Chapter 8 / **Example 9**

Powers of complex numbers

a Given $\tan\left(\frac{\pi}{6}\right)=\frac{1}{\sqrt{3}}$ find the modulus and argument of $z=-\sqrt{3}-\mathrm{i}$.

b Find an expression for z^n and hence find the smallest value of n for which $\mathrm{Im}(z_n)=0$ and for this value of n give z^n in Cartesian form.

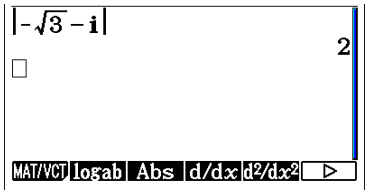
Press [MENU] 1 to display the Run-Matrix screen for arithmetical calculations.

To enter the modulus function press [F4] MATH [F3] Abs.

Type $-\sqrt{3}-\mathrm{i}$ and press [EXE].

To enter i press [SHIFT] 0 ***i***.

$\left|-\sqrt{3}-\mathrm{i}\right|=2$.

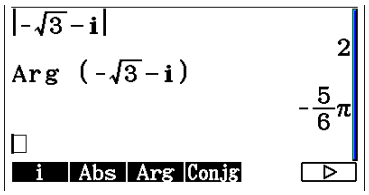


Press [OPTN] [F3] COMPLEX [F3] Arg.

Type $\left(-\sqrt{3}-\mathrm{i}\right)$ and press [EXE] [•]

Remember to enclose the complex number in parentheses.

The argument is $-\frac{5\pi}{6}$.

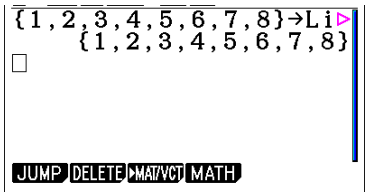


Complex numbers cannot be used in graph, table or recursion modes. However, the use of a list in a complex calculation is supported.

Enter the numbers 1, 2, 3,…, 8 in a list.

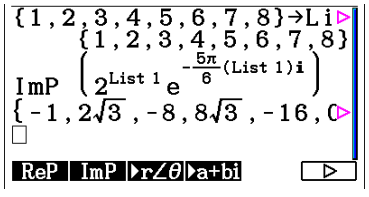
Type {1, 2, 3, 4, 5, 6, 7, 8}.

Press [→], press [SHIFT] [1] [List] type 1 and press [EXE].



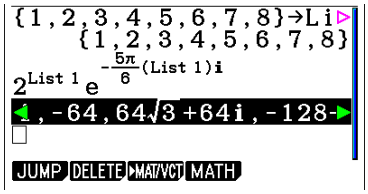
Press [OPTN], [F3] COMPLEX, [F6] ▷, [F2] ImP.

Type $\left(2^{List1}e^{-\frac{5\pi}{6}(List1)i}\right)$ and press [EXE].



Chapter 8 / **Example 9**

Powers of complex numbers

Press ▲ T and then use ▶ to scroll through the list. The sixth term in the list is 0. Hence the smallest value of n for which $\text{imag}\left(2^n e^{-\frac{5\pi}{6}ni}\right) = 0$ is 6.	
Type $2^6 e^{-\frac{5\pi}{6}\times 6i}$ and press EXE. $2^6 e^{-\frac{5\pi}{6}6i} = -64$.