6.8. For two particles with extremely uneven balance between their mass, the CM frame is essentially the rest frame of the heavier particle. In CM, the cross section is given by.

$$\frac{d\sigma}{d\Omega} = \left(\frac{\hbar c}{8\pi}\right)^2 \frac{S|\mathcal{M}|^2}{(E_1 + E_2)^2} \cdot \frac{|\vec{P_f}|}{|\vec{P_i}|}$$

we take the limit of $\frac{m_A}{m_B} \ll 1$, the process

being elastic with no recoil implies $\frac{|\vec{P_f}|}{|\vec{P_i}|} = 1$.

Since the particles are distinguishable, $S = 1$.

Then
$$\frac{d\sigma}{d\Omega} = \left(\frac{\hbar c}{8\pi}\right)^2 \frac{|\mathcal{M}|^2}{m_B^2 c^4}$$