Question Authoring Cheat Sheet

Editor: numbas.mathcentre.ac.uk.
Documentation: bit.ly/numbasdocs.

Part Types

Information only	Normally used in Steps; no student input.
Gap-fill	Place multiple inputs inside the prompt text.
Mathematical expression	Algebraic answer; instant rendering of input.
Number entry	Accept a number within a range; can require certain number of sig. fig.s or d.p.
Match text pattern	Free text input. Must match given regular expression.
Choose one from a list	Student picks one answer from a multiple choice list.
Choose several from a list	Student picks any number of answers from a list; can specify max. and min. choices.
Match choices with answers	2D grid; match items from two lists. Can allow one answer per choice or many.

You can add additional Step parts to any part. These should provide extra hints, or break the question into smaller steps.

Displaying Maths

LaTeX is only used to render maths, not for text or layout.

Variables and correct answers are defined using JME syntax, not LaTeX.

Inline maths is enclosed in dollar signs: `$x^2 + 1$` produces $x^2 + 1$.

Display maths is enclosed in `\[` and `\]`, and displayed on its own line. `\[ x^2 + 1 \]` produces:

$$x^2 + 1$$

Online resources

Test commands with instant rendering: bit.ly/biglatex.
Draw symbols and get the corresponding commands: bit.ly/detexify.
More LaTeX commands: bit.ly/latexcommands.

LaTeX commands

Command	Output
`x \lt y \gt z`	$x < y > z$
`A_{x} A^{y}`	$A_x A^y$
`a = b \neq c`	$a = b \neq c$
`\frac{x}{y}`	$\frac{x}{y}$
`x \times y \cdot z`	$x \times y \cdot z$
`\alpha, \beta, \dots`	$\alpha, \beta, \dots$
`\left( \sum_{x=1}^{\infty} x^2 \right)`	$\left(\sum_{x=1}^{\infty} x^2 \right)$

Content

To insert a video

Go to the YouTube / Vimeo page for the video. Copy the URL in the address bar. In the editor, click the cloud button and paste in the URL.

To insert an image

Click the tree icon. Click Upload an image and select the image.

Randomised content

To substitute text, wrap a variable name in curly braces: `My name is {name}` produces output like `My name is Bob`.

To substitute a simple number in maths, use the `\var` command in LaTeX: `$x + \var{a}$` produces $x + 2$.

For randomised expressions which might need simplifying, use `\simplify`. Expressions inside curly braces are evaluated: `$\simplify{ {a}x + {b}x + {c} }$` produces $2x - 3$ when $a = 2, b = 0, c = -3$.

Variable annotations

Use annotations to display variable names differently inside a simplified expression. For example, `$\simplify{ vector:x }$` produces $\boldsymbol{x}$.

Any LaTeX command can be used as an annotation for notation which is not built-in, e.g. `$\simplify{ vec:x }$` produces $\vec{x}$.

Annotations can be chained together. For example, `$\simplify{ unit:v:x }$` produces $\hat{\boldsymbol{x}}$.

Annotation	Output	Meaning
`verb:pi`	π	Verbatim - overrides built-in constants e, π, i.
`op:x`	x	Operator name
`v:x`	$\boldsymbol{x}$	Vector
`unit:x`	$\hat{x}$	Unit vector
`dot:x`	$\dot{x}$	Dot on top
`matrix:A`	$\mathbf{A}$	Matrix

Simplification rules

Usage: `$\simplify[rule1,rule2,...]{ expression }$`

`unitFactor`	Cancel products of 1.
`unitPower`	Cancel exponents of 1.
`unitDenominator`	Cancel fractions with denominator 1.
`zeroFactor`	Cancel products of 0 to 0.
`zeroTerm`	Omit zero terms.
`zeroPower`	Cancel exponents of 0 to 1.
`noLeadingMinus`	Rearrange expressions so they don't start with a minus.
`collectNumber`	Collect together numerical products and sums.
`simplifyFractions`	Cancel fractions to lowest form.
`zeroBase`	Cancel any power of zero.
`constantsFirst`	Numbers go to the left of multiplications.
`sqrtProduct`	Collect products of square roots.
`sqrtDivision`	Collect fractions of square roots.
`sqrtSquare`	Cancel square roots of squares, and squares of square roots.
`trig`	Apply some trigonometric identities.
`otherNumbers`	Evaluate powers of numbers.
`all`	Apply all of the above rules, but not the two display rules below.
`fractionNumbers`	Numbers are displayed as fractions instead of decimals.
`rowVector`	Vectors are displayed as rows instead of columns.

Numbas