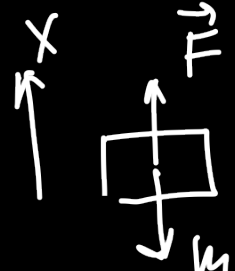
Homework 8

N1. → m the same

$$W_{moon} = \frac{W_{Earth}}{6} = \frac{mg}{6}$$

N2.



$$F_{Net} = F - mg = 10\,N$$

$$\rightarrow \quad m \cdot a = F_{Net} \rightarrow \boxed{a = 5\ \frac{m}{s^2}}$$

N3.

$$W_{grav} = m_{grav.} \cdot g$$

2nd Newton's law: $\boxed{F_{Net} = m_{in.} \cdot a}$

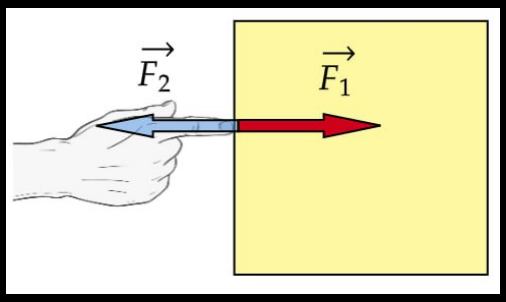
$$F_{Net} = W_{grav} = \underline{2 * m_{ch}} \cdot g$$

$$2 \times m_{ch} \cdot g = m_{ch} \cdot a$$

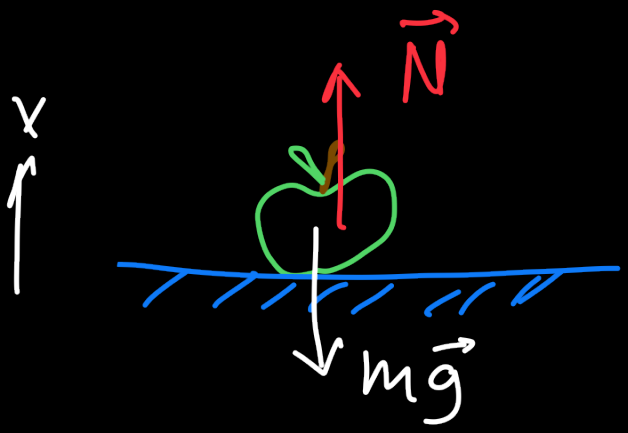
$$\rightarrow \quad a_{free\ fall} = 2 * g = 20\ \frac{m}{s^2}$$

Recall: Newton's 3rd law

$$\vec{F}_2 = -\vec{F}_1$$



Normal Force $\vec{N}$



apple is on the table at rest!

$$N - mg = 0 \Rightarrow \boxed{N = mg}$$

Newton's 3rd law:

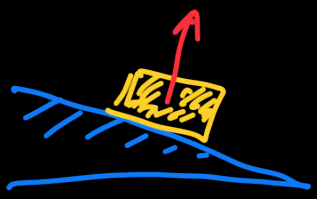
$$\boxed{\vec{N} = -m\vec{g}}$$

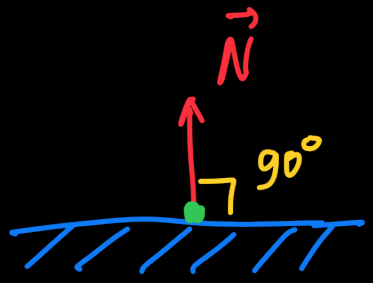
Elastic Forces:

trampoline

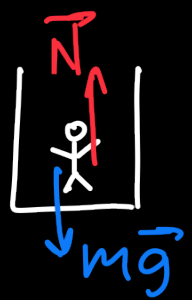
table is much stiffer, but there are still small deformations that cause elastic forces to push back.

Why normal ?





