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Formulas

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```
\usepackage{amsmath,amssymb}  
\usepackage{commath,mathtools}
```

Formulas: The basics

Formula	Code	Formula	Code
$\sqrt{2}$	<code>\$</code>	$\sqrt[3]{8}$	<code>\$</code>
$\frac{2}{3}$	<code>\$</code>	x_1	<code>\$</code>
$6 \geq 3$	<code>\$</code>	x_1^2	<code>\$</code>
$a^2 + b^2$	<code>\$</code>	a^{2+b^2}	<code>\$</code>

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`$ x^{22} $`: x^{22}

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`$ x^22 $` : x^{22} | `$ x^{\{22\}} $` : x^{22}

Formulas: Symbols

Formula	Code	Formula	Code
x_1, \dots, x_n	<code>\$</code>	$5 \cdot 6$	<code>\$</code>
α, β, γ	<code>\$</code>	A, B, Γ	<code>\$</code>
ϵ, ε	<code>\$</code>	\mathcal{P}	<code>\$</code>
ϕ, φ	<code>\$</code>	\mathbb{P}	<code>\$</code>

Formulas: Symbols

Formula	Code	Formula	Code
x_1, \dots, x_n	<code>$\text{\textcolor{green}{\$} x_1, \text{\textcolor{blue}{\dots}}, x_n \text{\textcolor{green}{\$}}$</code>	$5 \cdot 6$	<code>$\text{\textcolor{green}{\$}} \text{\textcolor{green}{\$}}$</code>
α, β, γ	<code>$\text{\textcolor{green}{\$}} \text{\textcolor{green}{\$}}$</code>	A, B, Γ	<code>$\text{\textcolor{green}{\$}} \text{\textcolor{green}{\$}}$</code>
ϵ, ε	<code>$\text{\textcolor{green}{\$}} \text{\textcolor{green}{\$}}$</code>	\mathcal{P}	<code>$\text{\textcolor{green}{\$}} \text{\textcolor{green}{\$}}$</code>
ϕ, φ	<code>$\text{\textcolor{green}{\$}} \text{\textcolor{green}{\$}}$</code>	\mathbb{P}	<code>$\text{\textcolor{green}{\$}} \text{\textcolor{green}{\$}}$</code>

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x_1, \dots, x_n	<code>\$ x_1, \textcolor{blue}{\dots}, x_n \$</code>	$5 \cdot 6$	<code>\$ 5\textcolor{blue}{\cdot} 6 \$</code>
α, β, γ	<code>\$ \alpha, \textcolor{blue}{\beta}, \textcolor{blue}{\gamma} \$</code>	A, B, Γ	<code>\$ A, B, \Gamma \$</code>
ϵ, ε	<code>\$ \epsilon, \textcolor{blue}{\varepsilon} \$</code>	\mathcal{P}	<code>\$ \mathcal{P} \$</code>
ϕ, φ	<code>\$ \phi, \textcolor{blue}{\varphi} \$</code>	\mathbb{P}	<code>\$ \mathbb{P} \$</code>

Formulas: Symbols

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x_1, \dots, x_n	<code>\$ x_1, \textcolor{blue}{\dots}, x_n \$</code>	$5 \cdot 6$	<code>\$ 5\textcolor{blue}{\cdot} 6 \$</code>
α, β, γ	<code>\$ \alpha, \textcolor{blue}{\beta}, \textcolor{blue}{\gamma} \$</code>	A, B, Γ	<code>\$ A, B, \textcolor{blue}{\Gamma} \$</code>
ϵ, ε	<code>\$ \epsilon, \textcolor{blue}{\varepsilon} \$</code>	\mathcal{P}	<code>\$ \textcolor{blue}{P} \$</code>
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α, β, γ	<code>\$ \alpha, \beta, \gamma \$</code>	A, B, Γ	<code>\$ A, B, \Gamma \$</code>
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Formulas: Vectors

Formule	Code	Formule	Code
\vec{x}	<code>\$ \vec{x} \$</code>	\vec{F}_{tot}	<code>\$ \vec{F}_{\text{tot}} \$</code>
\mathbf{x}	<code>\$ \mathbf{x} \$</code>	$\hat{i} + 6\hat{k}$	<code>\$ \hat{i} + 6\hat{k} \$</code>
$\ \vec{x}\ $	<code>\$ \ \vec{x}\ \$</code>	$\nabla \times \mathbf{A}$	<code>\$ \nabla \times \mathbf{A} \$</code>

$$\vec{F}_{tot}, \vec{F}_{\text{tot}}$$

Formulas: Calculus

