Worksheet 1

7) a. System C → two "towing" masses

b. System A → least total mass

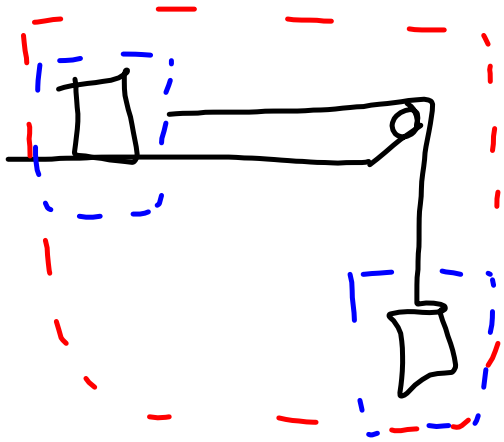
$$a = \frac{\text{towing force}}{\text{total mass}}$$

c. System A: $a = \frac{Ma_g}{2M} = \frac{a_g}{2} = 4.9\ m/s^2$

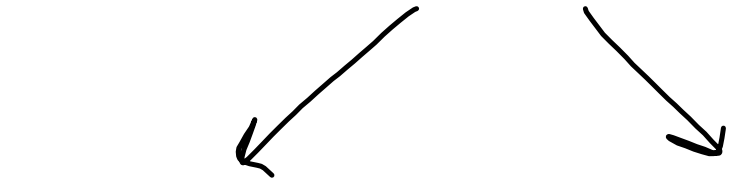
System B: $a = \frac{Ma_g}{3M} = \frac{a_g}{3} = 3.26\ m/s^2$

System C: $a = \frac{2Ma_g}{3M} = \frac{2a_g}{3} = 6.53\ m/s^2$

System → what we are looking at



Is there acceleration?



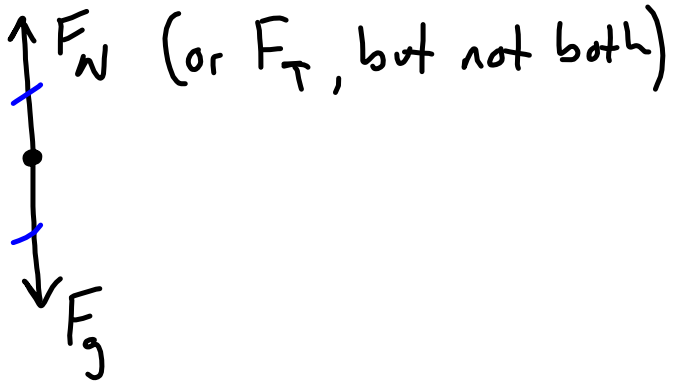
Yes

$\sum \vec{F} = m\vec{a}$

No

$\sum \vec{F} = \emptyset$

1) a.



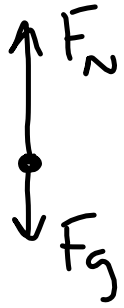
$\uparrow^+$

b. $\sum \vec{F} = \emptyset$ (moving with constant velocity)

$F_N - F_g = \emptyset$

$F_N = F_g = ma_g = (85\,kg)(9.8\,m/s^2) = 833N$

2. a.



$\uparrow^+$

b. $\sum \vec{F} = m\vec{a}$

$$F_N - F_g = ma$$

$$F_N = F_g + ma$$

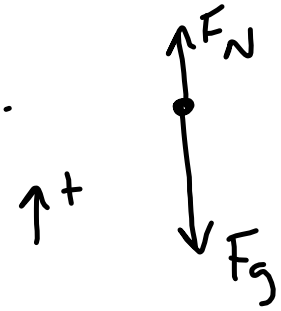
$$= ma_g + ma$$

$$= m(a_g + a)$$

$$= (85\,kg)(9.8\,m/s^2 + 2\,m/s^2)$$

$$= 1003\,N$$

3) a.



b. $\sum \bar{F} = m\bar{a}$

$F_N - F_g = ma$

$F_N = F_g + ma$

$= (85\,kg)(9.8\,m/s^2) + (85\,kg)(-3\,m/s^2)$

c. $= 578\,N$