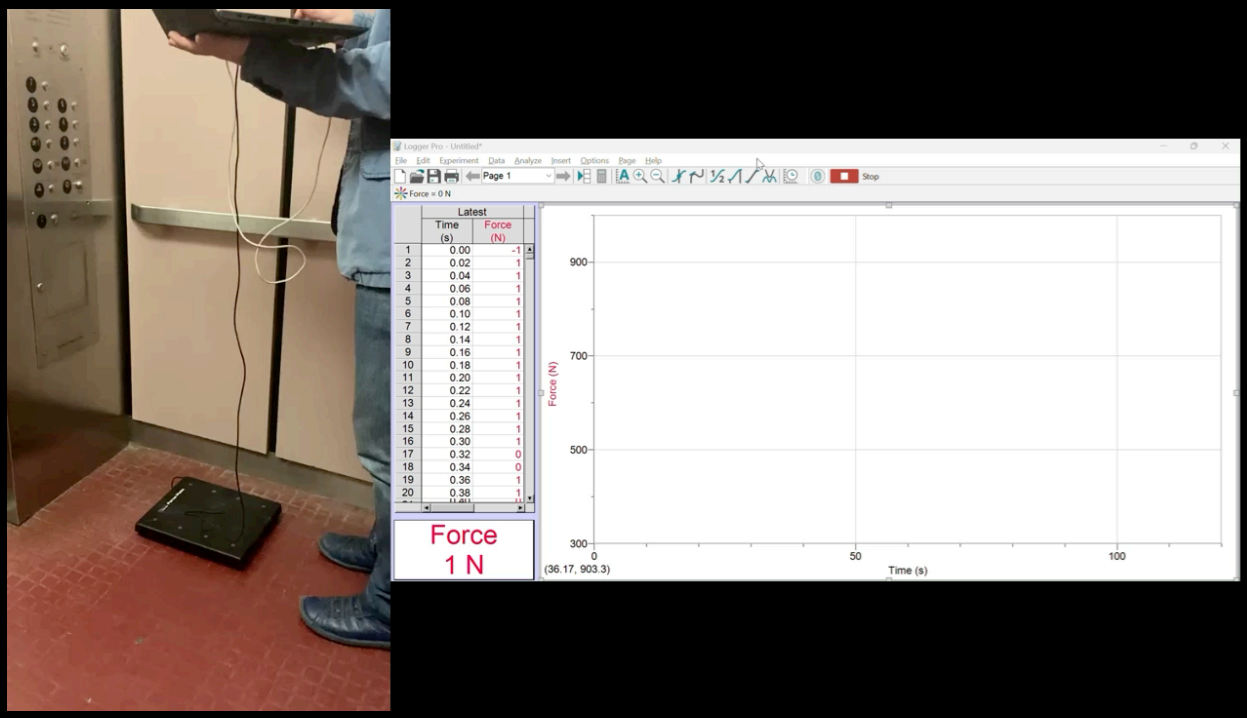
You are in an elevator

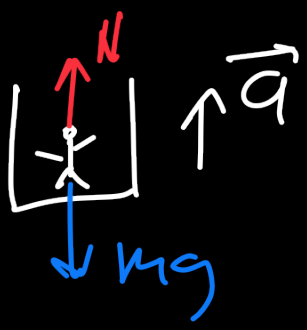


Forces: gravity
Normal Force.

Newton's 3rd Law: $\vec{N} = ?$

$N > mg$, $N = W_{scale}$.





$$N - mg = m \cdot a$$

$$\Downarrow$$

$$\boxed{N = mg + m \cdot a}$$

by the 3rd Newton's law:

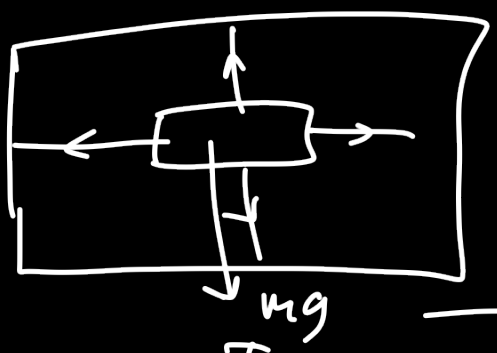
$$W_{scale} = mg + ma$$

elevator moving down:

$$N - mg = -ma \Rightarrow \boxed{N = mg - ma}$$

HW 8

N4.*



$$F^{t.}_{horizontal} = T_2 - T_1 = 15\,N$$

$$\Rightarrow \quad F^{t.}_{vertical} = T_4 - T_3 = 30\,N$$

$$F^{t.}_{vert.} - mg = 0 \rightarrow \boxed{m = 3kg}$$

$$F^{t}_{hor.} = ma$$

$$15\,N = 3kg \cdot a \Rightarrow \boxed{a = 5\,\frac{m}{s^2}}$$