Lezione 9 13/01/2022

giovedì 13 gennaio 2022 14:18

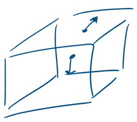
Lezione #9

13/01/2022

FLUIDI

STATO DI AGGREGAZIONE MATERIA

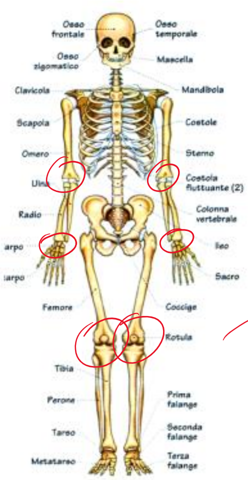
↳ legami molecolari + deboli



FLUIDI

LIQUIDI GAS

	FORMA	VOLUME
SIST. RIGIDI	FISSA	FISSO
LIQUIDI	VARIABILE	"
GAS	"	VARIABILE



la sup. è maggiore

$$\vec{F} \longrightarrow \boxed{P = \frac{F_\perp}{A}}$$

componente perp. della $\vec{F}$ sulla A

$$[P] = \frac{N}{m^2} = 1 \text{ Pascal} = \text{Pa}$$

$1 \text{ atm} = 1{,}03 \cdot 10^5 \text{ Pa}$

$\boxed{m}$ → Densità (massa volumica)

