Homework 10

N1.

Inertial:

w.r.t. still objects
car with $\vec{v} = \text{const}$
w.r.t. to the ball -"-
ship with $\vec{v} = \text{const}$

Non-inertial:

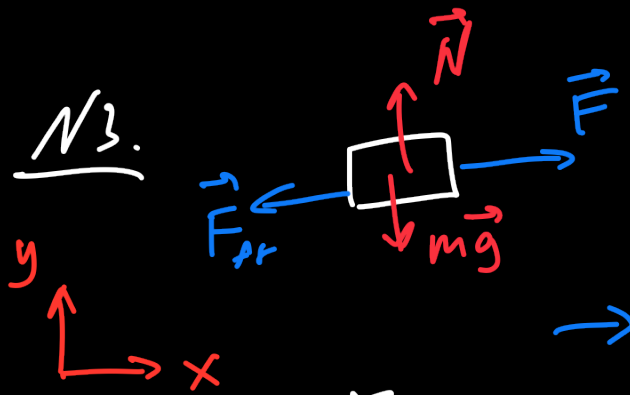
car, when breaking
airplane during take off
train, slowing down

N2.

$\vec{F}_{fr.} = -50N$

static !

N3.



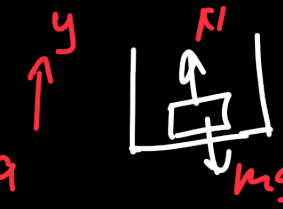
y-dir.: $N - mg = 0$

x-dir.: $F - F_{fr} = 0$ ($= m \cdot a$)

$\rightarrow$

$$F_{fr.} = \mu \cdot N = \frac{1}{2} \cdot 100\,N = 50N$$

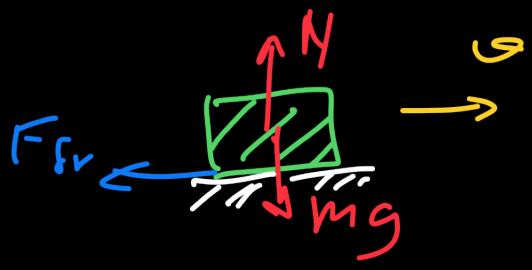
N4. when accel. upward



y-dir: $N - mg = ma$

$N = mg + mg \Rightarrow \mu \cdot N$

Recall: forces of friction.



What affects magnitude of F_{fr}:

a) mass of an object √√√√√

x b) velocity √√

c) properties of a surface √√√√√

$$F_{fr} = \mu \cdot N$$

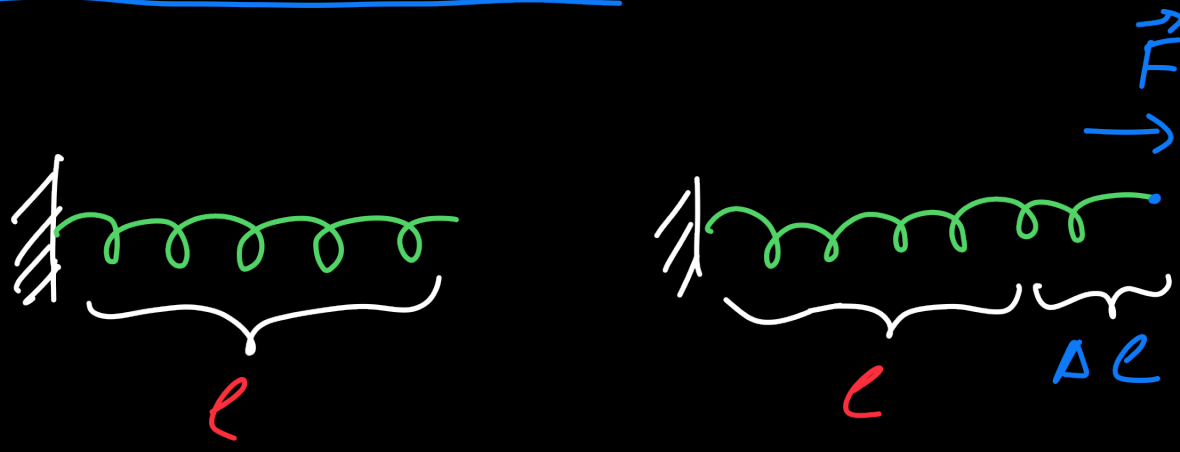
very smooth surface → $\mu \approx 0$

So far, we discussed:

- Gravity force
- Normal force
- Friction force

Elastic force.

Elastic forces.

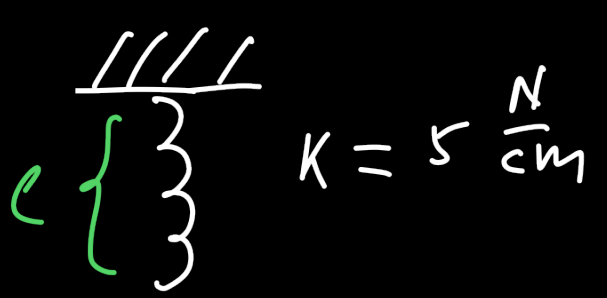


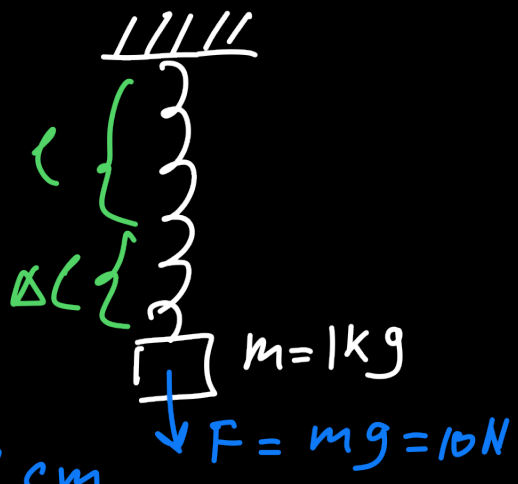
Hooke's law:

spring constant "stiffness"

$$F = K \cdot \Delta \ell$$

$K \rightarrow$ units $\left[\frac{N}{cm.}, \frac{N}{m}\right]$





$$F = K \cdot \Delta \ell$$

$$\Delta \ell = \frac{F}{K} = \frac{10N}{5 \frac{N}{cm}} = 2cm.$$