TEX, LATEX and math

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Starting up

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Modes

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2. horizontal mode
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Each mode has two flavors. In particular, math mode can be *inline* or *display*.

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Warning

the code `\,|\,` *should not be typed in*

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There are *very good reasons* to do this!

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An important exception

In the abstract there should be *no* use of personal macros. It should be able to typeset with a 'naked' version of LaTeX: it's very common nowadays that the abstract is fed to some web page that maybe uses MathML, MathJax or similar device for handing the text to browsers.

Fine points of mathematical typing

$$\begin{cases} a^6 + 2a^3b^3 + b^6 = q^2 \\ 4a^3b^3 = -\dfrac{4}{27}\,p^3 \end{cases}$$

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Be consistent! Also with your choice of "phi".

Thin points of mathematical typing

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but in this case TEX automatically the *thin space*.

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$$a\,\frac{f(x+h)-f(x)}{h}+b\,\frac{g(x+h)-g(x)}{h}$$

$$\left(1+\sqrt{z-1}\right)z^2$$
$$\left(1+\sqrt{z-1}\,\right)z^2$$

The eagle eyed people in the attendance will have spotted the small but important differences.

The difference is the same as between

$$2\log x \qquad \text{and} \qquad 2\,\log\,x$$

but in this case TEX automatically the *thin space*.
In the formulas above we have to add `\,` manually where needed.

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ISO prescribes upright type. Mathematicians mostly use italic.

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Should I mention the *differential d*?

The *differential d*

```
\newcommand{\diff}{\mathop{}\!d}
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A double integral

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Choose whatever form of *d* you like, but be consistent

Sets, bras and kets

Would you like to type something like

```
\left\{ x \;\middle|\; \frac{1}{2} < x < \frac{1+\sqrt{5}}{2}\right\}
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whenever you have a set denotation?

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Or something like

```
\langle x\mathclose|    \mathopen|y\rangle    \langle x\mid y\rangle
```

which are a "bra", a "ket" and a "braket"?

$$\langle x| \qquad |y\rangle \qquad \langle x \mid y\rangle$$

Sets, bras and kets

Good news: the paper contains code for easing the input:

```
\bra{x}     \ket{y}     \braket{x|y}     \braket{x|y|z}
```

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\bra{x}    \ket{y}    \braket{x|y}    \braket{x|y|z}
```

The code also provides easy way to increase the size of the delimiters when needed

Numbers and units

What I agree with ISO on is typesetting numbers and units

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It would be 7,400,043,022,221 for our American or British friends

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Another piece of good news: we have the **siunitx** package that does most of the work for us

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```
\SI{100}{\meter} \SI{100}{\metre}
\SI{20}{\kilo\gram}
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\num{7400043022221} \num[group-separator={,}]{7400043022221}
```

100 m 100 m
20 kg
600 cm^3 600 cm^3
7 400 043 022 221 7,400,043,022,221

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Remember the Mars Climate Orbiter crash?

Numbers and units

The acceleration due to gravity near the surface of the Earth is

$$9.8\,\mathrm{m\,s^{-2}} = 9.8\,\frac{\mathrm{m}}{\mathrm{s}^2} = 9.8\,\mathrm{m}/\mathrm{s}^2$$

The three realizations have all been input with

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by just changing some runtime options

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```
\sisetup{per-mode=reciprocal} % default
\sisetup{per-mode=fraction}
\sisetup{per-mode=symbol}
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so it's easy to adapt a paper to the publisher's requirements *without changing the code* in the `document` environment

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OK, I cheated: the middle term has been typeset with

```
\SI[per-mode=fraction]{9.8}{\meter\per\square\second}
```

Numbers and tables

You now shouldn’t be surprised that the following three tables have all been typeset with *the same input code* for the table body

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Nation	Number
Italy	640 375
Germany	231 803
France	100 002
Turkey	91 329
Spain	1 003 000

Nation	Number
Italy	640,375
Germany	231,803
France	100,002
Turkey	91,329
Spain	1,003,000

Nation	Number
Italy	640×10^3
Germany	232×10^3
France	100×10^3
Turkey	91.3×10^3
Spain	1.00×10^6

Source: Mr Leporello, private communication

Numbers and tables

The first two tables

```
\begin{tabular}{
  @{}
  l
  S[table-format=7.0]
  @{}
}
\toprule
Nation  & {Number} \\
\midrule
Italy   &  640375 \\
Germany &  231803 \\
France  &  100002 \\
Turkey  &   91329 \\
Spain   & 1003000 \\
\bottomrule
\end{tabular}
```

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Spain   & 1003000 \\
\bottomrule
\end{tabular}
```

The third table

```
\begin{tabular}{
  @{}
  l
  S[table-format=3.2e1]
  @{}
}
\toprule
Nation  & {Number} \\
\midrule
Italy   &  640375 \\
Germany &  231803 \\
France  &  100002 \\
Turkey  &   91329 \\
Spain   & 1003000 \\
\bottomrule
\end{tabular}
```

Numbers and tables

The first table has been typeset with no special setting

Numbers and tables

The first table has been typeset with no special setting

The second table with `\sisetup{group-separator={,}}`

Numbers and tables

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The second table with `\sisetup{group-separator={,}}`

The third table with

```
\sisetup{
  round-mode=figures,
  round-precision=3,
  scientific-notation=engineering
}
```

Acknowledgment

The math and technical typesetting would be different without

> *Claudio Beccari, “Typesetting mathematics for science and technology according to ISO 31/XI». TUGboat, 18 (1), 1997*

and without Claudio, to begin with

Grazie, Claudio