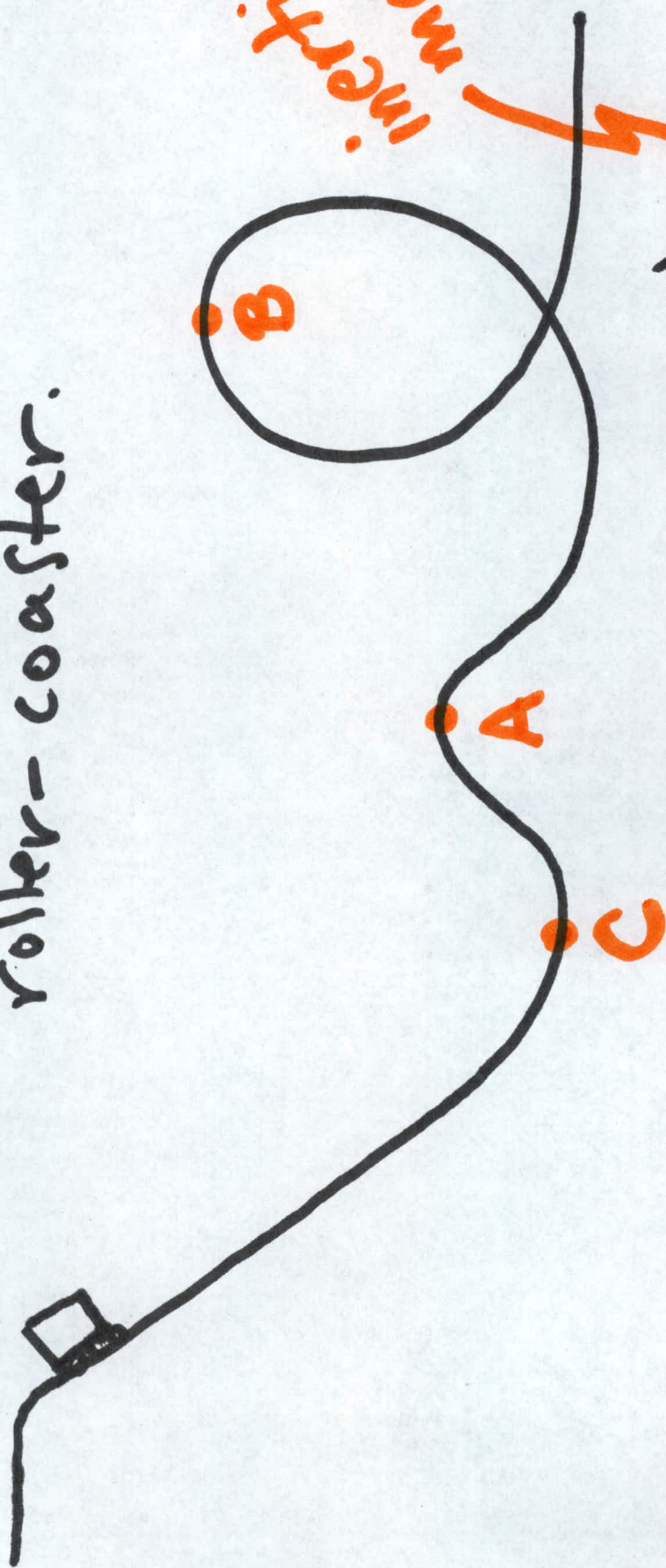


roller-coaster.



inertial  
mass

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

① "mass" in

is the same as the "mass"

