

	DECIM. set	DECIM. clear	
GAP 4	1 2345.6789 01	1 2345,6789 01	
GAP 3	12 345.678 901	12 345,678 901	
GAP 2, GAP 1, or GAP 0	12345.678901	12345,678901	
MULTx set	12.3×10 ⁴⁵⁶	12,3×10 ⁴⁵⁶	
MULTx clear	12.3·10 ⁴⁵⁶	12,3·10 ⁴⁵⁶	
	123°45' 67.89"	123°45' 67,89"	
MULTx set & CPXj clear	12.3−i×4.56	12,3−i×4,56	
MULTx clear & CPXj clear	12.3−i·4.56	12,3−i·4,56	
MULTx set & CPXj set	12.3−j×4.56	12,3−j×4,56	
MULTx clear & CPXj set	12.3−j·4.56	12,3−j·4,56	
	12.3 4 −4.56°	12,3 4 −4,56°	
	1:23:45.678 901	1:23:45,678 901	
	1:23:45.678 901 a.m.	1:23:45,678 901 a.m.	
	Y.MD	D.MY	M.DY
	0001-02-03	01.02.0304	01/02/0304

Obviously, your *WP 43S* allows for interpreting and displaying your input very flexibly. And it allows you immediately recognizing the various *data types* and format settings looking at the screen.

Now, how can you use and combine data of various types in calculations? The matrix below lists in its 1st column ten *data types* your *WP 43S* supports; and it shows what will happen when you combine various objects: an object of the *DT* as indicated in one of the lean

columns at right (*y*) plus or minus an object of the *DT* in column 1 (*x*) will return an object of the *DT* at the intersection (thus, wherever a *DT* number is printed at the intersection, the corresponding combination is legal for addition or subtraction⁶⁵).

<i>DT</i> and meaning <i>x</i>	<i>y</i>									
	1	2	3	4	5	6	7	8	9	10
1 \mathbb{Z} Long integer	1	2	3	4	5	6	7	-	-	10
2 \mathbb{R} Real number	2	2	3	4	5	6	7	-	-	2
3 \mathbb{C} Complex number	3	3	3	-	-	-	7	-	-	3
4 Angle (in various formats) ⁶⁶	4	4	-	4	-	-	7	-	-	4
5 Time interval (in H.MS)	5	5	-	-	5	-	7	-	-	-
6 Date (in various formats)	6	6	-	-	-	1 ⁶⁷	7	-	-	-
7 Text string ⁶⁸	-	-	-	-	-	-	7	-	-	-
8 Real matrix or vector	-	-	-	-	-	-	7	8	9	-
9 Complex matrix or vector	-	-	-	-	-	-	7	9	9	-
10 Short integer	1	2	3	4	-	-	7	-	-	10 ⁶⁹

Example:

A complex number (*DT* 3) plus or minus a real number (*DT* 2) will result in a complex number.

⁶⁵ Else an error **Illegal input data type for this operation** (24) will be thrown.

⁶⁶ Angular output is tagged according to the current *angular display mode* chosen.

⁶⁷ A *date* minus a *date* returns an integer number of days (there are no other legal arithmetic operations on two *dates*). And a *date* plus a *real number* takes the integer part of that number and adds the respective number of days to said *date*.

⁶⁸ In additive operations on *text strings*, such a string must be present in **Y** at the beginning. One character suffices. Adding corresponds to appending *x* (converted to a string according to the display format set at execution time, if applicable) to string *y*. Adding a matrix to a *text string* appends its abbreviation (e.g. **[3×4 \mathbb{C} matrix]**, see the chapters about vectors and matrices below in this section). Subtractions from *text strings* are not allowed.

⁶⁹ If and when *short integers* of different bases are combined by an arithmetic operation, output will be a *short integer* of the base given in **Y**.

The following matrix shows the resulting *data types* of products and ratios in the same way (note that neither *dates* nor *text strings* can be multiplied or divided, and plain numbers cannot be divided by an *angle* or a *time* – cf. footnote 20 on p. 29):

... times an object <i>x</i> of the <i>DT</i> below returns a product of the <i>DT</i> printed at the intersection.	An object <i>y</i> of <i>DT</i> ...							
	1	2	3	4	5	8	9	10
1 \mathbb{Z} Long integer	1	2	3	4	5	8	9	10
2 \mathbb{R} Real number	2	2	3	4	5	8	9	2
3 \mathbb{C} Complex number	3	3	3	-	-	9	9	3
4 Angle	4	4	-	-	-	-	-	4
5 Time interval	5	5	-	-	-	-	-	5
8 Real matrix or vector	8	8	9	-	-	8	9	8
9 Complex matrix or vector	9	9	9	-	-	9	9	9
10 Short integer	1	2	3	4	5	8	9	10 ⁶⁹
... divided by an object <i>x</i> of the <i>DT</i> below returns a ratio of the <i>DT</i> printed at the intersection.								
	1	2	3	4	5	8	9	10
1 \mathbb{Z} Long integer ⁷⁰	1/2	2	3	4	5	8	9	10
2 \mathbb{R} Real number	2	2	3	4	5	8	9	2
3 \mathbb{C} Complex number	3	3	3	-	-	9	9	3
4 Angle	-	-	-	2	-	-	-	-
5 Time interval	-	-	-	-	2	-	-	-
8 Real matrix ⁷¹	8	8	9	-	-	8	9	8
9 Complex matrix ⁷¹	9	9	9	-	-	9	9	9
10 Short integer	1/2	2	3	4	5	8	9	10 ⁶⁹

⁷⁰ For example, 15 / 3 returns 5 while 14 / 5 returns 2.8.

