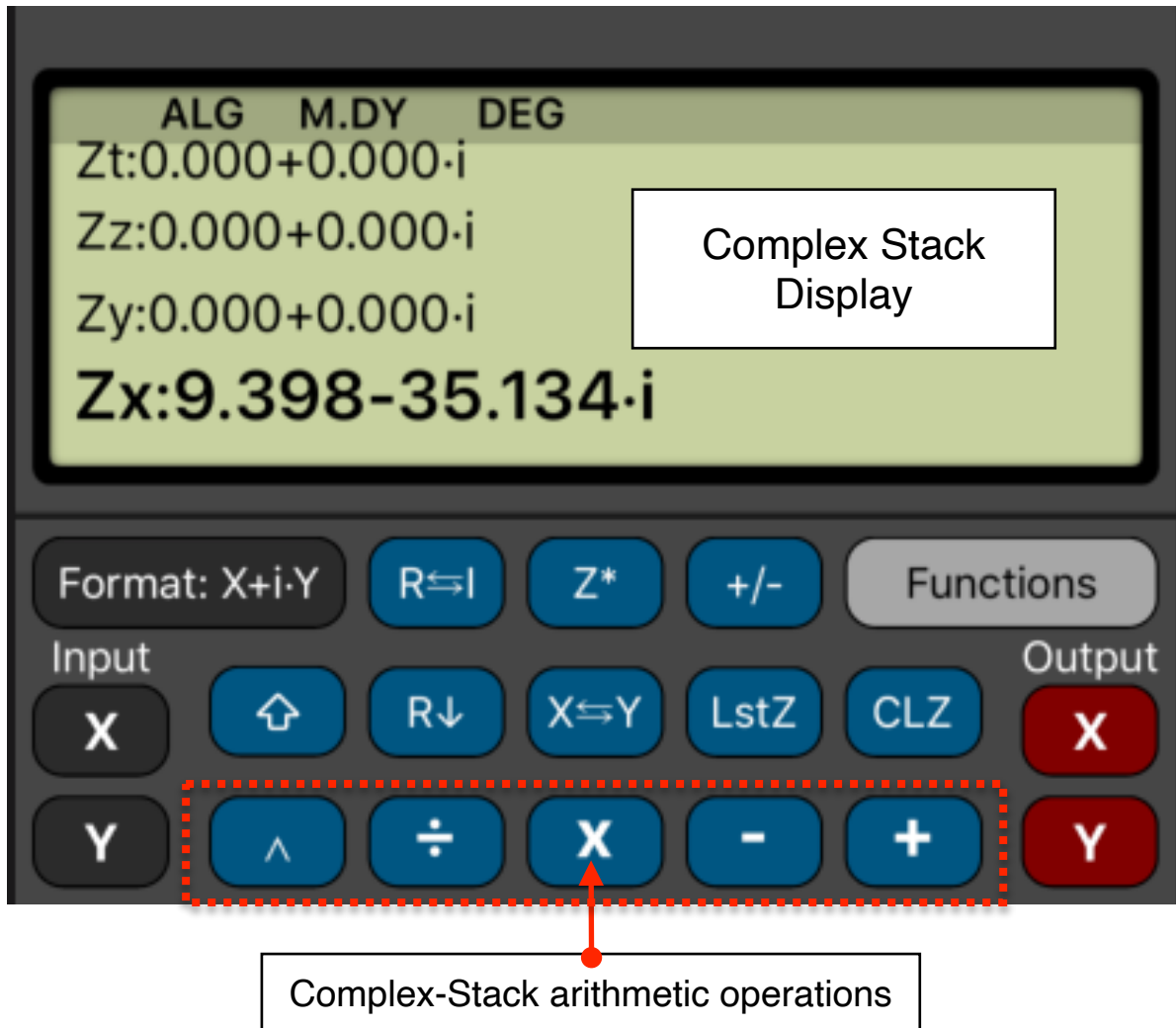


Complex Numbers Menu

This “Complex Numbers” menu implements a stack to perform operations and functions with complex numbers. To show it, touch the “**SCI**” menu, and then select the “Complex Numbers” option.



This “Complex-Stack” is similar to the normal calculator’s history stack, but specially designed for operations with complex numbers. The number are entered in the Complex Stack from the calculator using the “Inputs” buttons. The calculator’s stack-X value is used as the real, imaginary, modulus or angle parts depending of the “Format” button state.

The Complex Stack, operations and functions are completely independent from the calculator and always behaves in the RPN logic.

Complex Numbers Menu Buttons

<p>[Format: X+i·Y] Input [X] Input [Y] Output [X] Output [Y]</p> <p>[Format: R∠θ] Input [R] Input [θ] Output [R] Output [θ]</p>	<p>Rectangular format selected.</p> <ul style="list-style-type: none"> - Input real part of complex number Z_x. - Input imaginary part of complex number Z_x. - Enters real part of Z_x in calculator's stack. - Enters imaginary part of Z_x in calculator's stack. <p>Polar (phasor) format selected.</p> <ul style="list-style-type: none"> - Input modulus of phasor Z_x. - Input angle of phasor Z_x. - Enters modulus of Z_x in calculator's stack. - Enters angle of Z_x in calculator's stack.
<p>[Function▶] [Function▶]</p>	<p>Toggles to show or hide common mathematical function with complex argument.</p>
<p>[R↔I]</p>	<p>Swaps the real and imaginary parts of the Z_x complex number.</p>
<p>[Z*]</p>	<p>Conjugates Z_x (change the sign of the imaginary part).</p>
<p>[+/-]</p>	<p>Change the sign of Z_x (change the sign of the real & imaginary part).</p>
<p>[↑]</p>	<p>Lift the complex-stack duplicating Z_x.</p>
<p>[R↓]</p>	<p>Rolls down the Complex-Stack.</p>
<p>[X↔Y]</p>	<p>Swaps the Complex-Stack Z_x by Z_y.</p>
<p>[LstZ]</p>	<p>Enters the last Z_x number that was just before a function or operation was applied.</p>
<p>[CLZ]</p>	<p>Clears both parts of Z_x to 0.</p>