$$\vec{F}_g = m\vec{g}$$

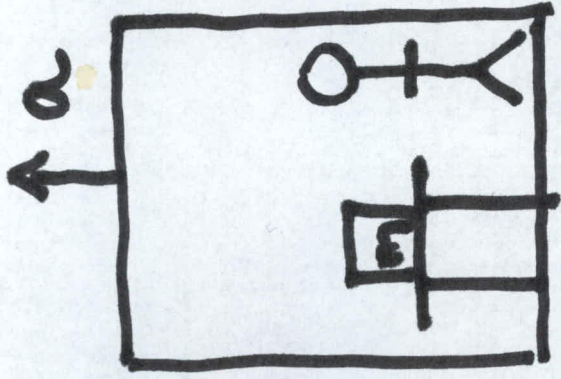
gravitational  
mass

Equivalence

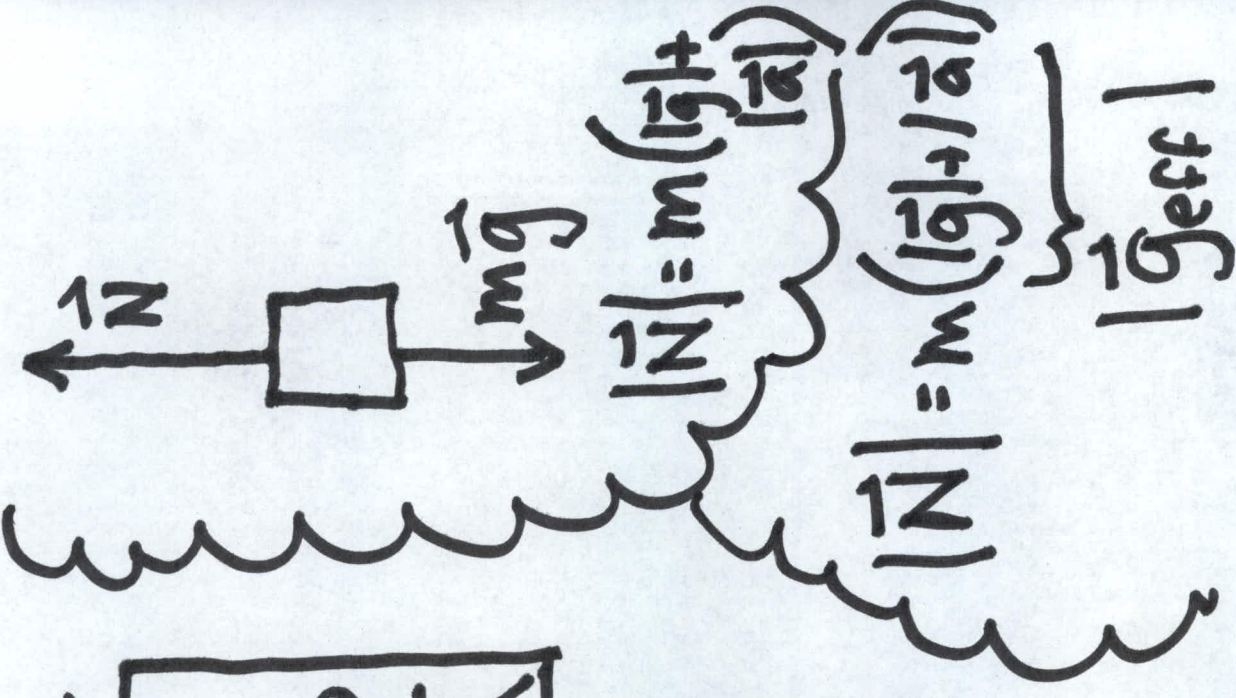
Principle



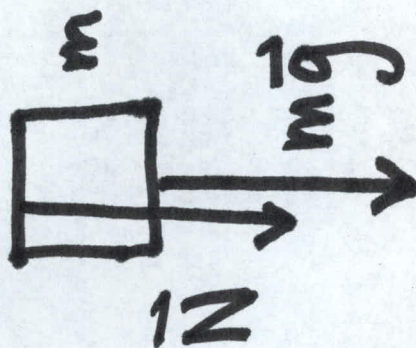
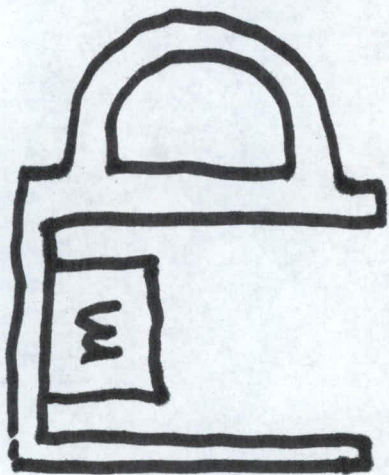
# Equivalence } ② Principle }



"You can't tell the difference between a gravitational force and an acceleration"



