**La scomposizione dei vettori e le funzioni goniometriche fondamentali.**

**AS 2020-21. Prof. A. Pisani**

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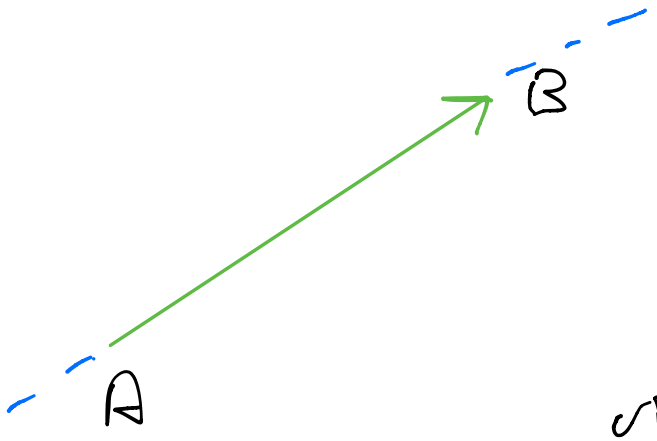
VETTORE → INTENSITÀ'
VETTORE → DIREZIONE
VETTORE → VERSO

ES.: SPOSTAMENTO

FRECCIA = SEGMENTO ORIENTATO



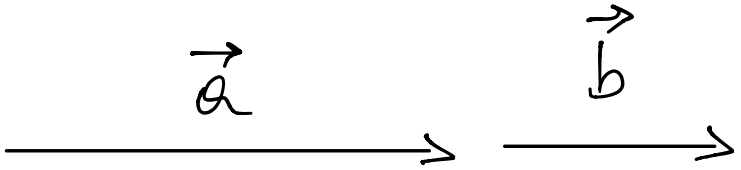

$\overline{AB}$ = INTENSITÀ' MODULO

RETTA → DIREZ.
VERSO $\overrightarrow{AB}$ $\overrightarrow{BA}$

VETTORI ALLINEATI / PARALL.

↓

STESSA DIREZIONE

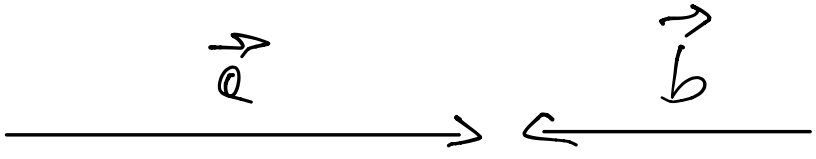



LUNGHEZZA: $a = |\vec{a}|$

O MODULO DI $\vec{a}$

$|\vec{b}| \neq |\vec{a}|$

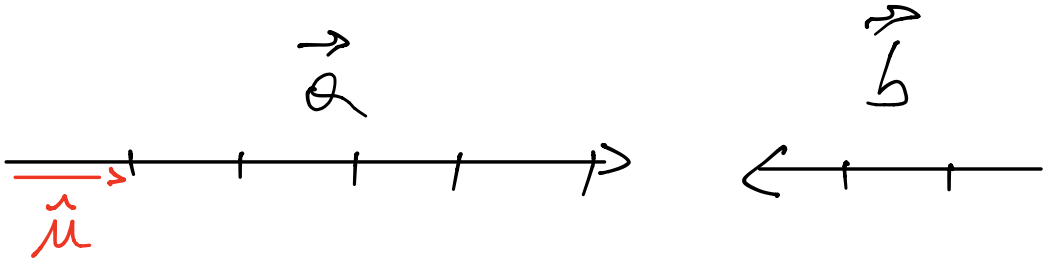
STESSA RETTA → STESSA RETTA




UTILE → VETTORE UNITARIO

LUNGHEZZA (1)

RIFERIMENTO.

