Chapter 10 / **Example 2**

Cartesian and polar form

Write the following complex numbers in polar form:

a $4\sqrt{3}+4\mathrm{i}$ **b** $-2+3\mathrm{i}$ **c** $-12-5\mathrm{i}$ **d** $4-2\mathrm{i}$

Find the modulus and argument of $4\sqrt{3}+4\mathrm{i}$.

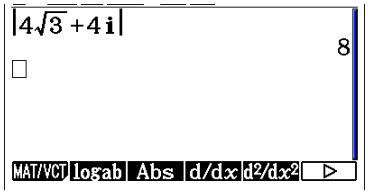
Press MENU 1 to display the Run-Matrix screen for arithmetical calculations.

To enter the modulus function press F4 MATH F3 Abs

Type $4\sqrt{3}+4\mathrm{i}$ and press EXE.

To enter i press SHIFT 0 *i*

$\left|4\sqrt{3}+4\mathrm{i}\right|=8$.



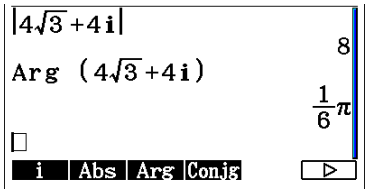
Press OPTN F3 COMPLEX F3 Arg.

Type $\left(4\sqrt{3}+4\mathrm{i}\right)$ and press EXE ⊡

Remember to enclose the complex number in parentheses.

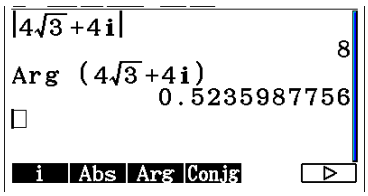
The argument is $\frac{\pi}{6}$.

Hence $4\sqrt{3}+4\mathrm{i}=8\mathrm{e}^{\frac{\pi}{6}\mathrm{i}}=8\,\mathrm{cis}\,\frac{\pi}{6}$.



To find the value of the argument as a decimal press S⇔D ⊡

$\frac{\pi}{6}\approx 0.524$.

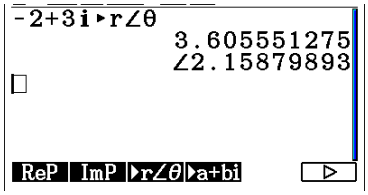


The fx-CG50 will find both the modulus and argument directly.

Type $-2+3\mathrm{i}$.

Press OPTN F3 COMPLEX F6 ▷ F3 ▸∠θ and press EXE ⊡

$-2+3\mathrm{i}=3.61\mathrm{e}^{2.16\mathrm{i}}=3.61\,\mathrm{cis}\,2.16$.



Chapter 10 / **Example 2**

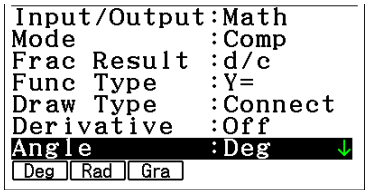
Cartesian and polar form

If the GDC is set in degrees, the GDC attempts to give the number in polar form.

Press SHIFT MENU (SETUP).

Scroll down using ▼ to Angle and change the setting to F1 Deg.

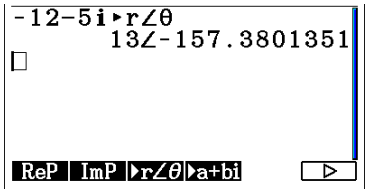
Press EXIT.



Type $-12-5\mathrm{i}$.

Press OPTN F3 COMPLEX F6 ▷ F3 ▸∠θ and press EXE ●

The modulus of $-12-5\mathrm{i}$ is 13 and its argument is −157°.



So, to convert a complex number from Cartesian to polar form, ensure that the GDC is in radian mode.

Type $4-2\mathrm{i}$.

Press OPTN F3 COMPLEX F6 ▷ F3 ▸∠θ and press EXE ●

$4-2\mathrm{i} = 4.47\mathrm{e}^{-0.464\mathrm{i}} = 4.47\,\mathrm{cis}-0.464$.

The GDC will choose a principal value of the argument in the interval $]\pi,\pi]$ but some authors use $[0,2\pi[$.