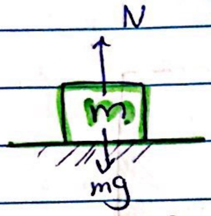
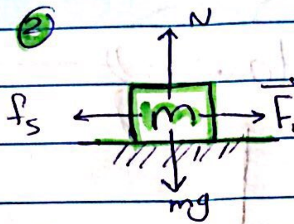
UPLOAED BY AHMAD JUNDI

Force & motion II

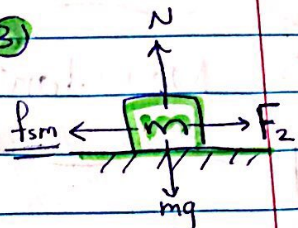
① 

"no motion, no friction"

② 

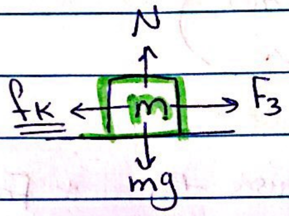
"no motion"

$f_s = F_1$

③ 

"about to move"

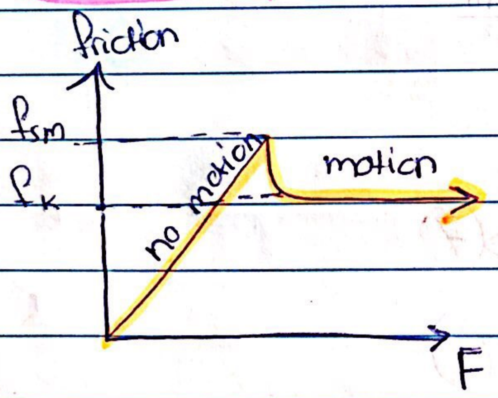
Friction Force

④ 

"there is motion"

معامل الاحتكاك السكوني $\Rightarrow f_{sm} = \mu_s N$, μ_s - Coefficient of static friction.

معامل الاحتكاك الحركي $\Rightarrow f_K = \mu_K N$, μ_K = Coefficient of kinatic friction.



$\mu_s > \mu_K$

* لا وحدة لمعامل الاحتكاك

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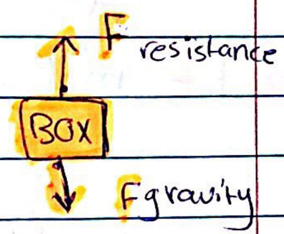
The drag force and terminal speed:-

Drag force "a force from fluid medium" " causes the velocity"

$$D = \frac{1}{2} C \rho A v^2$$

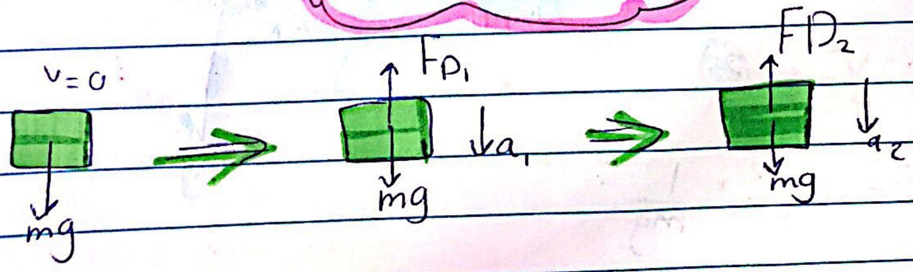


- D: drag force
- C: The medium resistance
- A: effective cross-section area of the body (m)
- V: velocity (m/s)
- ρ: medium density (air)

* If $D = mg \Rightarrow a = 0 \Rightarrow$ the body falls at a constant speed called "Terminal Speed".

$$V_{terminal} = \sqrt{\frac{2mg}{C \rho A}}$$

$\Rightarrow 0 < C < 1$



$a_1 > a_2$

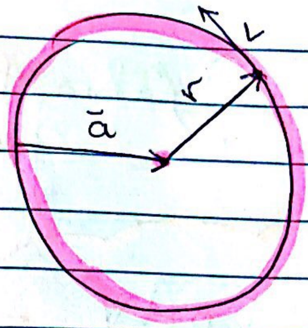
* السرعة تزداد التسارع يقل

* Uniform circular motion:-

→ $V = \frac{2\pi r}{T}$

→ $a = \frac{v^2}{r}$

→ $F = \frac{mv^2}{r}$

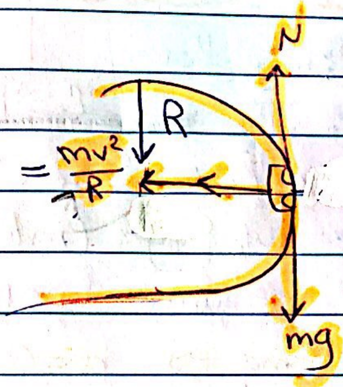


* Cars in flat turn:-

$\frac{mv^2}{R} = \mu_s N$

$\frac{mv^2}{R} = \mu_s mg$

$V = \sqrt{\mu_s R g}$



* Cars in abanked circular turn:-

$\sum F_y = 0$

$\Rightarrow N\cos\theta - mg = 0$ —①

$\sum F_x = ma$

$\Rightarrow N\sin\theta = m\frac{v^2}{R}$ —②

$\frac{②}{①} \Rightarrow \tan\theta = \frac{mv^2}{R} \times \frac{1}{mg}$

$\tan\theta = \frac{v^2}{Rg}$

$V_{max} = \sqrt{Rg\tan\theta}$