Step-1

Given that $(A+iB)(x+iy)=Ax+iBx+iAy-By$ where $i^2=-1$.We have to use blocks to separate the real part from the imaginary part that multiplies i

Step-2

Since by block multiplication from $\begin{bmatrix} A & -B \\ iB & iA \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix}$ we get

Real part is $\begin{pmatrix} A & -B \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix}=(Ax-By)$

Imaginary part $\begin{pmatrix} iB & iA \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix}=\boxed{(iBx+iAy)}$