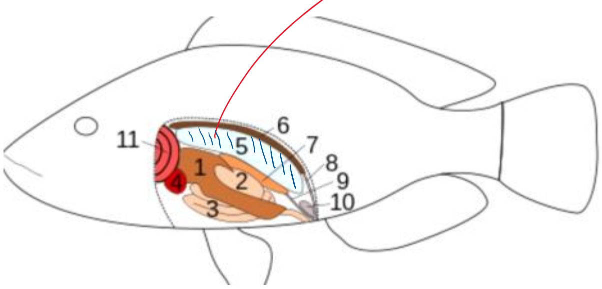
$$\rho \text{ (rho)} = \frac{m}{V}$$

Vesaica natatoria (5) → $V \nearrow$ ⇒ a parità di masse

⇓

ρ diminuisce

↳ galleggiare



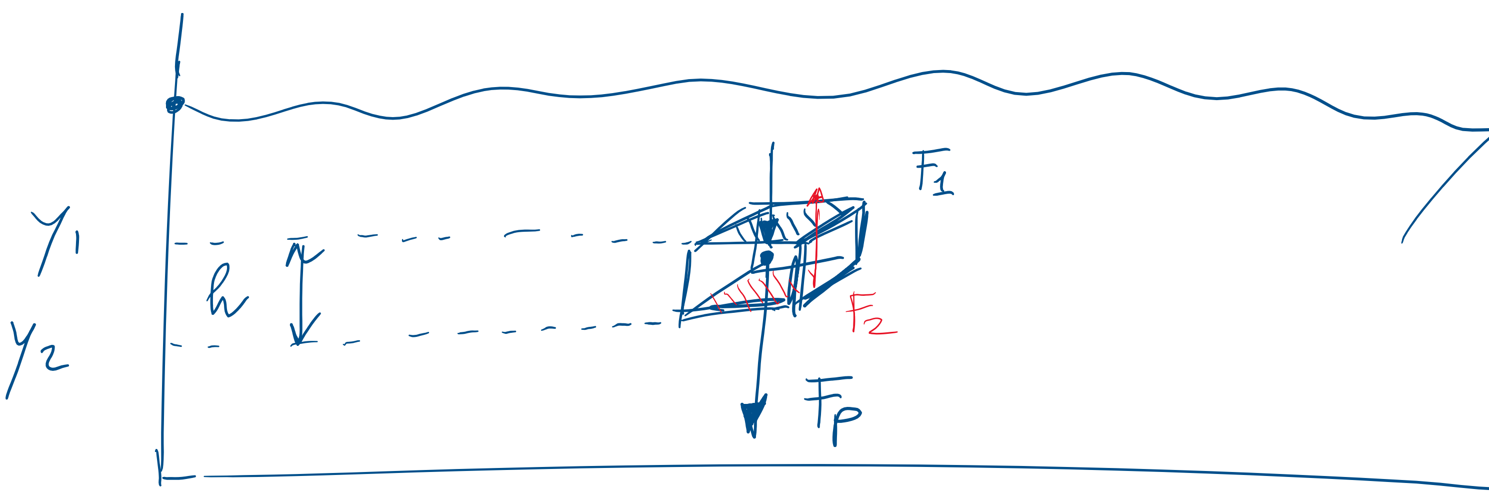
$$\rho = \frac{m}{V} = \frac{kg}{m^3}$$

$$[\rho] = kg/m^3$$

$$\boxed{\rho_{H_2O} = 10^3\ kg/m^3}$$

Legge di variazione di p al variare della profondità (liquido) / altezza (gas)

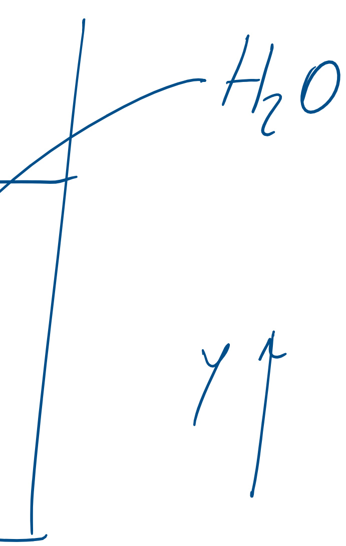
Dimostrazione nel caso di un liquido



$$(y_1 - y_2) = h$$

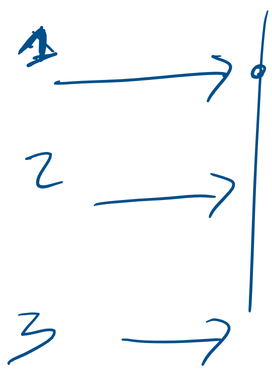
e profondità

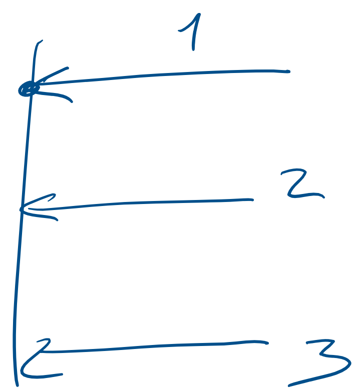
ido:



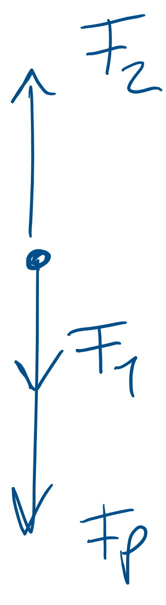
Cubo è in equilibrio: $F_y = -F_p -$

Lungo l'asse x:





