PP|168

6.

$m = 1.2\times10^3\ kg$

$\vec{V}_1 = 45 km/h\ [W]$ → $\frac{45000m}{3600s}$ → $12.5 m/s$

$\vec{V}_2 = 0 km/h$

$\Delta d = 35 m$

(boxed values) → a

$\mu = ?$

① Find the acceleration:

$$V_2^2 = V_1^2 + 2a\Delta d$$

$$V_2^2 - V_1^2 = 2a\Delta d$$

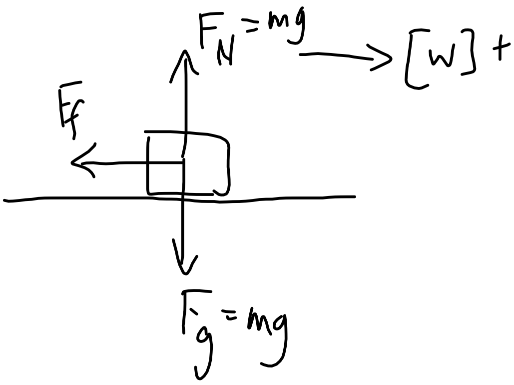
$$a = \frac{V_2^2 - V_1^2}{2\Delta d}$$

$$a = \frac{0 - (12.5 m/s)^2}{2(35m)}$$

$$a = -2.232 m/s^2$$

$$\vec{a} = 2.232 m/s^2\ [E]$$

② Find F_f:



$$\vec{F}_{net} = m\vec{a}$$

$$-F_f = ma$$

$$-F_f = (1.2\times10^3 kg)(-2.232 m/s^2)$$

$$F_f = 2678.57 N$$

③ Find μ:

$$F_f = \mu F_N$$

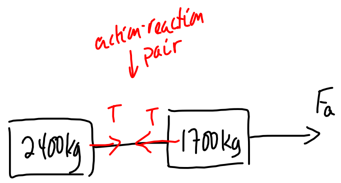
$$\mu = \frac{F_f}{F_N}$$

$$\mu = \frac{2678.57N}{(1.2\times10^3 kg)(9.81 m/s^2)}$$

$$\mu = 0.23$$

PP|182

18.



$V_1 = 0$

$V_2 = 15 km/h$ $\frac{15000 m}{3600 s}$ 4.17 m/s

$\Delta t = 11 s$

① Find the acceleration

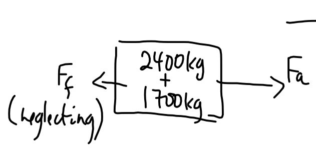
$a = \frac{\Delta V}{\Delta t}$

$a = \frac{V_2 - V_1}{\Delta t}$

$a = \frac{4.17 m/s - 0}{11 s}$

$a = 0.378 m/s^2$

② Find F_a:



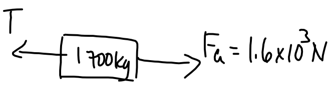
$\vec{F}_{net} = m\vec{a}$

$F_a = (4100 kg)(0.378 m/s^2)$

$F_a \doteq 1.6 \times 10^3 N$

③ Find T:

Consider the car: $a = 0.378 m/s^2$ →



$\vec{F}_{net} = m\vec{a}$

$F_a - T = ma$

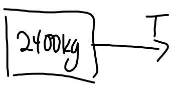
$1.6 \times 10^3 N - T = (1700 kg)(0.378 m/s^2)$

(1553.03) → $1.6 \times 10^3 N - T = 643.2 N$

$T \doteq 9.1 \times 10^2 N$

OR

Consider the truck: $a = 0.378 m/s^2$ →



$\vec{F}_{net} = m\vec{a}$

$T = (2400 kg)(0.378 m/s^2)$

$T = 9.1 \times 10^2 N$

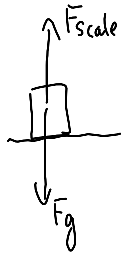
MP|184 - Apparent Weight

$m = 55\,kg$

a) $F_{scale} = ?$ (not moving)

b) $F_{scale} = ?$ ($\vec{a} = 0.75\,m/s^2$ [up])

a) Not moving:



$a = 0$

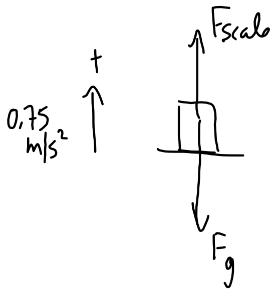
$F_{scale} = F_g$

$F_{scale} = mg$

$F_{scale} = (55\,kg)(9.81\,m/s^2)$

$F_{scale} = 5.4 \times 10^2\,N$ (539.55 N)

b) moving with $\vec{a} = 0.75\,m/s^2$ [up]



$\vec{F}_{net} = m\vec{a}$

$F_{scale} - F_g = ma$ $\quad -9.81\,m/s^2$

$F_{scale} - 539.55\,N = (55\,kg)(0.75\,m/s^2)$

$F_{scale} - 539.55\,N = 41.25\,N$

$F_{scale} = 580.8\,N$

$F_{scale} = 5.8 \times 10^2\,N$

feel heavier when there is upward acceleration
(up | speeding up
or
down | slowing down)

You would feel lighter when there is downward acceleration
(up | slowing down)
(down | speeding up)

If someone cuts the elevator cable, then the acceleration is $-9.81\,m/s^2$ and you feel weightless since F_{scale} will be zero.

TODO:
① PP|186
② Review → see webpage