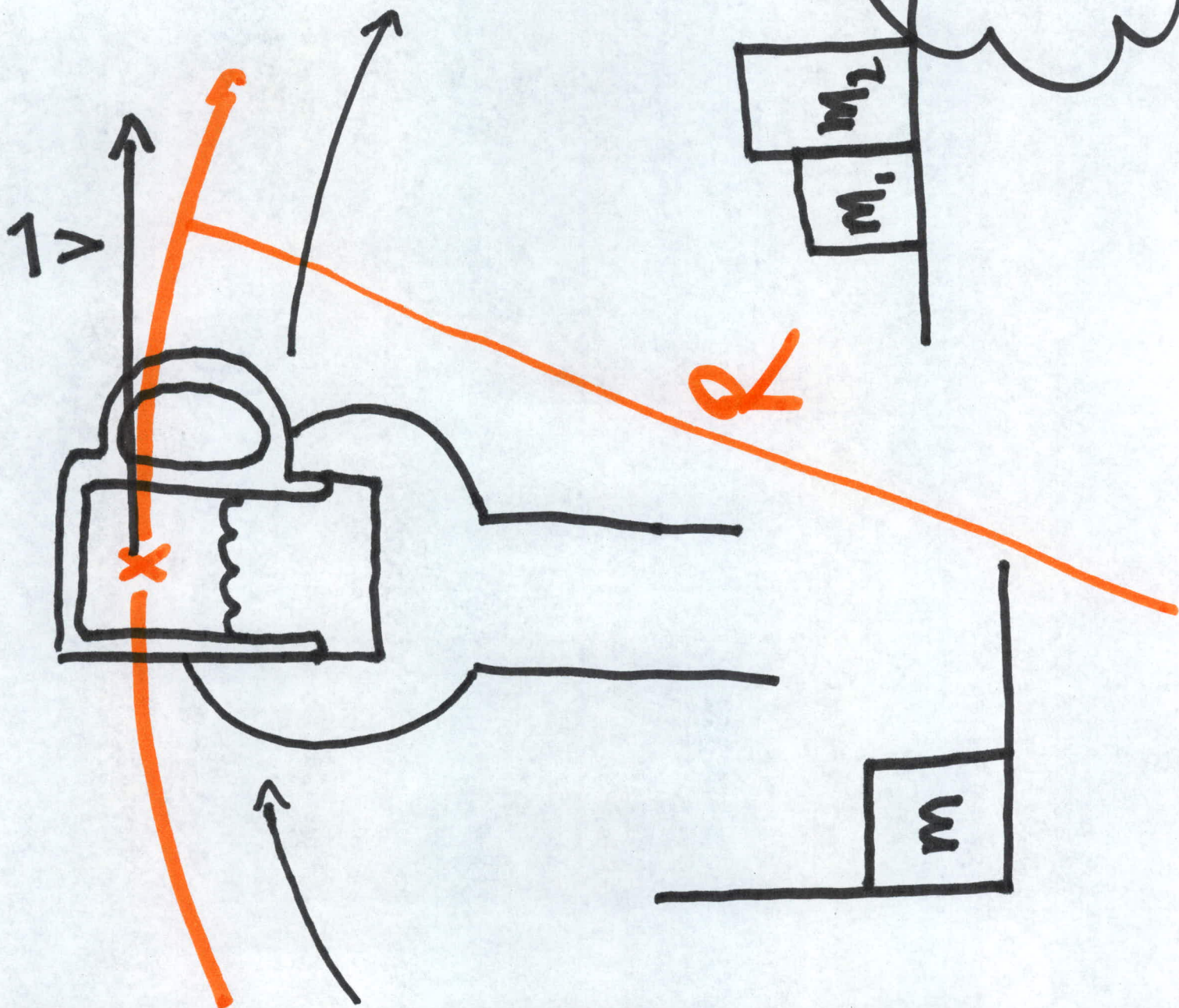




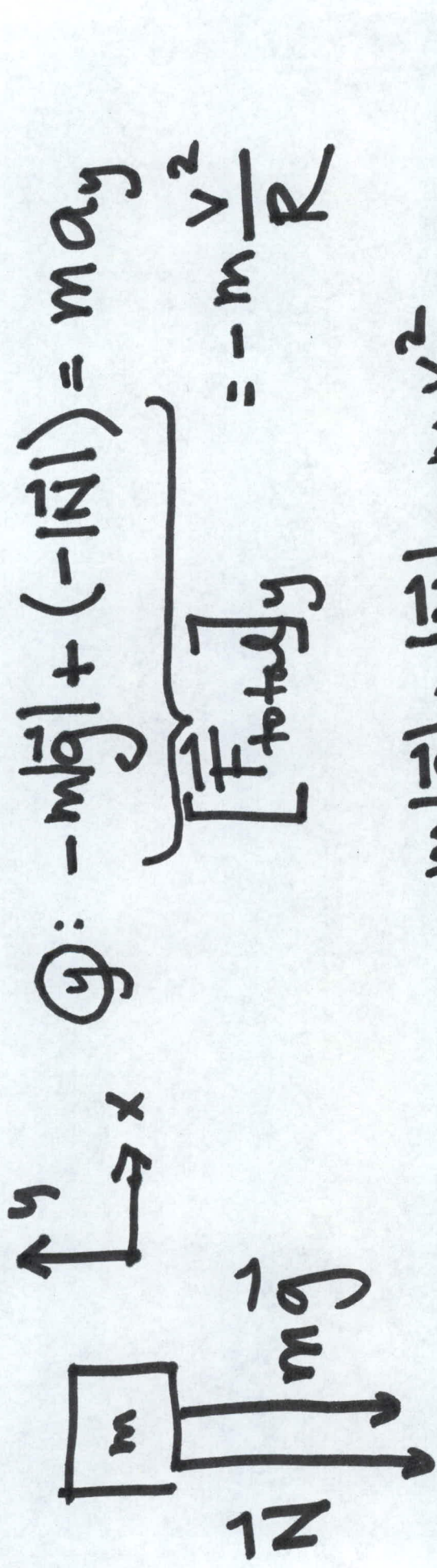
Free-body

diagram:

forces ONLY.







$$m|\vec{g}| + |\vec{N}| = m \frac{v^2}{R}$$

$$|\vec{N}| = m \frac{v^2}{R} - m|\vec{g}|$$

relationship between

$|\vec{N}|$  and  $v$  (speed)

If I want  $|\vec{N}| > 0$ , I need

$$\frac{mv^2}{R} > mg \quad v^2 > gR$$

$|\vec{N}|$  is +ve if  $v^2 > gR$

$|\vec{N}| > 0$  if  $v^2 > gR$