$F_x = 0 = 0$



$F_y = -F_p - F_1 +$

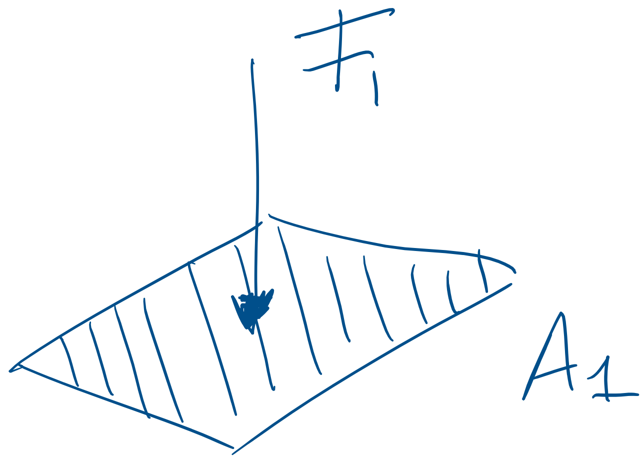
$-mg - F_1 -$

F_i

$$F_1 + F_2 = 0$$

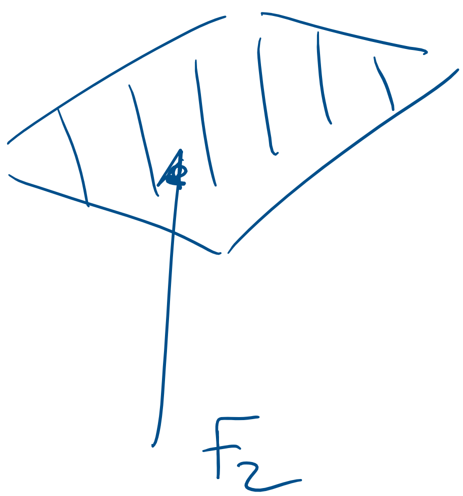
$$F_2 = 0$$

$$+ F_2 = 0$$



$$p_1 = \frac{F_1}{A_1}$$

$$F_1 = p_1 A_1$$

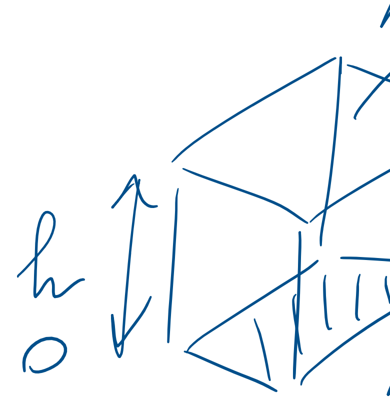


$$F_2 = p_2 A_2$$

$$-mg - p_1 A_1 + p_2 A_2 = 0$$

$$-\rho_{H_2O} V g - p_1 A_1 + p_2 A_2$$

$$-\rho_{H_2O} (\cancel{A} h) g - p_1 \cancel{A} + p_2 \cancel{A} = 0$$



$$\boxed{p_2 = p_1 + \rho g h}$$

$p_1 = p_0$ p al livello del m

$p_2 = p$ " generica ad u

$A_1 = A_2 = A$

nare

na este

profondità

$$\boxed{P = P_0 + \rho g h}$$

Nei liquidi $\begin{cases} P \\ h > \end{cases}$

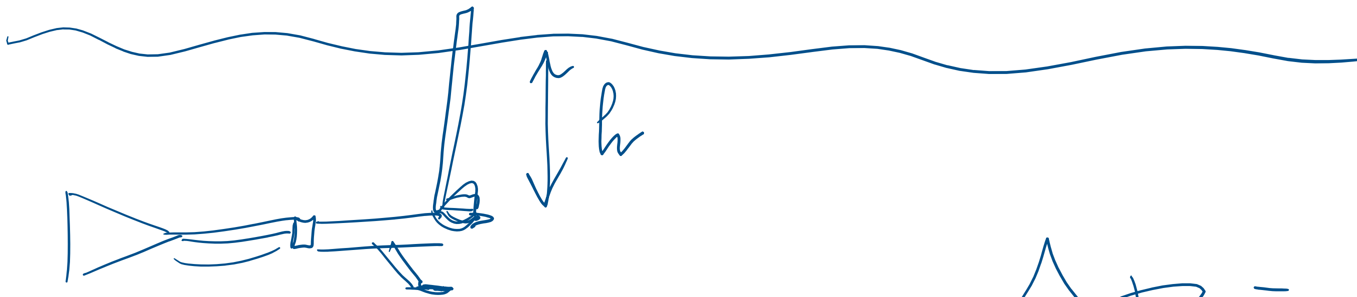
Nei gas invece

Esercizio (HR)

0

$P >$

$h < 0$



$\Delta p = 9{,}3$

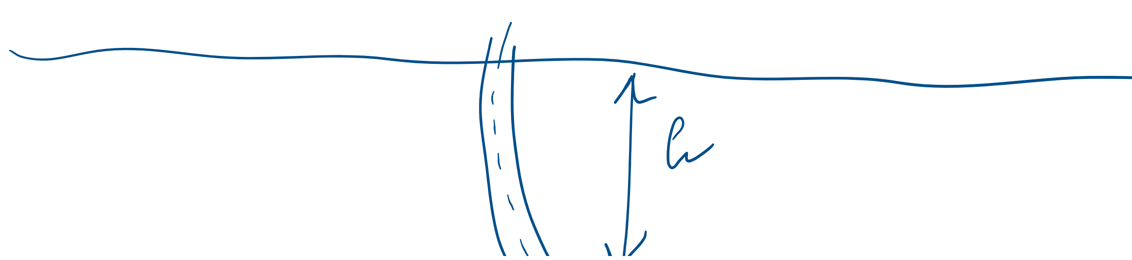
massima differen

nell'uomo prima

$\rho_{H_2O} = 10$

$$\Delta p = (p - p_0)$$

Sapendo Δp quale è la profondità che si può raggiungere respirando aria boccaglio?



