

$$\int 4 \ln(x^2) dx$$

Solution

$$\int 4 \ln(x^2) dx = 4 \int \ln(x^2) dx = 4 \int 2 \ln(x) dx = 8 \int \ln x dx.$$

We need to integrate $\ln x$, which we do by parts: let $u = \ln x$ and $dv = dx$. So $du = \frac{1}{x} dx$ and $v = x$. Thus,

$$\int \ln x dx = x \ln x - \int x \cdot \frac{1}{x} dx = x \ln x - \int 1 dx = x \ln x - x + C.$$

Thus

$$\int 4 \ln(x^2) dx = 8(x \ln x - x) + C.$$