Force and Motion - II

* a frictional force is the vector sum of many forces acting between the surface atomes of one body and of those of another body

- **Friction**
  - Kinetic friction : Resistive force ⇒ f_k
    → opposite to the Motion
    $f_k = \mu_k F_N$ — μ_k: coefficient of Kinatic Frict, F_N: Normal force
  - Static friction : $f_{s,max} = \mu_s F_N$ — μ_s: Coefficient of static friction
    it's a Resistive force
    - It's direction and It's strength can change

* an object moves when the strength that pushing is greater then the Maximum of static friction $f_{s,max}$

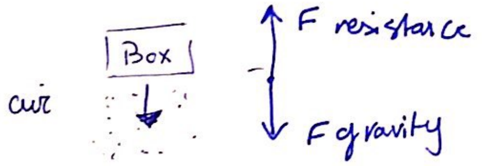
* usually . $|f_k| < |f_{s,max}|$

* f_s and f_k is always parallel to the surface and opposed to the attempted sliding

friction is independant of surface area and velocity

- **Drag force** - Resistive force $\vec{D}$

* when objects move via fluids (liquids and gases) the Molecules create a resistance force known as Drag force



- depends on velocity of object

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

C: The drag coefficient
ρ: the air density
A: effective cross-sectional area of the body
V: velocity

$mg = \frac{1}{2} C \rho A V_t^2$

if $D = mg \Rightarrow a = 0 \Rightarrow$ the body falls at a constant speed called
- Terminal speed

Alaa Etarini

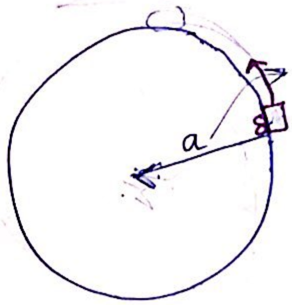
• Uniform circular Motion

$F = m\frac{v^2}{R}$ (a)

$\mu_k F_N = m v^2$ ...

- speed is constants
- |a| is constant and F is constant too

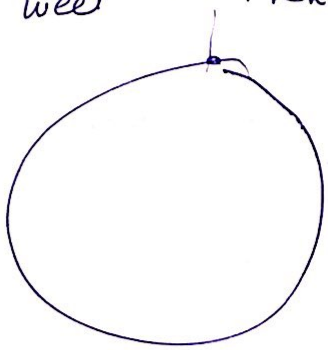
* Directions of a and F are changing



centripetal acceler...
⇒ caused by centripetal Force which is :- frictional force

- When $F_{centripetal}$ is bigger than f Then it slides off to the outside of the curve

- if a person is strapped into their seat belt on a ferris wheel Then at the Top



$F_{belt\ up} = 0$

$F_{belt\ down} = 0$

$F_g = mg$

$F = ma$

$F_g = mg$

Alaa Ibrahimi