By the theorem†, $\mathbf{a} \cdot \mathbf{b} = |\mathbf{a}| \, |\mathbf{b}| \cos \theta = (6)(3) \cos \frac{2\pi}{3} = 18 \left(-\frac{1}{2}\right) = -9$

†

Theorem   If θ is the angle between the vectors **a** and **b**, then

$$\mathbf{a} \cdot \mathbf{b} = |\mathbf{a}| \, |\mathbf{b}| \cos \theta$$