By Green's Theorem,

$W = \int_C \mathbf{F} \cdot d\mathbf{r} = \int_C 8x\,dx + (x^3 + 3xy^2)\,dy = \iint_D (3x^2 + 3y^2 - 0)\,dA,$

where D is the semicircular region bounded by C. Converting to polar coordinates, we have

$W = 3 \int_0^1 \int_0^\pi r^2 \cdot r\,d\theta\,dr = 3\pi\left[\frac{1}{4}r^4\right]_0^1 = \frac{3}{4}\pi.$