3 kPa

za sopportabile

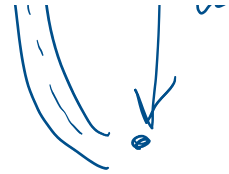
collasso/embolie

^{3} kg/m^{3}

massima

da un

Pa



$$P = P_0 + \rho g h$$

$$(P - P_0) = \rho g h$$

$$\Delta P = \rho g h$$

$$\boxed{h = \frac{\Delta P}{\rho g}}$$

$$h =$$

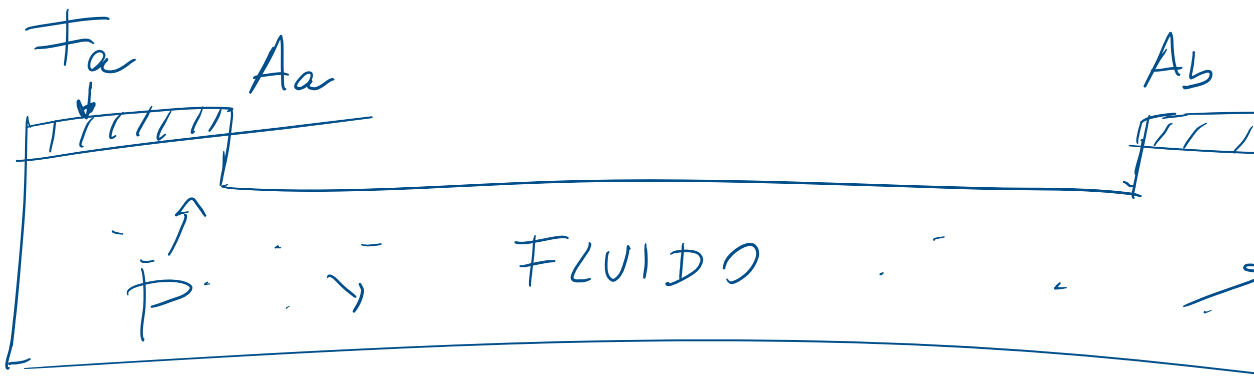
h ?

