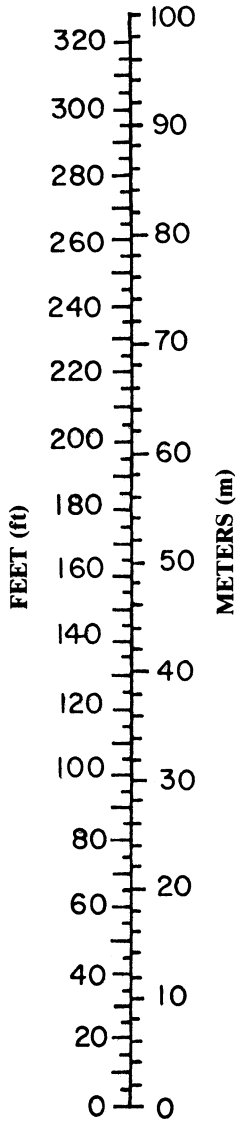
10 millimeters = 0.394 inch

1 inch = 2.54 centimeters



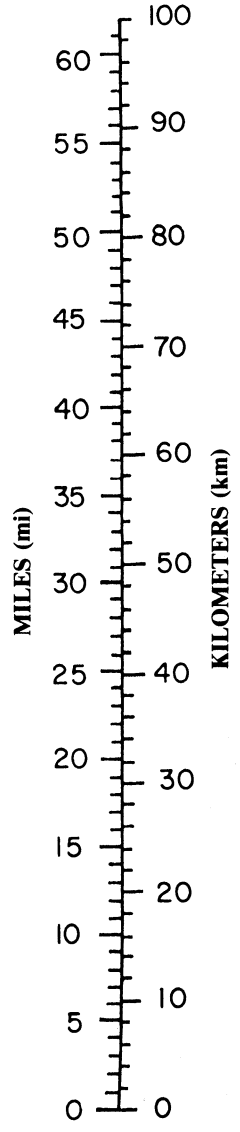
1 centimeter = 0.394 inch

1 foot = 0.305 meter



1 meter = 3.28 feet

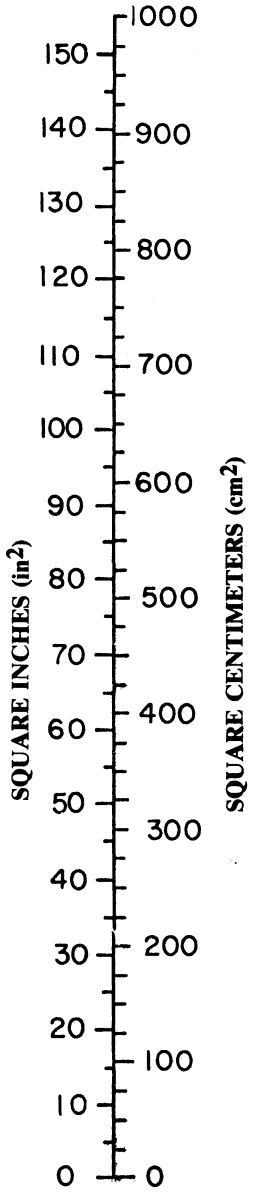
1 mile = 1.61 kilometers



1 kilometer = 0.621 mile

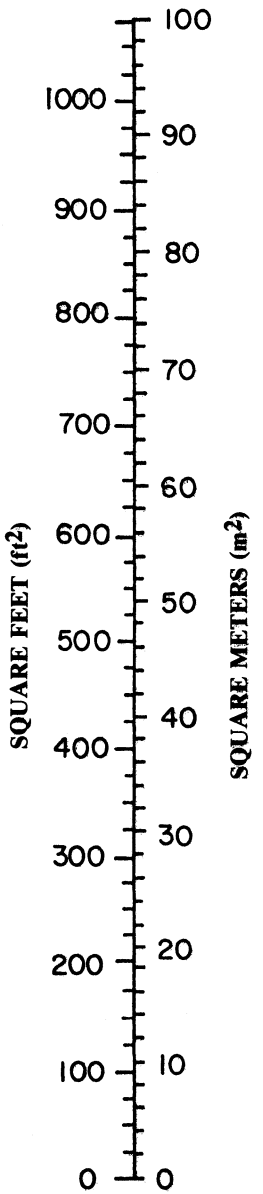
Area

1 square inch = 6.45 square centimeters



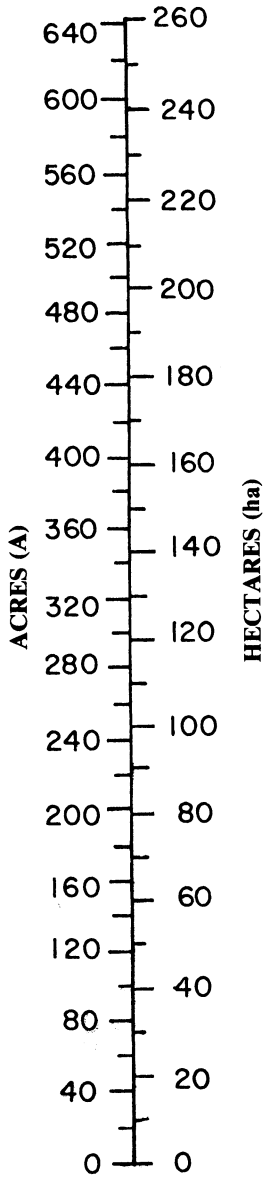
1 square centimeter = 0.155 square inch

1 square foot = 0.093 square meter



1 square meter = 10.8 square feet

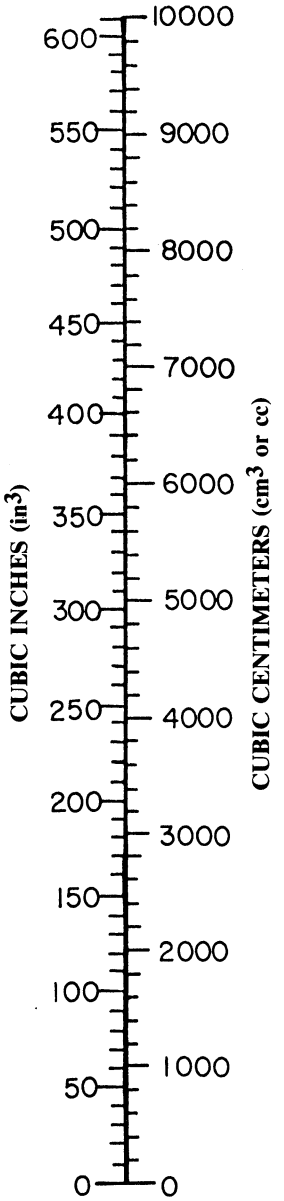
1 acre = 0.405 hectare



