Write each expression in the standard form for a complex number, a + bi.
a. [3(cos(27°) + isin(27°))]5
b. [2(cos(40°) + isin(40°))]6

Solution.

We will use the De Moivre's formula

$$(\cos x + i \sin x)^n = \cos nx + i \sin nx$$

That is,

$$a. [3(\cos(27°) + i \sin(27°))]^5 = 3^5[(\cos(5*27°) + i \sin(5*27°))]$$
$$= 3^5(\cos(135°) + i \sin(135°)) = 243 * \left(-\frac{1}{\sqrt{2}}\right) + 243i * \frac{1}{\sqrt{2}}) = \frac{-243}{\sqrt{2}} + \frac{243}{\sqrt{2}}i$$

$$b. \left[2\big(\cos(40°) + i\sin(40°)\big)\right]^6 = 2^6\big(\cos(240°) + i\sin(240°)\big) = 64 * \left(-\frac{1}{2}\right) + 64i\left(-\frac{\sqrt{3}}{2}\right)$$
$$= -32 - 32\sqrt{3}i$$

Answer. $a. \frac{-243}{\sqrt{2}} + \frac{243}{\sqrt{2}}i$ $b. -32 - 32\sqrt{3}i.$