

calc_decimal_example

Student Group

First Name	Surname	Matrikel Nr.

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$\$1.\!\!\!\!\!\quad$ Calculation example for decimal value

Idea: The number \$2658.47\$ is only the representation with the numerals $[0..9]$, but what is the value behind it?

so lets start

First: Put space between the numerals to see the thousands, hundreds, tens, ones, tenths, hundredths

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\begin{align*} \begin{smallmatrix} \color{black}{\text{number}:} & \color{black}{} & \color{black}{2} & \color{black}{6} & \color{black}{5} & \color{black}{8.} & \color{black}{4} & \color{black}{7} \\ \color{white}{\text{index}:} & \color{white}{i} & \color{white}{3} & \color{white}{2} & \color{white}{1} & \color{white}{0} & \color{white}{-1} & \color{white}{-2} \\ \color{white}{\text{place value}:} & \color{white}{B^i} & \color{white}{10^3} & \color{white}{10^2} & \color{white}{10^1} & \color{white}{10^0} & \color{white}{10^{-1}} & \color{white}{10^{-2}} \\ \color{white}{\text{numerals}:} & \color{white}{z_i} & \color{white}{2} & \color{white}{6} & \color{white}{5} & \color{white}{8} & \color{white}{4} & \color{white}{7} \\ \color{white}{\text{calc}.:} & \color{white}{z_i \cdot B^i} & \color{white}{2000} & \color{white}{600} & \color{white}{50} & \color{white}{8} & \color{white}{0.4} & \color{white}{0.07} \\ \color{white}{\text{result}:} & \color{white}{\sum_i z_i \cdot B^i} & \color{white}{2658.47} \end{smallmatrix} \end{align*}
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Second: Write down the index for each position.

 $\quad$
$$\begin{matrix} \text{\color{black}\{\text{number}\}:} & \text{\color{black}\{}} & \text{\color{black}\{2\}} & \text{\color{black}\{6\}} & \text{\color{black}\{5\}} & \text{\color{black}\{8\}} & \text{\color{black}\{4\}} & \text{\color{black}\{7\}} \\ \text{\color{blue}\{\text{index}\}:} & \text{\color{blue}\{i\}} & \text{\color{blue}\{3\}} & \text{\color{blue}\{2\}} & \text{\color{blue}\{1\}} & \text{\color{blue}\{0\}} & \text{\color{blue}\{-1\}} & \text{\color{blue}\{-2\}} \\ \text{\color{white}\{\text{place value}\}:} & \text{\color{white}\{B^i\}} & \text{\color{white}\{10^3\}} & \text{\color{white}\{10^2\}} & \text{\color{white}\{10^1\}} & \text{\color{white}\{10^0\}} & \text{\color{white}\{10^{-1}\}} & \text{\color{white}\{10^{-2}\}} \\ \text{\color{white}\{}} & \text{\color{white}\{}} & \text{\color{white}\{1000\}} & \text{\color{white}\{100\}} & \text{\color{white}\{10\}} & \text{\color{white}\{1\}} & \text{\color{white}\{0.1\}} & \text{\color{white}\{0.01\}} \\ \text{\color{white}\{\text{numerals}\}:} & \text{\color{white}\{z_i\}} & \text{\color{white}\{2\}} & \text{\color{white}\{6\}} & \text{\color{white}\{5\}} & \text{\color{white}\{8\}} & \text{\color{white}\{4\}} & \text{\color{white}\{7\}} \\ \text{\color{white}\{\text{calc.}\}:} & \text{\color{white}\{z_i \cdot B^i\}} & \text{\color{white}\{2000\}} & \text{\color{white}\{600\}} & \text{\color{white}\{50\}} & \text{\color{white}\{8\}} & \text{\color{white}\{0.4\}} & \text{\color{white}\{0.07\}} \\ \text{\color{white}\{\text{result}\}:} & \text{\color{white}\{\sum_i z_i \cdot B^i\}} & \text{\color{white}\{2658.47\}} \end{matrix}$$

Third: calculate the place value

 $\quad$
$$\begin{pmatrix} \text{number} & & & & \\ & 2 & 6 & 5 & 8 & 4 \\ & & & & & 7 \end{pmatrix} \begin{pmatrix} \text{index} & i & 3 \end{pmatrix}$$

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\color{black}{2} & \color{black}{1} & \color{black}{0} & \color{black}{-1} & \color{black}{-2} \\
\color{blue}{\text{place value:}} & \color{blue}{B^i} & \color{blue}{10^3} & \color{blue}{10^2} & \color{blue}{10^1} & \color{blue}{10^0} & \color{blue}{10^{-1}} & \color{blue}{10^{-2}} \\
\color{white}{} & \color{white}{} & \color{white}{1000} & \color{white}{100} & \color{white}{10} & \color{white}{1} & \color{white}{0.1} & \color{white}{0.01} \\
\color{white}{\text{numerals:}} & \color{white}{z_i} & \color{white}{2} & \color{white}{6} & \color{white}{5} & \color{white}{8} & \color{white}{4} & \color{white}{7} \\
\color{white}{\text{calc.}} & \color{white}{z_i \cdot B^i} & \color{white}{2000} & \color{white}{600} & \color{white}{50} & \color{white}{8} & \color{white}{0.4} & \color{white}{0.07} \\
\color{white}{\text{result:}} & \color{white}{\sum_i z_i \cdot B^i} & & & & & & \color{white}{2658.47} \\
\end{smallmatrix} \end{align*}

