For the DE of the form $\frac{dy}{dx} + f(x) \bullet y = g(x)$,

We will multiply both sides by an integrating factor given by $e^{\int f(x)dx}$, such that the above becomes

$$e^{\int f(x)dx} \bullet \frac{dy}{dx} + \left[f(x) e^{\int f(x)dx} \right] \bullet y = e^{\int f(x)dx} g(x) = h(x), \text{ where } \quad h(x) = e^{\int f(x)dx} g(x)$$

This is equivalent through reduction (by the product rule for the LHS) to

$$\frac{d}{dx}\left[y e^{\int f(x)dx} \right] = h(x)$$

Integrating both sides $wrt\ x$ gives $y e^{\int f(x)dx} = \int h(x)dx + C$

Therefore, the general solution is $y = \left[e^{-\int f(x)dx} \right] \bullet \left[\int h(x)dx + C \right]$ (shown)