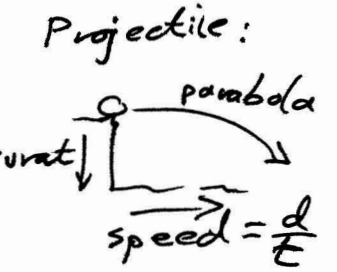


a due to gravity = 9.8 m/s^2

- s : displacement
- u : initial vel
- v : final vel
- a : acceleration
- t : time

use if object is accelerating

- $v = u + at$
- $s = ut + \frac{1}{2}at^2$
- $s = \frac{(u+v)t}{2}$
- $v^2 = u^2 + 2as$



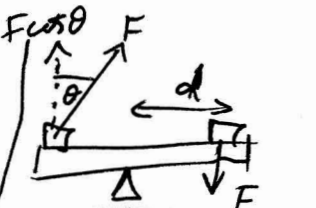
$KE = \frac{1}{2}mv^2$
 $GPE = mgh$ → use if given h

- If no E lost when falling: $mgh = \frac{1}{2}mv^2$
- If $mgh \neq \frac{1}{2}mv^2$, E lost (thermal)

Work done: $E = Fd$
 Power developed: $P = Fv$

- Thinking d : speed, dings, distractions, tiredness
- Braking $d \times 4$ ($\frac{1}{2}mv^2$)
- rod, weather, tyres

MECHANICS

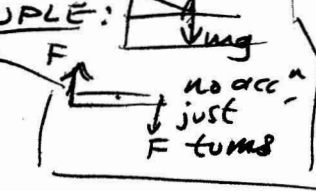


moment = Fd
 (it is perpendicular from pivot to F's line of action)

If 2 unknown forces take moments about one. (make pivot)

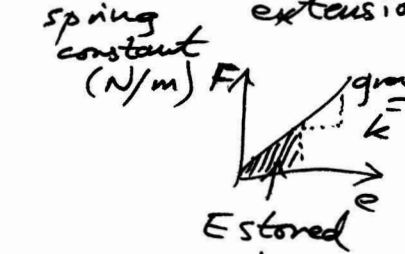
Principle of moments: "FOR SYSTEM TO BE IN EQM, SUM OF \downarrow = SUM OF \uparrow "

- To topple, centre of m must be past pivot



Fluid: $F = \frac{\Delta m}{t} v = \rho A v^2$

Hooke's Law: $F = ke$

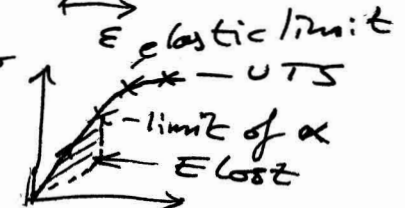


$E = \frac{1}{2}Fe = \frac{1}{2}ke^2$

stress $\sigma = \frac{F}{A}$ (Pa)

strain $\epsilon = \frac{e}{L}$

Young mod $E = \frac{\sigma}{\epsilon} = \frac{FL}{Ae}$



elastic: returns to L
 plastic: does not.

NEWTON: 1st Law: MOTION CONSTANT IF NO EXTERNAL FORCE

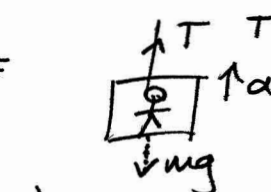
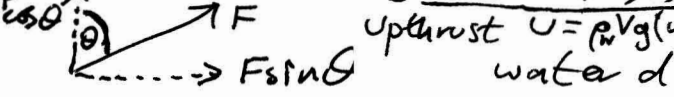
2nd Law: $F = ma$
 3rd Law: TO EACH ACTION THERE IS EQUAL + OPPOSITE.

WEIGHT = mg

For EQUILIBRIUM (constant motion):
 - NO RESULTANT FORCE (BALANCED)
 - NO RESULTANT MOMENT/TORQUE

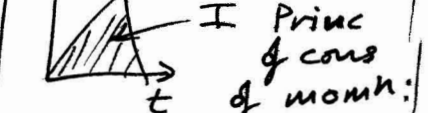
AIR RESISTANCE + FRICTION increase with SPEED.

- SCALARS just have mag → A, d, E, P
 - VECTORS have mag + dir → F, a, v, s



momentum = mv (kgm/s or Ns) Impulse

$F = \frac{\Delta(mv)}{t}$



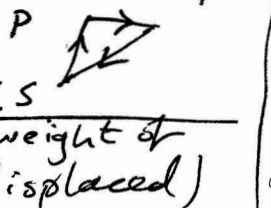
"TOTAL MOMENTUM IS CONSERVED ABSENT EXTERNAL FORCES"

$m_A u_A + m_B u_B = m_A v_A + m_B v_B$

recoil $F = \frac{\Delta m}{t} v = \rho A v^2$

"man carried per sec"

vectors make loop



- ELASTIC COLLISION: Total KE conserved
 - INELASTIC: It isn't.
 - Total E conserved in both.
 - Crumple zones/airbags increase collision t, reduce F.