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\begin{align*} \begin{smallmatrix} \color{white}{\text{number:}} & \color{white}{} & \color{white}{2} & \color{white}{6} & \color{white}{5} & \color{white}{8.} & \color{white}{4} & \color{white}{7} \\
\color{white}{\text{index:}} & \color{white}{i} & \color{white}{3} & \color{white}{2} & \color{white}{1} & \color{white}{0} & \color{white}{-1} & \color{white}{-2} \\
\color{white}{\text{place value:}} & \color{white}{B^i} & \color{white}{10^3} & \color{white}{10^2} & \color{white}{10^1} & \color{white}{10^0} & \color{white}{10^{-1}} & \color{white}{10^{-2}} \\
\color{white}{} & \color{white}{} & \color{white}{1000} & \color{white}{100} & \color{white}{10} & \color{white}{1} & \color{white}{0.1} & \color{white}{0.01} \\
\color{white}{\text{numerals:}} & \color{white}{z_i} & \color{white}{2} & \color{white}{6} & \color{white}{5} & \color{white}{8} & \color{white}{4} & \color{white}{7} \\
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First: But space between the numerals to see the thousands, hundreds, tens, ones, tenths, hundredths

```

\begin{align*} \begin{smallmatrix} \color{blue}{\text{number:}} & \color{blue}{} & \color{blue}{2} & \color{blue}{6} & \color{blue}{5} & \color{blue}{8.} & \color{blue}{4} & \color{blue}{7} \\
\color{blue}{\text{index:}} & \color{blue}{i} & \color{blue}{3} & \color{blue}{2} & \color{blue}{1} & \color{blue}{0} & \color{blue}{-1} & \color{blue}{-2} \\
\color{blue}{\text{place value:}} & \color{blue}{B^i} & \color{blue}{10^3} & \color{blue}{10^2} & \color{blue}{10^1} & \color{blue}{10^0} & \color{blue}{10^{-1}} & \color{blue}{10^{-2}} \\
\color{blue}{} & \color{blue}{} & \color{blue}{1000} & \color{blue}{100} & \color{blue}{10} & \color{blue}{1} & \color{blue}{0.1} & \color{blue}{0.01} \\
\color{blue}{\text{numerals:}} & \color{blue}{z_i} & \color{blue}{2} & \color{blue}{6} & \color{blue}{5} & \color{blue}{8} & \color{blue}{4} & \color{blue}{7} \\
\color{blue}{\text{calc.}} & \color{blue}{z_i \cdot B^i} & \color{blue}{2000} & \color{blue}{600} & \color{blue}{50} & \color{blue}{8} & \color{blue}{0.4} & \color{blue}{0.07} \\
\color{blue}{\text{result:}} & \color{blue}{\sum_i z_i \cdot B^i} & & & & & & \color{blue}{2658.47} \end{smallmatrix} \end{align*}

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\begin{align*} \begin{smallmatrix} \color{black}{\text{number:}} & \color{black}{} & \color{black}{2} & \color{black}{6} & \color{black}{5} & \color{black}{8.} & \color{black}{4} & \color{black}{7} \\
\color{black}{\text{index:}} & \color{black}{i} & \color{black}{3} & \color{black}{2} & \color{black}{1} & \color{black}{0} & \color{black}{-1} & \color{black}{-2} \\
\color{black}{\text{place value:}} & \color{black}{B^i} & \color{black}{10^3} & \color{black}{10^2} & \color{black}{10^1} & \color{black}{10^0} & \color{black}{10^{-1}} & \color{black}{10^{-2}} \\
\color{black}{} & \color{black}{} & \color{black}{1000} & \color{black}{100} & \color{black}{10} & \color{black}{1} & \color{black}{0.1} & \color{black}{0.01} \\
\color{black}{\text{numerals:}} & \color{black}{z_i} & \color{black}{2} & \color{black}{6} & \color{black}{5} & \color{black}{8} & \color{black}{4} & \color{black}{7} \\
\color{black}{\text{calc.}} & \color{black}{z_i \cdot B^i} & \color{black}{2000} & \color{black}{600} & \color{black}{50} & \color{black}{8} & \color{black}{0.4} & \color{black}{0.07} \\
\color{black}{\text{result:}} & \color{black}{\sum_i z_i \cdot B^i} & & & & & & \color{black}{2658.47} \end{smallmatrix} \end{align*}

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$$\begin{matrix} 10^{-2} \\ 100 \\ 0.01 \end{matrix} \begin{matrix} \\ \\ \text{numerals:} \end{matrix} \begin{matrix} \\ \\ z_i \end{matrix} \begin{matrix} \\ \\ 2 \end{matrix} \begin{matrix} \\ \\ 6 \end{matrix} \begin{matrix} \\ \\ 5 \end{matrix} \begin{matrix} \\ \\ 8 \end{matrix} \begin{matrix} \\ \\ 4 \end{matrix} \begin{matrix} \\ \\ 7 \end{matrix} \begin{matrix} \\ \\ \text{calc:} \end{matrix} \begin{matrix} \\ \\ z_i \cdot B^i \end{matrix} \begin{matrix} \\ \\ 2000 \end{matrix} \begin{matrix} \\ \\ 600 \end{matrix} \begin{matrix} \\ \\ 50 \end{matrix} \begin{matrix} \\ \\ 8 \end{matrix} \begin{matrix} \\ \\ 0.4 \end{matrix} \begin{matrix} \\ \\ 0.07 \end{matrix} \begin{matrix} \\ \\ \text{result:} \end{matrix} \begin{matrix} \\ \\ \sum_i z_i \cdot B^i \end{matrix} \begin{matrix} \\ \\ 2658.47 \end{matrix}$$

First: But space between the numerals to see the thousands, hundreds, tens, ones, tenths, hundredths

[illegible]

\$II.\quad\$ Betrachtung der Spannungsverstärkung

[illegible]