1 hectare = 2.47 acres

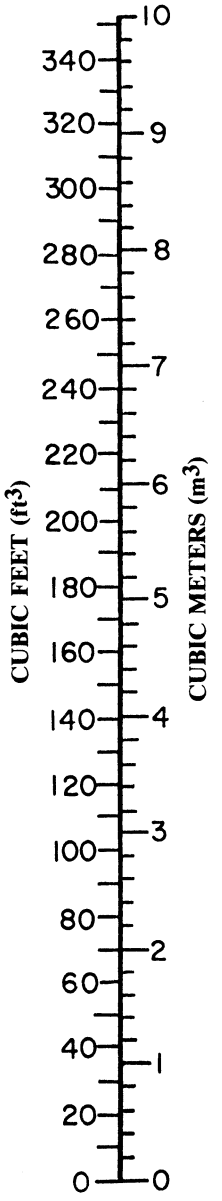
Volume

1 cubic inch = 16.4 cubic centimeters



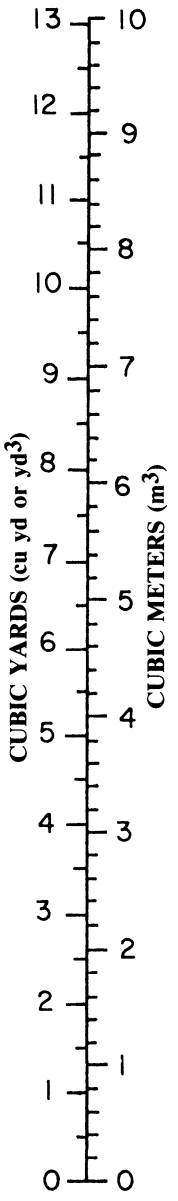
10 cubic centimeters = 0.61 cubic inch

1 cubic foot = 0.028 cubic meter



1 cubic meter = 35.3 cubic feet

1 cubic yard = 0.765 cubic meter



1 cubic meter = 1.31 cubic yards

Extension work in "Agriculture, Home Economics and subjects relating thereto," The Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Cooperating with the Counties and the U.S. Department of Agriculture
Leo E. Lucas, Director

File Under: GENERAL AGRICULTURE
B-4, Public Policy
Issued April 1980, 15,000