

Going up

① Givens

$$m_{cab} = 1360\text{kg}$$

$$m_{capacity} = 1200\text{kg}$$

$$m_T = m_{cab} + m_{capacity} = 1360\text{kg} + 1200\text{kg} = 2560\text{kg}$$

$$\vec{a}_{su} = 0.2\text{m/s}^2[U]$$

$$\vec{a}_{sd} = 0.6\text{m/s}^2[D]$$

$$\vec{g} = 9.81\text{m/s}^2[D]$$

② Rearrange

$$\Sigma \vec{F} = \vec{F}_{net}$$

$$\vec{F}_{net} = \vec{F}_g + \vec{F}_t$$

$$\vec{F}_g + \vec{F}_t = m\vec{a}$$

$$\vec{F}_t = m\vec{a} - \vec{F}_g$$

$$\vec{F}_t = m\vec{a} - m\vec{g}$$

③ Solve for speeding up

$$\vec{F}_t = m_T \vec{a}_{su} - m\vec{g}$$

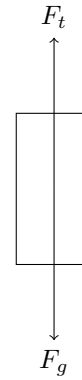
$$\vec{F}_t = (2560\text{kg})(0.2\text{m/s}^2) - (2560\text{kg})(-9.81\text{m/s}^2)$$

$$\vec{F}_t = (512\text{N}) - (-25113.6\text{N})$$

$$\vec{F}_t = 25625.6\text{N}$$

$$\boxed{\vec{F}_t = 25625.6\text{N}[U]}$$

U^+
↑
 D^-



④ Solve for slowing down

$$\vec{F}_t = m_T \vec{a}_{sd} - m\vec{g}$$

$$\vec{F}_t = (2560\text{kg})(-0.6\text{m/s}^2) - (2560\text{kg})(-9.81\text{m/s}^2)$$

$$\vec{F}_t = (-1536\text{N}) - (-25113.6\text{N})$$

$$\vec{F}_t = 26649.6\text{N}$$

$$\boxed{\vec{F}_t = 26649.6\text{N}[U]}$$