```
\usepackage{commath}
```

```
\dod{\sin(x)}{x}, \dod{f(x,y)}{x}, \partial_x f
```

```
\int_{0}^{\infty} e^{-x} \dif x = 1
```

$$\frac{d \sin(x)}{dx}, \frac{\partial f(x,y)}{\partial x}, \partial_x f$$

$$\int_0^\infty e^{-x} dx = 1$$

Formula	Code	Formula	Code
$a \leq b$	<code>\$ a \leq b \$</code>	$a \geq b$	<code>\$ a \geq b \$</code>
$a < b$	<code>\$ a < b \$</code>	$a > b$	<code>\$ a > b \$</code>
$a \ll b$	<code>\$ a \ll b \$</code>	$a \gg b$	<code>\$ a \gg b \$</code>
$a = b$	<code>\$ a = b \$</code>	$a \simeq b$	<code>\$ a \simeq b \$</code>
$a \neq b$	<code>\$ a \neq b \$</code>	$a \approx b$	<code>\$ a \approx b \$</code>
$a \sim b$	<code>\$ a \sim b \$</code>	$a \stackrel{*}{=} b$	<code>\$ a \stackrel{*}{=} b \$</code>

Formulas: Arrows and operators

```
\DeclareMathOperator{\Image}{Image}
```

```
a \iff b, a\implies b, a\mapsto b
\lim_{x\to 0}\frac{\sin(x)}{x} = 1
\Image(f) = \mathbb{R}_{\geq 0}
```

$$a \iff b, a \implies b, a \mapsto b$$

$$\lim_{x \rightarrow 0} \frac{\sin(x)}{x} = 1$$

$$\text{Image}(f) = \mathbb{R}_{\geq 0}$$

So many! And there are lots more :-)

CTAN symbol list:

<http://mirrors.ctan.org/info/symbols/comprehensive/symbols-a4.pdf>

Detexify:

<http://detexify.kirelabs.org/classify.html>

Equation

The trigonometric identity is

`$ \sin^2(\theta) + \cos^2(\theta) = 1 $.`

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`\begin{equation}`

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`\end{equation}`

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The trigonometric identity is

$$\sin^2(\theta) + \cos^2(\theta) = 1. \quad (1)$$

Align

The double-angle formula can now be rewritten as

```
\begin{align}
  \cos(2\theta) &= \cos^2(\theta) - \sin^2(\theta) \\
  &= 2\cos^2(\theta) - 1.
\end{align}
```

The double-angle formula can now be rewritten as

$$\cos(2\theta) = \cos^2(\theta) - \sin^2(\theta) \tag{1}$$

$$= 2\cos^2(\theta) - 1. \tag{2}$$

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Align

We do this with the double-angle formula

```
\begin{align*}
\cos(2\theta) &= \cos^2(\theta) - \sin^2(\theta),
\end{align*}
```

which we can rewrite as

```
\begin{align*}
&= \cos^2(\theta) - (1 - \cos^2(\theta))\\
&= 2\cos^2(\theta) - 1.
\end{align*}
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\intertext{which we can rewrite as}
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$$\cos(2\theta) = \cos^2(\theta) - \sin^2(\theta),$$

which we can rewrite as

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Also in use

AA	<code>\(\sqrt{2}\)</code>
BB	<code>\[\sqrt{3}\]</code>
CC	<code>\$\$\sqrt{4}\$\$</code>

AA	$\sqrt{2}$	BB
	$\sqrt{3}$	
CC	$\sqrt{4}$	

Left-right

```
\begin{align*}
&f(\sum_{i=1}^n x_i) \\
&f\left(\sum_{i=1}^n x_i\right)
\end{align*}
```

$$f\left(\sum_{i=1}^n x_i\right)$$

$$f\left(\sum_{i=1}^n x_i\right)$$

Delimiter point

```
\begin{align*}
\left.\left[x^2\right]\right|_{x=0}^{\phantom{x^2}\left|_{x=2}} = 4
\end{align*}
```

$$\left[x^2\right]\bigg|_{x=0}^{x=2} = 4,$$

```

\begin{align*}
R(\theta) &= \begin{pmatrix} \cos(\theta) & -\sin(\theta) \\ \sin(\theta) & \cos(\theta) \end{pmatrix} \\
\abs{x} &= \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}
\end{align*}

```

$$R(\theta) = \begin{pmatrix} \cos(\theta) & -\sin(\theta) \\ \sin(\theta) & \cos(\theta) \end{pmatrix}, \quad |x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$$