$$\frac{9{,}3 \cdot \cancel{10^3}}{\cancel{10^3}\ 9{,}81}$$

$$\boxed{h \simeq 0{,}95\, m \simeq 1\, m}$$

PRINCIPIO DI PASCAL

IN UN FLUIDO CONFINATO UNA VARIAZIONE
PRESSIONE SI TRASMETTE INALTERATA IN
DEL FLUIDO E DELLE PARETI CHE LO

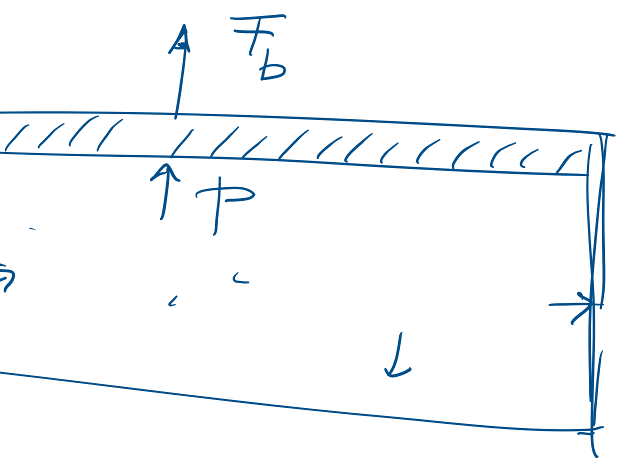


$$p = \frac{F_a}{A_a} = \frac{F_b}{A_b}$$

DI

OGNI PARTE

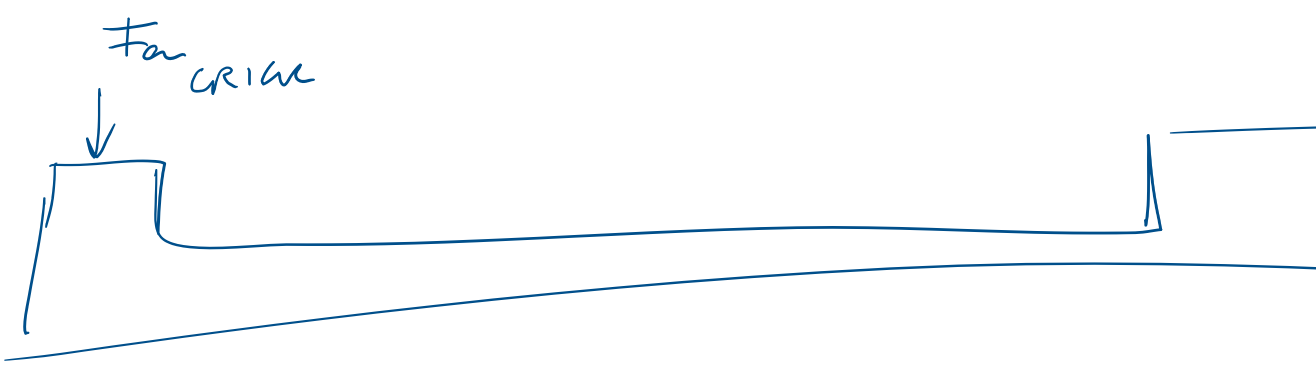
CONTENGONO



$$\frac{F_a}{A_a} = \frac{F_b}{A_b} \qquad F_b = \frac{A_b}{A_a}$$

Se $A_b \gg A_a$ ad esempio A

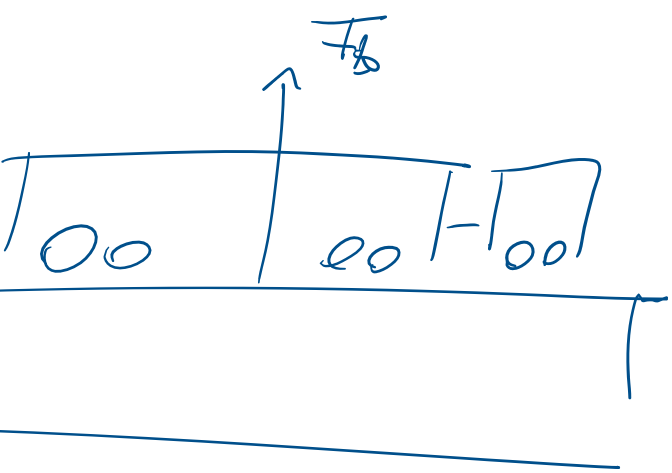
$$\Rightarrow \boxed{F_b = \frac{1000\cancel{A_a}}{\cancel{A_a}} F_a}$$