⁷¹ The matrix *x* must be invertible. Dividing by *x* is equivalent to multiplying times x^{-1} . (see the chapter *Vectors and Matrices: Calculating* below).

The following matrices are for powers ($|x| < 1$ may correspond to roots):

... raised to a power of $x > 0$ of the DT below returns a result of the DT printed at the intersection.	A number $y > 0$ of DT ...		
	1	2	10
1 \mathbb{Z} Long integer	1	2	10
2 \mathbb{R} Real number	2^{72}	2	10^{73}
10 Short integer	1	2	10^{69}
... raised to a power of $x < 0$ of the DT below ...			
1 \mathbb{Z} , 2 \mathbb{R} , and 10	2	-	

... raised to a power of $x > 0$ of the DT below returns a result of the DT printed at the intersection.	A number $y < 0$ of DT ...		
	1	2	10
1 \mathbb{Z} Long integer	1	2	10
2 \mathbb{R} Real number	<div> <div>FP(x) = 0</div> <div>else</div> </div>	<div> <div>2</div> <div>3</div> </div>	<div> <div>10^{73}</div> <div>-</div> </div>
10 Short integer	1	2	10^{69}
... raised to a power of $x < 0$ of the DT below ...			
1 \mathbb{Z} Long integer and 10 short integer	2	-	
2 \mathbb{R} Real number	<div> <div>FP(x) = 0</div> <div>else</div> </div>	<div> <div>2</div> <div>3</div> </div>	<div> <div>-</div> <div>-</div> </div>

Any number of DT 1 or 2 raised to *complex* power will return a *complex number*, as well as any *complex number* raised to arbitrary power. Raising a *short integer* to *complex* power is not supported.

Other powers – involving DTs 4, 5, 6, 7, 8, or 9 – are not supported.

⁷² For $x < 1$, results will be *long integer* if possible (e.g. **625** **ENTER↑** **.25** **y^x** returns 5).

⁷³ The result will be the (*short*) integer part of y^x here.

And this is for logarithms:

... combined in $\log_x y$ with a number $x > 0$ of the DT below results in a DT printed at the intersection.	A number $y > 0$ of DT ...		
	1	2	10
1 \mathbb{Z} Long integer	1^{72}	2	10^{74}
2 \mathbb{R} Real number	2^{72}	2	10^{74}
10 Short integer	1^{72}	2	10^{69}

And for $y < 0$ of DT 1 or 2, $\log_x y$ will return a *complex* result if such results are allowed (see the chapters about *complex numbers* below); $\log_x y$ of negative *short integers* is not supported.




As the DTs for results of \sqrt{x} , $\sqrt[3]{x}$, and $\sqrt[n]{y}$ can be derived easily from the generic power table on previous page, also the DTs for results of \lg , lb , and \ln can be derived from the table for $\log_x y$ above.

This is for integer divisions and remainders:

... IDIVR-divided by an object x of the DT below returns an integer ratio in \mathbb{X} and a remainder in \mathbb{Y} of the data types printed at the intersection.	An object y of DT ...		
	1	2	10
1 \mathbb{Z} Long integer	1; 1	1; 2	10; 10
2 \mathbb{R} Real number	1; 2	1; 2	10; 2
10 Short integer	1; 1	1; 2	10; 10^{69}

Additionally, explicit DT conversions are available where necessary:

⁷⁴ The result will be the (*short*) integer part of $\log_x y$ here.

A <u>closed</u> object x of DT will be converted in an object x of the DT below by the command printed at the intersection.
1	2	4	5	6	10	
		<i>angle</i>	<i>time</i>	<i>date</i>		
IP	-	-	-	-	IP	1 \mathbb{Z} Long integer
→REAL (press )						2 \mathbb{R} Real number
 ...	-	-	-	-	-	4 Angle
→INT (press )	-	-	-	-	→INT	10 Short integer (of the base specified)

Recognizing Calculator Settings and Status

Some settings are obvious: as seen above, radix marks and gap settings are recognized in the numeric display immediately; so are date and time display modes (Y.MD / D.MY / M.DY and CLK24 / CLK12) in the time string top left in the *status bar*. Also *program-entry mode* (PEM) is easily recognized (see pp. 205ff).

Further modes and system states as well as many settings for specific *data types* are indicated in the *status bar*. The following specific characters may appear trailing the date and time string there, listed below from left to right in various sets – indicators shown in *startup default* are printed in a light blue field again:⁷⁵

Indicator	Set by	Deleted by	Explanation, remarks
\mathbb{C}	CPXRES	\neg CPXRES	With CPXRES set, <i>complex</i> results of <i>real number</i> calculations are allowed, like $\sqrt{-1}$. Else a domain error would be thrown in such a case (see the <i>ReM</i> , App. C).
\mathbb{R}	\neg CPXRES	CPXRES	

⁷⁵ The symbol \neg means “not” (i.e. the trailing *system flag* cleared), while “&” denotes a logical “and” and a comma a logical “or” in this table.