

## Chapter 10 / Example 3

## Cartesian and polar form

Write the following complex numbers in Cartesian form. Check your answer by using technology.

**a**  $2\text{cis}\frac{\pi}{3}$     **b**  $5e^{i\frac{3\pi}{4}}$     **c**  $8\text{cis}\frac{11\pi}{6}$     **d**  $e^{i\frac{17\pi}{12}}$

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

Complex numbers can be entered in polar form.

Type 2 **SHIFT** **X,θ,T** (**∠**)  $\frac{\pi}{3}$  **▢** pressing **▢** to use the fraction template.

The screen displays the polar form  $2\angle\frac{\pi}{3}$ . The top status bar shows 'Math(Rad|Norm1) d/c|Real'. The bottom navigation bar includes 'JUMP', 'DELETE', 'MAT/VCT', and 'MATH'.

Press **EXE**.

Since the default format of complex numbers is Cartesian, the GDC converts from polar to Cartesian without needing to enter any additional command.

$$2\text{cis}\frac{\pi}{3} = 1 + \sqrt{3}i = 1 + 1.73i$$

The screen displays the Cartesian form  $1 + \sqrt{3}i$ . The top status bar shows 'Math(Rad|Norm1) d/c|Real'. The bottom navigation bar includes 'JUMP', 'DELETE', 'MAT/VCT', and 'MATH'.

Type  $5e^{i\frac{3\pi}{4}}$  using **SHIFT** **In**  $e^x$  and press **EXE**.

$$5e^{i\frac{3\pi}{4}} = -\frac{5\sqrt{2}}{2} + \frac{5\sqrt{2}}{2}i = -3.54 + 3.54i$$

The screen displays the Cartesian form  $-3.54 + 3.54i$ . The top status bar shows 'Math(Rad|Norm1) d/c|Real'. The bottom navigation bar includes 'JUMP', 'DELETE', 'MAT/VCT', and 'MATH'.

Type  $8\angle\frac{11\pi}{6}$  and press **EXE**.

$$8\text{cis}\frac{11\pi}{6} = 4\sqrt{3} - 4i = 6.93 - 4i$$

The screen displays the Cartesian form  $4\sqrt{3} - 4i$ . The top status bar shows 'Math(Rad|Norm1) d/c|Real'. The bottom navigation bar includes 'JUMP', 'DELETE', 'MAT/VCT', and 'MATH'.

Type  $e^{i\frac{17\pi}{12}}$  and press **EXE**.

$$e^{i\frac{17\pi}{12}} = \frac{-\sqrt{6} + \sqrt{2}}{4} - \frac{\sqrt{6} + \sqrt{2}}{4}i = -0.259 - 0.966i$$

The screen displays the Cartesian form  $-0.259 - 0.966i$ . The top status bar shows 'Math(Rad|Norm1) d/c|Real'. The bottom navigation bar includes 'JUMP', 'DELETE', 'MAT/VCT', and 'MATH'.