

calc_decimal_example

Student Group

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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?

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

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

value	2	6	5	8 ,	4	7	
index	\$i\$	3	2	1	0	-1	-2
place value	B^i	$\{10^3\}$ $\{1000\}$	$\{10^2\}$ $\{100\}$	$\{10^1\}$ $\{10\}$	$\{10^0\}$ $\{1\}$	$\{10^{-1}\}$ $\{0.10\}$	$\{10^{-2}\}$ $\{0.01\}$
digit	z_i	2	6	5	8	4	7
calc.	$z_i \cdot B^i$	2000	600	50	8	0.4	0.07
Result $\sum_i z_i \cdot B^i$	2658,47						
aus (2+3)	$\{l_p\} = \{l_m\} = 0\$$				\$l_p\$ und \$l_m\$ sind damit definiert		
aus (6)	$\{l_o\} = l_1 \$$				\$l_o\$ ist damit bekannt, wenn \$l_1\$ bekannt ist		
aus (7) und (3)	$l_1 - l_2 \cdot \{l\}_0 = 0 \$$						
	$l_1 = l_2 = l_o\$$						
	$\{l_1\} = \{l_2\} = \{l\}_o \$$				mit (8) und (9): $\boxed{} = \frac{\boxed{}}{\boxed{}} \cdot \boxed{}$ und (5)		
	$\frac{\{U_1\}}{\{R_1\}} = \frac{\{U_2\}}{\{R_2\}} = \frac{\{U_A\}}{\{R_1 + R_2\}} \$$				Spannungsteilerformel, $i_1=const.\$$		
(10)	$U_2 = U_A \cdot \frac{\{R_2\}}{\{R_1 + R_2\}} \$$				Spannungsteilerformel		

\$II.\quad\$ Betrachtung der Spannungsverstärkung

[illegible]

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