Complex Numbers Menu Buttons

[^]	Raises Zy to Zx . => Stores Zx in LstZ , drop the stack and put in Zx the result of Zy ^ Zx .
[÷]	Divides Zy by Zx . => Store Zx in LstZ , drop the Stack and put in Zx the result of Zy ÷ Zx .
[x]	Multiplies Zy by Zx . => Store Zx in LstZ , drop the Stack and put in Zx the result of Zy x Zx .
[-]	Subtracts Zx from Zy . => Store Zx in LstZ , drop the Stack and put in Zx the result of Zy - Zx .
[+]	Adds Zy to Zx . => Store Zx in LstZ , drop the Stack and put in Zx the result of Zy + Zx .

Complex Functions:

Additionally to the arithmetic operations for complex numbers, touching the **[Function▶]** button, brings up a common set of functions that can be applied to the **Zx** complex number.

Note: Before applying the function, the number currently in **Zx** is copied to the **LstZ**.

The Complex functions included in the calculator are:

1 / z	Calculates the reciprocal of Zx
\sqrt{z}	Calculates the square of Zx
z²	Calculates the square of Zx
LN	Calculates the Natural Logarithm of Zx
LOG	Calculates the Common Logarithm of Zx
EXP	Calculates the Natural Anti-Logarithm of Zx
ALog	Calculates the Common Anti-Logarithm of Zx
SIN	Calculates the Sine of Zx
COS	Calculates the Cosine of Zx
TAN	Calculates the Tangent of Zx
SIN⁻¹	Calculates the Arc-Sine of Zx
COS⁻¹	Calculates the Arc-Cosine of Zx
TAN⁻¹	Calculates the Arc-Tangent of Zx
HSin	Calculates the Hyperbolic-Sine of Zx
HCos	Calculates the Hyperbolic-Cosine of Zx
HTan	Calculates the Hyperbolic-Tangent of Zx
HSin⁻¹	Calculates the Arc-Hyperbolic-Sine of Zx
HCos⁻¹	Calculates the Arc-Hyperbolic-Cosine of Zx
HTan⁻¹	Calculates the Arc-Hyperbolic-Tangent of Zx

Example 1: (Arithmetic calculation)Evaluate the expression: $[2i \cdot (-8 + 6i)^3] / [(4 - 2i \cdot \sqrt{5}) \cdot (2 - 4i \cdot \sqrt{5})]$

Keystrokes	Description
[CLZ] 2 Input [Y]	Enter the first complex number "2·i". Zx = 0.00 + 2.00·i
8 [+/-] Input [X] 6 Input [Y]	Enter the second complex number "-8 + 6·i". Zx = -8.00 + 6.00·i
3 Input [X]	Enter the exponent number "3 + 0·i". Zx = 3.00 + 0.00·i
Menu key [^]	Calculate $(-8 + 6 \cdot i)^3$. Zx = 352.00 + 936.00·i
Menu key [x]	Calculate $2 \cdot i \cdot (-8 + 6 \cdot i)^3$. Zx = -1,872.00 + 704.00·i
4 Input [X] 5 [Shift] [√x] [x] 2 [=] [+/-] Input [Y]	Calculates $(4 - i \cdot 2 \cdot \sqrt{5})$. Zx = 4.00 - 4.47·i
2 Input [X] 5 [Shift] [√x] [x] 4 [=] [+/-] Input [Y]	Calculates $(2 - i \cdot 4 \cdot \sqrt{5})$. Zx = 2.00 - 8.94·i
Menu key [x]	Calculates $(4 - i \cdot 2 \cdot \sqrt{5}) \cdot (2 - i \cdot 4 \cdot \sqrt{5})$. Zx = -32.00 - 44.72·i
Menu key [÷]	Calculate the final result. Zx = 9.40 - 35.13·i
Output [X] Output [Y]	Enters Zx real and imaginary parts to the calculator's stack.

Solution: (ALG mode, Format: X + i·Y)

Example 2: (Arithmetic calculation)

Calculate the phasor expression: $2 \angle 65^\circ + 3 \angle 40^\circ$

Solution: (DEG mode)

Keystrokes	Description
[Format: R∠Θ]	Set display format to Polar (phasor).
2 Input [R] 65 Input [Θ]	Enter the 1 st phasor. Zx = 2.00 ∠ 65.00
3 Input [R] 40 Input [Θ]	Enter the 2 nd phasor. Zx = 3.00 ∠ 40.00
Menu key [+]	Adds the complex numbers phasors. Zx = 4.89 ∠ 49.96
Output [R] Output [Θ]	Enters Zx modulus and angle to the calculator's stack.