**Numbers and Units**

**Introduction**

As science communicators, you will often have to include highly specific information in your written materials. For example, you might be writing a lab report in which you provide numerical details about the method you used in your experiment. There are some rules to follow if you want to do this effectively and achieve your basic goal of enhancing the readability of your work.

In a few cases, you might have to make a judgment call as to which rule should be followed; when working with numbers especially, there are sometimes occasions when rules from different style guides clash. Having said this, if you plan your work with clarity in mind, most sentences can be simplified to follow the important, universally accepted rules. When this is not possible, you should follow the one golden rule: **Always be consistent in your style**.

**Some Important Rules for Working with Numbers**

The table below shows some of the more important rules to learn when using numbers in your writing. This list is not extensive but it details the majority of the common instances in which you will be using numbers.

|  |  |
| --- | --- |
| **Rule** | **Example** |
| **Spell out small numbers (one to nine).** | I performed **three** experiments yesterday. |
| **Use numerals for larger numbers (10 +),**  ***except when beginning a sentence.*** | Mike performed **12** experiments.  ***Fifteen*** *days later, he collected the data.* |
| **Use numerals for counts, percentages, decimals, magnifications, and official scales.** | We found **8** mice, **12** rats, and **37** rabbits. Mammal populations here have grown by about **30%** in the last **five** years. |
| **Use commas to make large numbers easier to interpret (one comma separates each three figures),**  ***but round numbers up/down when very large and use a combination of numerals and words.*** | There are 5**,**194 new species of insect discovered each year.  *There are approximately* ***7.5 million*** *insect species on Earth.* |
| **Avoid having two distinct numbers written next to one another, most simply by rearranging a sentence.** | We tested **15 different 19-year-olds** [not ‘we tested 15 19-year-olds’]. |
| **Spell out names and nouns.** | The **First** Law of Thermodynamics. |
| **Use numerals for dates.** | On March **4** [or **4th**], we have an exam. |
| **Use numerals for times,**  ***except when writing ‘o’clock’*** | The exam begins at **9:00 am**,  *and finishes at* ***one o’clock*** *in the afternoon.* |
| **Use numerals for currency references.** | My lunch cost **$4.35**, but the chips were only **85 cents**. |

**Always remember the one golden rule of being consistent in your style.** If two rules clash in one sentence, you will have to favour one over the other. Make sure you continue to favour that one over the other throughout your text.

**Some Important Rules for Working with Units**

You should abbreviate units of scientific measurement in your writing, but remember that it is very important to use the correct abbreviations. At best, erroneous abbreviations give the impression that you don’t care about your work, but they also have the potential to confuse your readers.

The Table below shows the correct abbreviations for many commonly used scientific measurements, as well as some of the most important and commonly used rules governing their use in science writing.

|  |  |
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| **Scientific Measurement** | **Abbreviation** |
| **Mass** (gram, kilogram, pound, stone, ounce) | g, kg, lb, st, oz |
| **Volume** (millilitre, litre, gallon) | ml, l, gal |
| **Temperature** (Kelvin, Celsius, Fahrenheit) | K, ˚C, ˚F |
| **Time** (millisecond, second, minute, hour) | ms, s, min, h |
| **Length** (millimetre, centimetre metre, inch, foot, yard, kilometre, mile) | mm, m, in, ft, ydm km, mi |
| **Current** (ampere, coulomb, electron, millivolt, volt, ohm) | A, C, e, mV, V, Ω |
| **Light Intensity** (candela, lux, lumen) | cd, lx, lm |
| **Amount of Substance** (millimole, mole) | mM, mol |
| **Rules for Appropriate Use** | **Example** |
| **Do not pluralize unit abbreviations.** | The chemicals only weighed 46 **g**. |
| **Only use a period after abbreviations if they end a sentence.** | The chemicals only weighed 46 **g.** Compound A was **30 g** lighter than Compound B. |
| **Put a space between numerals and unit abbreviations, unless using Celsius, Fahrenheit or percentages** | The chemicals only weighed **46 g.** Compound A was approximately **20%** as heavy as Compound B before burning at **21˚C.** |
| **Do not capitalize abbreviations**  ***Unless they are named after people (e.g. Kelvin, Celsius) or begin sentences.*** | The chemicals only weigh 46 **g.**  *Absolute zero (0* ***K****) is around -273****˚C****.*  ***Grams*** *are abbreviated to ‘****g****’ in writing.* |

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**Video Resource**

For a recap and for some extra information about the importance of using numbers and units correctly in your science writing, please watch Grammar Squirrel’s [video](http://youtu.be/hK6yPJ0yJEw) on the UBC Science Writing [YouTube channel.](https://www.youtube.com/channel/UCvynvmsn_NTlS9lc8cH-OFw)

We then suggest you complete the quick quiz (below) to see whether you have mastered some of the important skills relating to the use of numbers and units in your writing.

