

Quadrant II – Transcript and Related Materials

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Notes

Introduction

Scientific writing is a technical writing done by researchers to communicate their findings to the fellow researchers. Being a technical document, the author needs to follow certain rules of communication with regard to the style of writing numbers, use of standard units of measurement, use of appropriate abbreviations and mention of scientific nomenclature.

Numbers

Scientific notation

Sometimes numbers are too big or too small to be able to write conveniently in a number form. At such times scientific notations are used.

Scientific notation is a method of writing numbers by using exponents. 'Exponent' is a power to which a number or expression should be raised. Scientific notations are written as $a \times 10^n$ where, the value of 'a' lies between 1 to 10 and 'n' is the exponent value. If the number to be converted lies between 0 to 1, n is negative while if it is 10 or more, n is positive.

Therefore, using scientific notation, we write:

50,000 as 5×10^4

0.00006 as 6×10^{-5}

Scientific notation can be written only for positive numbers.

Significant numbers

Very large or very small numbers are not always written as exact numbers. They are usually rounded-off values.

Significant numbers are number of digits in a value that contributes to the degree of accuracy of the value. These are important as they reflect the precision of the test and sensitivity of the measuring device.

Rules for significant figures: there are a set of rules in order to write or read numbers, specially in a scientific communication where precision of the test is linked to significant numbers.

1. All non-zero numbers are significant. (e.g. the number 25.8 has 3 significant figures because all the digits are non-zero).
2. Zeros between two non-zero digits are significant- (e.g. 8.067 has 4 significant figures).
3. Zeros that precede a non-zero number are NOT significant- (e.g. The number 0.0083 has only 2 significant figures).
4. Zeroes at the end of the number that includes a decimal point are significant- (e.g. The number 12.500 has 5 significant numbers).
5. Zeroes at the end of the number without a decimal are NOT significant. To indicate that the number is significant for more digits a bar is placed over the rightmost significant zero. (e.g. The number 5000 has only 1 significant number but the number $50\bar{0}0$ has 3 significant figures).

Units

Unit is a definite magnitude of a quantity. Units have evolved with the measurement system and today several units are available for a single physical quantity.

In order to maintain a standard system of measurement, the International System of Units or **SI** (*Systeme Internationale*) units are used since October 1960 in all scientific work and updated since then.

Base units- The SI system of measurement identifies 7 base units corresponding to 7 base physical quantities. These are:

Physical quantity	Name of the SI base unit	Symbol for SI base unit
Length	Metre	M
Mass	Kilogram	Kg
Time	Second	S
Electric current	Ampere	A
Temperature	Kelvin	K
Amount of substance	Mole	Mol
Luminous intensity	Candela	Cd

Derived units- These are units of derived quantities (powers, products or quotients) that are expressed in terms of base units. Examples of derived units are area (m^2) and velocity (m/s).

Prefixes- Prefixes are decimal based multipliers of the base units. For example, kilometre is 1000 times of metre, millimetre is thousandth part of a metre. While 'metre' is the base unit in this case, 'kilo' and 'milli' are prefixes.

Conventions on the use of SI units

1. The base unit can take only one prefix at a time. (e.g. Thousandth part of a millimetre is written as one micrometre and not milli millimetre).
2. Units written in abbreviated form are never pluralized. (e.g. 'm' could be 'metre' or 'metres'. It is incorrect to write 'ms' for metres because denotes 'millisecond'. 'kms' is therefore incorrect way of writing kilometres).
3. The abbreviation is never followed by a full stop unless it is the end of a sentence.

Non-SI units accepted for use with SI

A few non-SI units have been approved to be used in the scientific literature as they are more convenient and acceptable forms of measurement worldwide.

Example, unit of volume as litre, unit of time as day or hour.

Abbreviations

Abbreviation is the shortened form of a word or phrase. It is classified into two types- acronym and initialism. When long technical terms are shortened into short pronounceable words (e.g. Biosis or radar) it is called 'Acronym'. However, when the long technical terms are shortened and spelled out (e.g. LCD or DNA) it is called 'Initialism'.

Advantages of using abbreviations

Use of abbreviated technical terms makes writing and speaking:

1. more concise
2. Less repetitive
3. more accessible to non-scientist readers.

Besides, it also reduces the printing pages by shortening the text.

Disadvantages of using abbreviations

1. It is annoying if used in excess
2. It is confusing if not explained at first use

What to Abbreviate?

Abbreviations are not to be used at every opportunity. It could be annoying to the reader. In order to use abbreviations, the writer, while editing the manuscript should ask himself three important questions:

1. Is the term long enough to warrant abbreviation?
2. Is a standard abbreviation available for the term?
3. Is the term frequently used in the paper?

If the answer to all the three questions is in affirmation only than he should use abbreviations for that particular term in his manuscript.

How to Abbreviate?

In order to abbreviate a word or phrase one should look for standard abbreviations available. Whiel using abbreviation, if a word is represented in the acronym, it should not be repeated (e.g. the abbreviation HIV should not be written as HIV virus because the word virus is already a part of the abbreviation).

Introduce the abbreviation at first use in the text in parentheses immediately after the word is spelled-out. Common abbreviations however, need not be introduced. Abbreviations are generally (not always) given in capital letters without full stops or spaces. One should avoid using abbreviations in the title of the manuscript or even in the abstract. But, if an abbreviation is an important term in the work and therefore needs mention in the abstract or title, it can be used. In a book or thesis, a separate page listing 'Abbreviations used' may be added.

Nomenclature

Scientific Nomenclature is a system of naming objects in the natural world following International Nomenclatural Codes.

Scientific Nomenclature is used to refer to an organism in a scientific document because it is important to accurately and reliably identify it. Regional names or common names can create confusion in the minds of the reader because in different parts of the world the same organism may have different common names or different organisms may have the same common name.

Some important nomenclatural rules:

1. An organism is identified using two identifiers: a genus and a specific epithet.
2. The genus name is always capitalized.
3. The specific epithet is not capitalized (even if derived from proper noun).

4. Both, the genus and species are italicized.
5. Genus name is written in full upon its first use in a scientific document. For subsequent uses, it is abbreviated to its initial letter followed by a full stop.
6. If two genera have same initials- names are spelled full every time.
7. When only the genus is identified, the specific epithet is written as "sp.". In such case only the genus name is italicized.
8. When a binomial name is mentioned for the first time in the text, its author citation needs to be mentioned. Author citation is not italicized.
9. For ranks below species, an additional identifier needs to be added. The rank of the third identifier is inserted as subsp. or var. or subvar. and so on, in between the species and the subclassification italicized.