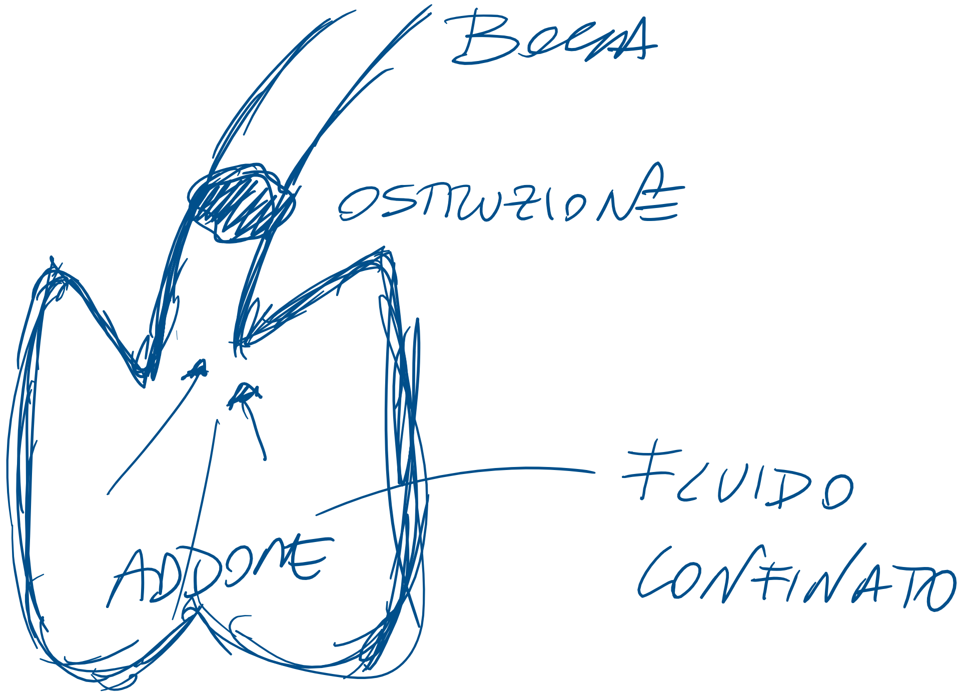


MANOVRA DI HEIMLICH

F_a

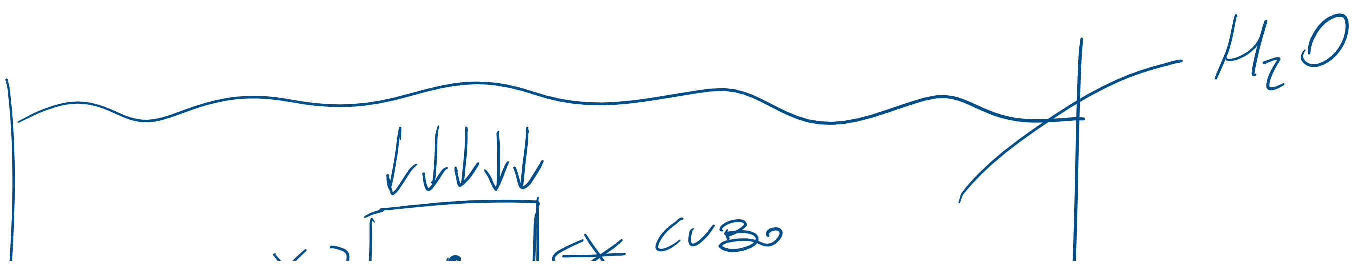
$= 1000\,A_a$





SPINTA DI ARCHIMEDE

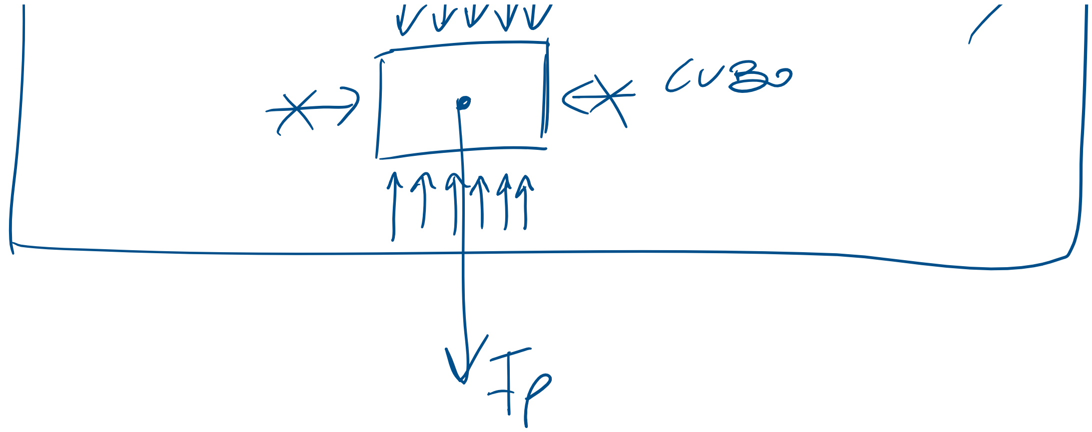
Un corpo immerso in un fluido riceve
dal basso verso l'alto applicata al c
pari al peso del volume di fluido



