Writing Numbers in Technical Documents

Perhaps you think these comments are pedantic. Some may be. But scientific reports, written or spoken, should reflect the precision of the experiments. Numbers and values submitted to editors or presented at meetings are sometimes hardly better than "umpteen zillion" or "every so often."

—Vernon Booth
Communicating in Science

Physics is a quantitative science. Thus, numbers must be represented in a way that ensures a reader interprets them correctly. To make sure that we're all speaking the same quantitative language, rules have evolved about how numerical values are presented in writing.

Learn the rules, and hew to them witlessly.

Caveat lector! While these rules generally apply to papers published in the physical sciences, different disciplines may have different rules. The style guides for individual journals may also differ in their rules for expression of numbers.

Use this document as a general style guide, be consistent, and always strive to express numbers in way that avoids ambiguity.

Units of measure

a) 37 μm

b) 37-microns

c) 37 micrometers

d) 37 µm

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c) 37 micrometers

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Why the other answers are wrong:

a) Units of measure are never italicized. If you use LaTeX, be sure to take the document out of "math mode" before typing the abbreviation for the unit. Always italicize letters used as symbols to set them off from the surrounding text; never italicize the abbreviations for units.

b) Always abbreviate the unit after an exact number, and don't hyphenate the number and unit unless they are combined to form an adjective modifying a noun.

c) Always abbreviate the unit after an exact number.

Units of measure

a) .75 cm

b) 0.75 centimeters

c) 0.75 cm

d) .75 centimeters

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a) .75 cm

b) 0.75 centimeters

c) 0.75 cm

d) .75 centimeters

Why the other answers are wrong:

a) You must put a 0 before the decimal place in decimal numbers <1.

b) Abbreviate the unit when it is used with an exact number.

d) Both a) and b).

Ranges of numbers

a) pages 1495-8

b) −10–40 °C

c) 50-65 pN

d) 250 kJ–360 kJ

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a) pages 1495-8

b) −10–40 °C

c) 50-65 pN

d) 250 kJ–360 kJ

Why the other answers are wrong:

a) To avoid misunderstanding, include all numbers in the second number in a range.

b) Two things are wrong in this example: 1) Is the second number −40°C or +40°C? Use the words "to" or "through" instead of the en dash to avoid confusion. 2) No space between the number and the unit (°C)—one of the few exceptions to the "put a space between the number and its unit" rule.

d) Two things are wrong in this example: 1) Use an en dash, not a hyphen, to indicate a range of numbers. 2) Good practice to give the unit for both numbers in a range, as shown in d).

Hyphenation

a) 25-mm bead

b) 25 mm bead

c) The bead size was 25-mm.

d) 25-mm beads were used to tether to the protein.

Hyphenation

a) **25-mm bead**

b) **25 mm bead**

c) **The bead size was 25-mm.**

d) **25-mm beads were used to tether to the protein.**

Why the other answers are wrong:

b) Hyphenate the number and the unit when they combine to form an adjective modifying a noun.

c) In this case, "25 mm" is simply a number (the size of the bead), not an adjective, so no hyphen.

d) Do not begin a sentence with a number written in numerals. While we're on the subject, don't begin a sentence with an acronym or a symbol, either.

Great big numbers

a) 6 100 000

b) 6,100,000

c) 6.1M

d) ~6 Million

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a) 6 100 000

b) 6,100,000

c) 6.1M

d) ~6 Million

Why the other answers are wrong:

b) In scientific writing, use non-breaking spaces to separate multiples of three digits in large numbers, not commas.

d) Two things are wrong with this example. 1) Use the ≈ symbol to indicate "approximately equal to." 2) The word "million" should be abbreviated as "M."

Approximate numbers

a) tens of megavolts

b) 10's of megavolts

c) tens of MV

d) 10s of MV

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a) tens of megavolts

b) 10's of megavolts

c) tens of MV

d) 10s of MV

Why the other answers are wrong:

b) Do not use an apostrophe to make a number written in numerals plural (unless it's a single digit, e.g., 2's and 3's).

c) Write out the name of the unit when it is used with approximate numbers.

d) Ditto.

Temperatures

a) 77°K

b) 200 °C

c) 1200F

d) 135 K

Temperatures
a) 77°K
b) 200 °C
c) 1200F
d) 135 K

Why the other answers are wrong:

a) The kelvin is an absolute unit, not a scale, so no ° sign.

b) No space between the number and the unit for F and C scales.

c) Fahrenheit is a scale, so the ° sign must be used.

Fractions and *folds*

a) **twelvefold increase**

b) **6-fold increase**

c) **2 ½ inches**

d) **three-fourths**

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b) **6-fold increase**

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d) **three-fourths**

Why the other answers are wrong:

a) Write *–fold* numbers greater than *ninefold* in numerals, and place a hyphen between the number and *fold*, e.g., 12-fold increase.

b) Write *–fold* numbers less than *10-fold* in words, i.e., sixfold.

c) Several problems with this example. 1)Abbreviate the unit after an exact number. 2) Generallym, express numbers in *SI* units. 3) Write 2 ½ as 2.5.

Adjacent numbers

a) 30 15-µg tablets

b) 10 30min annealing treatments

c) ten 5-mm wires

d) thirty 10-penny nails

Adjacent numbers

a) **30 15-µg tablets**

b) **10 30min annealing treatments**

c) **ten 5-mm wires**

d) **thirty 10-penny nails**

Why the other answers are wrong:

a) Don't write two adjacent numbers in numerals.

b) In addition to the difficulty in interpreting the two adjacent numbers written as numerals, the omission of the hyphen between "30" and "min" makes this example really hard to interpret.

d) While not strictly incorrect, I think the phrase is easier to interpret if written as 30 ten-penny nails. The "ten" in "ten-penny" is less of a number and more of an adjective, and "thirty" is the result of the count.

Spacing

a) 40°F

b) 15kg

c) $100 k

d) 65 %

Spacing
a) **40°F**
b) **15kg**
c) **$100 k**
d) **65 %**

To review the rules, see
http://people.physics.illinois.edu/Celia/Lectures/Numbers.pdf

Why the other answers are wrong:

b) Put a nonbreaking space between a number and its unit in all but a very few cases.

c) When "k" is used informally to mean "thousands," do not put a space between the number and the "k"; it is less of a unit and more a part of the number in this case.

d) Another exception to the "space" rule; no space between a number and the per cent sign.

Review the rules at http://people.physics.illinois.edu/Celia/Lectures/Numbers.pdf.