Units of Measure

Phil B. Fontanarosa and Stacy Christiansen

Print Publication Year: 2007 Published Online: 2009
ISBN: 9780195176339 eISBN: 9780195382846
Item type: chapter
Publisher: Oxford University Press
DOI: 10.1093/jama/9780195176339.003.0018

The presentation of quantitative scientific information is an integral component of biomedical publication. Accurate communication of scientific knowledge and presentation of numerical data require a scientifically informative system for reporting units of measure. The International System of Units (Le Système International d'Unités or SI) represents a modified version of the metric system that has been established by international agreement and currently is the official measurement system of most nations of the world.1 The SI promotes uniformity of quantities and units, minimizes the number of units and multiples used in other measurement systems, and can express virtually any measurement in science, medicine, industry, and commerce. In 1977, the World Health Organization recommended the adoption of the SI by the international scientific community. Since then, many biomedical publications throughout the world have adopted SI units as their preferred and primary method for reporting scientific measurements...

SI Units

Phil B. Fontanarosa and Stacy Christiansen

Print Publication Year: 2007 Published Online: 2009
ISBN: eISBN:
Item type: section
Publisher: Oxford University Press
DOI: 10.1093/jama/9780195176339.021.256

The International System of Units (Le Système International d'Unités or SI) represents a modified version of the metric system that has been established by international agreement and currently is the official measurement system of most nations of the world. The SI promotes uniformity of quantities and units, minimizes the number of units and multiples used in other measurement systems, and can express virtually any measurement in science, medicine, industry, and commerce. In 1977, the World Health Organization recommended the adoption of the SI by the international scientific community. Since then, many biomedical publications throughout the world have adopted SI units

Expressing Unit Names and Symbols

Phil B. Fontanarosa and Stacy Christiansen

Print Publication Year: 2007 Published Online: 2009
ISBN: eISBN:
Item type: section
Publisher: Oxford University Press
DOI: 10.1093/jama/9780195176339.021.257

The SI includes conventions for expressing unit names and abbreviations (often referred to as symbols) and for displaying them in text. | The SI unit names are written lowercase (eg, kilogram) when spelled out, except for Celsius (as in “degrees Celsius”), which is capitalized. Abbreviations or symbols for SI units also are written lowercase, with the following exceptions: # Abbreviations derived from a proper name should be capitalized (eg, N for newton, K for kelvin, A for ampere), although nonabbreviated SI unit names derived from a proper name are not capitalized (eg, newtons, amperes). # An uppercase letter L is

Format, Style, and Punctuation

Phil B. Fontanarosa and Stacy Christiansen

Print Publication Year: 2007 Published Online: 2009
ISBN: eISBN:
Item type: section
Publisher: Oxford University Press
DOI: 10.1093/jama/9780195176339.021.258

The format, style, and punctuation guidelines generally apply for SI reporting but also are used for reporting most values in conventional units. | SI reporting style uses exponents rather than certain abbreviations, such as cu and sq. | The same symbol is used for single and multiple quantities. Unit symbols are not expressed in the plural form. | Units of measure are treated as collective singular (not plural) nouns and require a singular verb.To control the patient’s fever, 500 mg of acetaminophen was [not were] administered at the time of admission and 1000 mg was required 4 hours later. |

Conventional Units and SI Units in JAMA and the Archives Journals

Phil B. Fontanarosa and Stacy Christiansen

Print Publication Year: 2007 Published Online: 2009
ISBN: eISBN:
Item type: section
Publisher: Oxford University Press
DOI: 10.1093/jama/9780195176339.021.260

In the United States, most physicians and other health care professionals use conventional units for most commonly encountered clinical measurements (eg, blood pressure), and most clinical laboratories report many laboratory values by means of conventional units. To serve these readers, but also to serve the needs of readers in countries where SI units are used, JAMA and the Archives Journals have adopted an approach for reporting units of measure that includes a combination of SI units and conventional units. | Measurements of length, area, volume, and mass are reported by means of metric units rather than English units (Table).

Base Units

Phil B. Fontanarosa and Stacy Christiansen

Print Publication Year: 2007 Published Online: 2009
ISBN: eISBN:
Item type: section
Publisher: Oxford University Press
DOI: 10.1093/jama/9780195176339.022.540

The SI is based on 7 fundamental units (base units) that refer to 7 basic quantities of measurement (see the tabulation below). These units form the structure from which other measurement quantities are composed. Although not included among the 7 base units, the liter is widely used in the SI as a fundamental measure of capacity or volume. The liter is the recommended unit for measurement of volume for liquids and gases, whereas the cubic meter is the SI unit of volume for solids. Although the kelvin is the SI unit for thermodynamic temperature, the degree Celsius is used with

Derived Units

Phil B. Fontanarosa and Stacy Christiansen

Print Publication Year: 2007 Published Online: 2009
ISBN: eISBN:
Item type: section
Publisher: Oxford University Press
DOI: 10.1093/jama/9780195176339.022.541

Other SI measurement quantities are referred to as derived units and are expressed as products or quotients of the 7 base units. Certain derived SI units have special names and symbols and may be used in algebraic relationships to express other derived units. See the following tabulation. |

Prefixes

Phil B. Fontanarosa and Stacy Christiansen

Print Publication Year: 2007 Published Online: 2009
ISBN: eISBN:
Item type: section
Publisher: Oxford University Press
DOI: 10.1093/jama/9780195176339.022.542

Prefixes are combined with base units and derived units to form multiples of SI units. The factors designated by prefixes are powers of 10, and most prefixes involve exponents that are simple multiples of 3, thereby facilitating conversion procedures using successive multiplications by 103 or 10-3. Compound prefixes formed by the combination of 2 or more SI prefixes generally are not used. It is preferable to use an expression with a single prefix. The kilogram is the only SI base unit with a prefix as part of its name and symbol (kg). However, because compound prefixes are not recommended, prefixes

Capitalization

Phil B. Fontanarosa and Stacy Christiansen

Print Publication Year: 2007 Published Online: 2009
ISBN: eISBN:
Publisher: Oxford University Press
DOI: 10.1093/jama/9780195176339.022.544

Item type: section

The SI unit names are written lowercase (eg, kilogram) when spelled out, except for Celsius (as in “degrees Celsius”), which is capitalized. Abbreviations or symbols for SI units also are written lowercase, with the following exceptions: # Abbreviations derived from a proper name should be capitalized (eg, N for newton, K for kelvin, A for ampere), although nonabbreviated SI unit names derived from a proper name are not capitalized (eg, newtons, amperes). # An uppercase letter L is used as the abbreviation for liter to avoid confusion with the lowercase letter l and the number 1. # Certain SI prefixes

Products and Quotients of Unit Symbols

Phil B. Fontanarosa and Stacy Christiansen

Print Publication Year: 2007 Published Online: 2009
ISBN: eISBN:
Item type: section
Publisher: Oxford University Press
DOI: 10.1093/jama/9780195176339.022.545

The product of 2 or more SI units should be indicated by a space between them or by a raised multiplication dot. The multiplication dot must be positioned properly to distinguish it from a decimal point, which is set on the baseline. (See , Mathematical Composition, Expressing Multiplication and Division.) When the unit of measure is the product of 2 or more units, either abbreviations (symbols) or nonabbreviated units should be used. Abbreviated and nonabbreviated forms should not be combined in products. When numerals are used to denote a quantity of measurement, it is preferable to use the abbreviated form