e una spinta

CDM ed è

spostato



$$-F_p \underbrace{- F_1 + F_2}_{} = 0$$

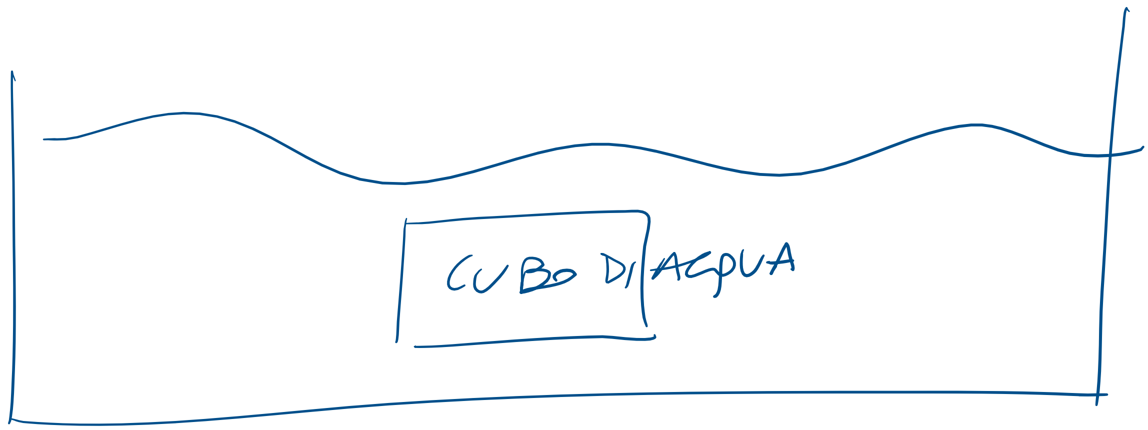
F_s = spinta di Archimede

Affinché l'oggetto sia in equilibrio:

$$-F_p + F_s = 0$$

$$F_s = F_p = mg = \rho_{FL}V$$

IDO Vg



Quando galleggia?

$F_P = F_S$ (in e

oppure

$F_P < F_S$ (F_S vin
oggetto

$F_P > F_S$ (oggetto

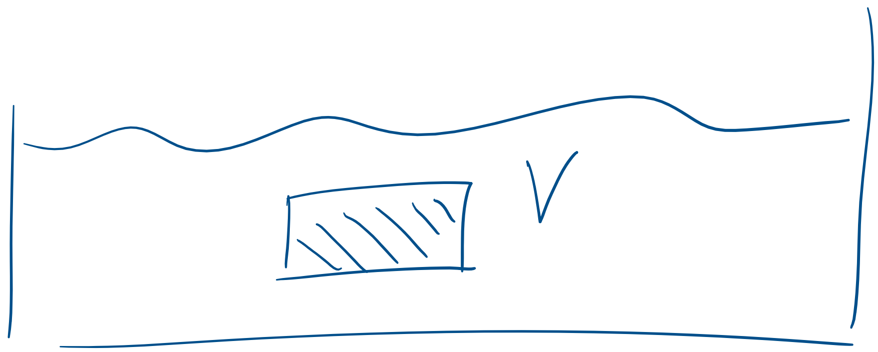
quilibrio)

LE su Fp

sale verso
l'alto)

affonda)

Condizione su galleggiamento:



$F_P =$

$m_{LEGNO}\, g =$

$$\rho_{LEGNO}\, \cancel{V_{LEGNO}}\, \cancel{g} = \rho_F\, \cancel{V_{LEGNO}}\, \cancel{g}$$

Condizione affinché galleggi:

F_S

$\rho_F \, V_I \, g$

V IMMERSO

$$\boxed{\rho_{LEGNO} = \rho_F}$$

In per un oggetto di ρ_O

$$\boxed{\rho_O = \rho_F}$$

Se $\rho_O < \rho_F$ l'oggetto

o cale verso
l'alto