Mathematical Communication

Successfully communicating mathematical material is a skill that only comes with patience and practice. However, it is an essential skill, whether you are writing an assignment, a scientific paper, or a technical report. Information in this flyer is designed to help improve your mathematical communication. In particular, this flyer covers how to present whole numbers, decimals and units.

Tables 1 and 2 show the conventions used to communicate mathematically. Table 1 shows ways to type numbers and units. Table 2 shows ways to type mathematical expressions and variables, in-text or in display style.

Table 1: Conventions used for communicating mathematically

Concepts:	Examples:
Numbers are used with units, ages, times, dates, page numbers, percentages, money, ratios and proportions.	5 metres, 10 seconds, 10 am, page 2, $5 or 5 : 1.
Numbers below 10 are written in words.	- Seven cars; - zero faulty items.

Be consistent when writing numbers in mathematics or technical documents.
 	
   • Use the same style throughout the sentence:
 	
      – If all of the numbers are under 10 then write them in words.
      – If any of the numbers are over 10 then write them all as numerals.
 	
   • Alternatively, if you are writing about a quantity of objects, which have numbers in their names, then you need to write one and use numerals for the other, to avoid confusion.
	- An irrigation system requires three water pumps and six water storage tanks. (All numbers under 10.) - An irrigation system requires 6 water pumps and 12 water storage tanks. (At least one number over 10.) - An irrigation system requires five water pumps and twelve 5 000 litre water storage tanks. (Combinations of numbers in one sentence, would be hard to read if it was 12 5 000 litre water storage tanks.)

Numbers larger than 999 should be written with a space to indicate thousands of units.	1001; 100 000 001.

Always write decimals and fractions as numerals, not in words. • A full stop should be used to represent the decimal point. • The zero should always be used before a decimal less than one. • When fractions are written in-line (as numeral), a slash (/) should be used.	• Seven point six, zero, four, two should be written as 7.6042. • Point six seven should be written as 0.67. • Four sevenths should be written as 4/7.
Units of measurement must be consistent within the document. • Standard (SI) units should be used. • In text, always use lower case for the name, even if it is a person's name. Note: this standard changed in Australia in 1998. • Unit symbols are expressed in lower case, apart from litre (L). • If the unit is named after a person, the first letter is capitalised when abbreviated. • Symbols containing exa, peta, giga and mega use a capital letter. • Unit symbols should never be written in italics. • A small space is used between the number and the unit	• 16 newtons or 16 N; • 21 gigawatts or 21 GW; • 34 megalitres or 34 ML.

The formatting you choose to use throughout your document should be:

1. consistent throughout the document;

2. in a format easily understood by your audience; and

3. suitable for any comparison you wish to make between numbers.

Table 2: Conventions when typing Mathematical equations.

Concept	Examples
Letters using a variable should be typed in *italics*. To be consistent, these should also be typed in Microsoft Equation, just like your formulas.	a, x, etc.
Vectors or Matrix quantities should be typed in **bold** instead of italics.	Matrices: $\mathbf{A}$, $\mathbf{X}$, etc. Vectors: $\mathbf{x}$, $\mathbf{y}$, etc.
Equations can be in-text or display. • In-text equations are used for short equations, which are in the text. • Display equations are formatted on their own line. • Display equations should be numbered, so that they can be referred to in the text around them.	• In-text equation: The area of a circle is $A = \pi r^2$, where r is the radius. • Display equation: The area of a circle is: $$A = \pi r^2, \qquad (1)$$ where r is the radius. Using Equation (1) the area of the given circle becomes: …
When displaying equations, all equal signs, fraction lines and operators ($+$, $-$, $\times$, and $\div$) should be horizontally aligned.	$$\cos\alpha + \cos\beta = 2\cos\frac{1}{2}(\alpha+\beta)\cos\frac{1}{2}(\alpha-\beta) \quad (2)$$
The equal signs should be aligned for a series of equations.	Using Equation 1: $$\begin{aligned} A &= \pi r^2 \\ &= \pi \times 5^2 \\ &\approx 78.34. \end{aligned} \qquad (3)$$
Functions should not be written in italics.	See Equation 2 for how to write functions, such as $\sin x$, $\cos\theta$, $\tan\phi$, $\log a$ and $\ln x$.

Resources

• Other QuickTips flyers;

• Online resources at Study Support, USQ Library;

• Make a consultation with a Mathematics Learning Advisor.