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**Numbers and Units Quick Quiz**

**1)** Read the following sentence and select the correct style for the number in it:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_ years ago, the Earth’s rainforests were in a much better state.

(options should be: **50, Fifty**)

**2)** Read the following sentence and select the correct style for the number in it:

Now, due to deforestation, experts predict that up to \_\_\_\_\_\_\_\_\_\_\_\_\_ species go extinct each year.

(options should be: a) **fifty thousand,** b) **50,000,** c) **50000)**

**3)** Read the following sentence and select the correct style for the number and unit in it:

This means that \_\_\_\_\_\_\_\_\_\_\_\_ of all species might be gone by 2065.

(options should be: **one ¼, 1 quarter, twenty five %, 25%)**

**4)** Read the following sentence and select the correct style for the number and unit in it:

As a measure of how rapidly forests can be lost, logging in Amazonian Brazil rose by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in just 12 months, between 2007 and 2008.

(options should be: **69%, 69 %, sixty nine %**)

**5)** Read the following sentence and select the correct style for the number in it:

The Amazon is an example of a tropical rainforest, which means is at least \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of rain each year.

(options should be: **168 cms, 168cms, 168 cm, 168cm**)

**6)** Read the following sentence and select the correct style for the number and unit in it: Incredibly, in some years, these forests receive more than \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of rain.

(options should be: **1,000 millilitre, 1,000 ml, 1,000 mls, 1,000 millilitres**)

Read the following four statements (A, B, C and D below) and rank these in order from best to worst in the way that they deal with numbers and units. *Hint: Think about which of those that contain errors are more problematic than others.*

1. Please pass me those 10 10 ml pipettes.
2. I need to shake the reagents within 10 after they first mixed.
3. If we wait longer, there is a 50% chance that the data will be inaccurate.
4. That would be a concern, especially because these results might influence a decision that affects over 600000 people.

For questions 7, 8, 9, and 10, simply input the number that indicates your ranking of this statement (1 = best, 2 = second best, 3 = second worst, 4 = worst). *Hint: Only assign each ranking score once (e.g. Q7 and Q8 cannot both be ranked 1)*

**7) A)** Please pass me those 10 10 ml pipettes.

**8) B)** I need to shake the reagents within 10 after they first mixed.

**9) C)** If we wait longer, there is a 50% chance that the data will be inaccurate.

**10) D)** That would be a concern, especially because these results might influence a decision that affects over 600000 people.

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**Quick Quiz Answer Key**

To check your answers and see whether you are now a wizard at using numbers and units in your writing, access the answer key **below.**

**1)** Read the short paragraph below and spot the errors with the numbers and units, before replacing/rewriting them in the correct format (8 marks). Each correct edit is highlighted in **bold font (**1 mark each**)**.

***Fifty*** *years ago, the Earth’s rainforests were in a much better state; now, due to deforestation, experts predict that up to* ***50,000*** *species go extinct each year, which means that* ***one quarter (OR ¼)*** *of all species might be gone in another 50 years. As a measure of how rapidly forests can be lost, logging in Amazonian Brazil rose by* ***69%*** *in just* ***12*** *months, between 2007 and 2008. The Amazon is an example of a tropical rainforest, which means monthly temperatures exceed* ***18˚C*** *and there is at least* ***168 cm*** *of rain each year. Incredibly, in some years, these forests receive more than* ***1,000 cm*** *of rain.*

**2)** Read the two sentences below and suggest how these might be confusing (1 mark each), before re-writing them to remove this potential confusion (1 mark each). Correct example answers are highlighted in **bold font** (1 mark each, 4 marks total).

1. Please pass me those 10 10 ml pipettes.

**PROBLEM: Two distinct numbers appear next to each other (possible someone might think you were referring to 1,010 ml pipettes).**

**EXAMPLE SOLUTION: Re-phrase the sentence to make sure the two numbers are not right next to each other. E.g. *Please pass me 10 of those 10 ml pipettes.***

1. I need to shake the reagents within 10 m after they first mixed.

**PROBLEM: Incorrect unit abbreviation; the author means they need to shake the reagents within a certain time, rather than a certain distance (as designated by ‘m’, the unit abbreviation for metres).**

**EXAMPLE SOLUTION: Re-write the sentence to use the correct unit abbreviation. E.g. *I need to shake the reagents within 10 min after they first mixed.***

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