6. During a small period of time Δt, the mass of the cart changes

$\Delta m = A\,\Delta t$. here $A = 1.2\,kg/s$.

The momentum before Δt and after Δt is P_0. P_0 is constant due to momentum conservation.

Then. $P_0 = mv \Rightarrow v = \frac{P_0}{m}$

$$a = \frac{dv}{dt} = P_0 \frac{d\frac{1}{m}}{dt} = -\frac{P_0}{m^2}\frac{dm}{dt} = -\frac{P_0 A}{m^2} = -\frac{mvA}{m^2}$$

$$= -\frac{Av}{m}$$

So $a = -1.2 \times 0.54 / 21 = -0.03\ m/s^2$ at a certain instant.

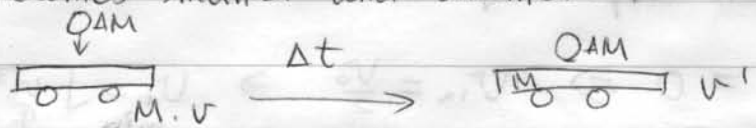
from $a = -\frac{P_0 A}{m^2}$ $\quad m = m_0 + At$

$$a = -P_0 A\,(m_0 + At)^{-2}$$

$$= -13.608\,(21 + 1.2t)^{-2}$$

So $|a|$ becomes smaller and smaller.

Another way,



$\Delta M = A\,\Delta t$

$F = \frac{\Delta P}{\Delta t}$ $\quad \Delta p = Mv' - Mv = M(v' - v)$ $\qquad (M + \Delta M)v' = Mv$

$$F = \frac{M\left(\frac{M}{M+\Delta M} - 1\right)v}{\Delta t} = -\frac{\Delta M v}{\Delta t} = -Av$$

$= Ma \quad \Rightarrow \quad a = \frac{F}{m} = -\frac{Av}{m}$ get the same result.