

calc_decimal_example

Student Group

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\$I.\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?

```
\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}{} & \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*}
```

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

```
\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{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{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} & \\ \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*}
```

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

```
\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{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}{} & \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} & \end{smallmatrix} \end{align*}
```


`\color{black}{2658.47} \\ \end{smallmatrix} \end{align*}` First: But space between the numerals to see the thousands, hundreds, tens, ones, tenths, hundredths

value		2	6	5	8 ,	4	7	
index	\$i\$	3	2	1	0	-1	-2	
$\frac{\quad}{\quad}$		$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$
$\frac{\quad}{\quad}$		$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	
$\frac{\quad}{\quad}$		$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	
$\frac{\quad}{\quad}$		$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	
$\frac{\quad}{\quad}$		$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	
value		2	6	5	8 ,	4	7	
index	\$i\$	3	2	1	0	-1	-2	
place value	B^i	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$
digit	z_i	2	6	5	8	4	7	
calc.	$\frac{z_i}{B^i}$	2000	600	50	8	0.4	0.07	
Result	$\sum_i z_i \cdot B^i$	2658,47						
aus (2+3)		$I_p = I_m = 0$				I_p und I_m sind damit definiert		
aus (6)		$I_o = I_1$				I_o ist damit bekannt, wenn I_1 bekannt ist		
aus (7) und (3)		$I_1 - I_2 - I_o = 0$						
		$I_1 = I_2 = I_o$						

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