18. (a) We recall that a derivative with respect to a dimensional quantity carries the (reciprocal) units of that quantity. Thus, the first term in Eq. 40-18 has dimensions of ψ multiplied by dimensions of x^{-2}. The second term contains no derivatives, does contain ψ, and involves several other factors that (as we show below) turn out to have dimensions of x^{-2}:

$$\frac{8\pi^2 m}{h^2}\,[E-U(x)] \quad\Longrightarrow\quad \frac{\mathrm{kg}}{(\mathrm{J}\cdot\mathrm{s})^2}[\mathrm{J}]$$

assuming SI units. Recalling from Eq. 7-9 that $\mathrm{J} = \mathrm{kg}\cdot\mathrm{m}^2/\mathrm{s}^2$, then we see the above is indeed in units of m^{-2} (which means dimensions of x^{-2}).

(b) In one-dimensional Quantum Physics, the wavefunction has units of $\mathrm{m}^{-1/2}$ as Sample Problem 40-2 shows. Thus, since each term in Eq. 40-18 has units of ψ multiplied by units of x^{-2}, then those units are $\mathrm{m}^{-1/2}\cdot\mathrm{m}^{-2} = \mathrm{m}^{-2.5}$.