In-class problem linked to lecture pages 257-266

Suppose that a quantity being transported diffusively is measured in units of $\otimes$ and that its density Q in a certain region of space varies as ax^3. In terms of $\otimes$, kg, m, and s, what are the units of

(a) Q ?

(b) a ?

(c) the diffusion constant D ?

In class problem linked to pages 257-266.

unit: (x)

(a) density ρ: $Q = ax^3 = \frac{(x)}{\text{volume}} = \frac{(x)}{m^3}$

(b) $ax^3 = \frac{(x)}{m^3}$, $\Rightarrow a = \frac{(x)}{m^6}$

(c) $D = \frac{nl\bar{v}}{6} = \text{number} \cdot m \cdot \frac{m}{s}$