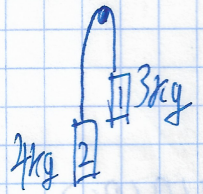
7.



对2: $\vec{a_2} = \frac{m_2 g - m_1 g}{m_2}$

$= 10 - 7.5 = 2.5\ m/s$

对1: $\vec{a_1} = \vec{a_2} = 2.5\ m/s$

对2: $\vec{a_2} = \frac{m_2 g - F_T}{m_2}$

对1: $a_1 = \frac{F_T - m_1 g}{m_1}$

$a_1 = a_2 \Rightarrow F_T = \frac{240}{7} N$

$a_2 = a_1 = a_2 = \frac{10}{7}\ m/s^2$

$a_1 = \frac{1}{2}(a_1 + a_2)t^2 = 3$

$t = \sqrt{\frac{6}{\frac{20}{7}}}$

$= \sqrt{\frac{21}{10}}\ s = \sqrt{2.1}\ s \approx 1.4\ s$