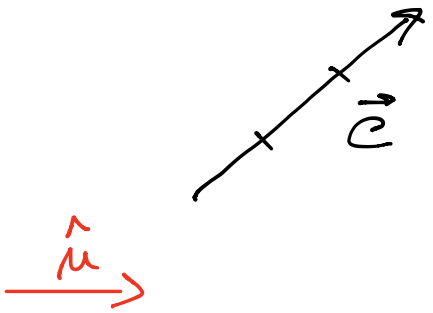



$|\hat{u}| = 1$ ← VERSORE

$\vec{a} = 5\,\hat{u}$

$\vec{b} = -3\,\hat{u}$

ATTENZIONE




$|\vec{c}| = 3$

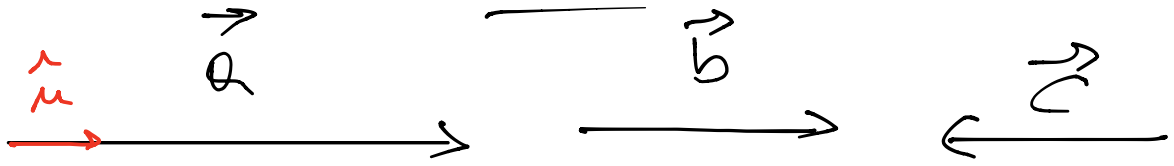
$\vec{c} \neq 3\,\hat{u}$

$\vec{c} \not\parallel \hat{u}$

$\vec{c}$ e $\hat{\mu}$ DIVERSE DIREZIONI

=

STANNO SU RETTE DIVERSE




$\vec{a} = 5\hat{\mu} \qquad \vec{b} = 3\hat{\mu}$

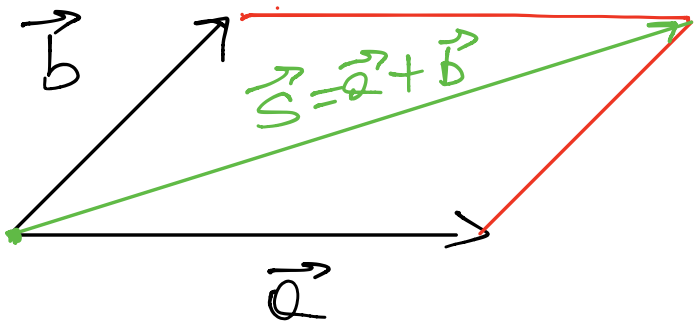
$\vec{a} + \vec{b} = 5\hat{\mu} + 3\hat{\mu} = 8\hat{\mu}$

SE $\vec{c} = -\vec{b} \Rightarrow \vec{c} = -3\hat{\mu}$

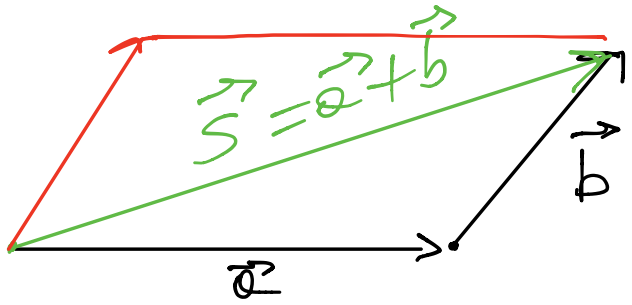
$\vec{a} + \vec{c} = 5\hat{\mu} - 3\hat{\mu} = +2\hat{\mu}$

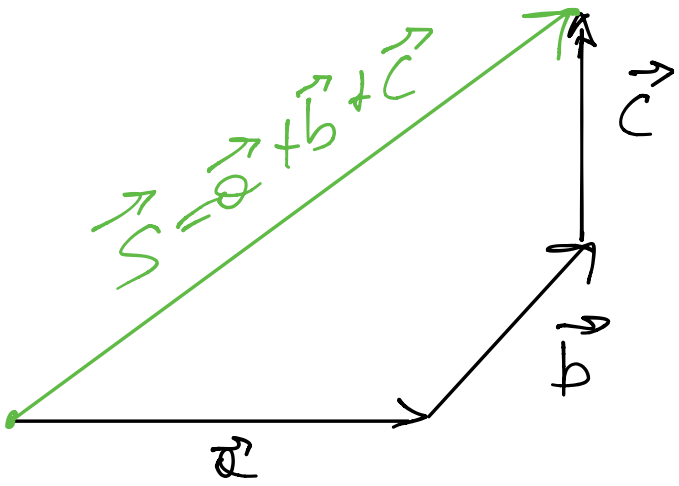
SE $\vec{a}$ e $\vec{b}$ HANNO DIREZ. DIVERSE

REGOLA DEL PARALLELOGRAMMA




REGOLA PUNTA — CODA

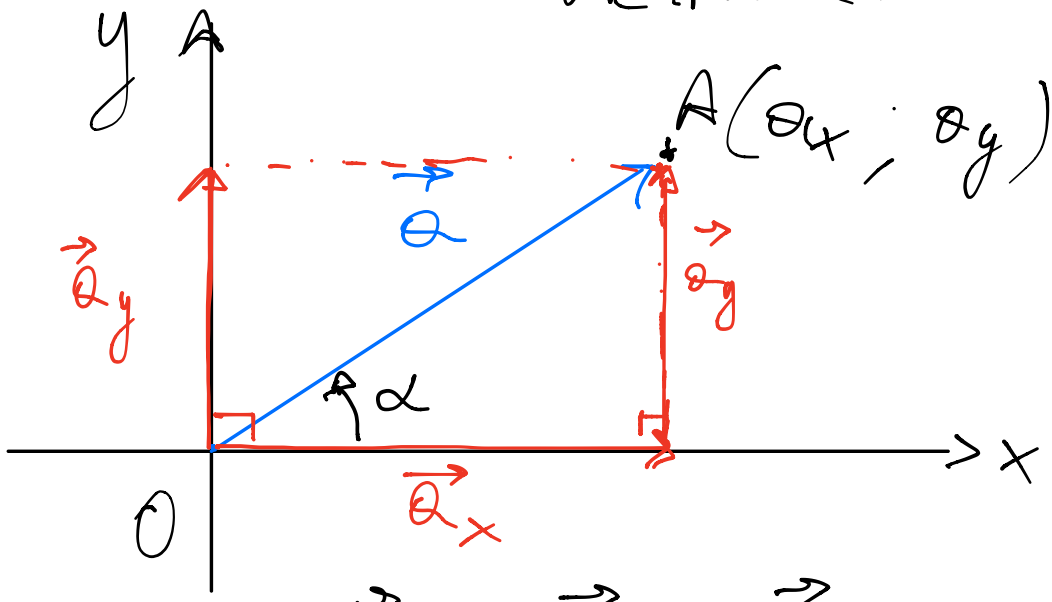



$$\vec{s} = \vec{a} + \vec{b} + \vec{c}$$

# SCOMPOSIZIONE

VETTORE → SOMMA DI DUE VETTORI (COMPONENTI)




$$\vec{a}_x + \vec{a}_y = \vec{a}$$

$$\vec{i} \quad \vec{j} \quad \vec{i}$$

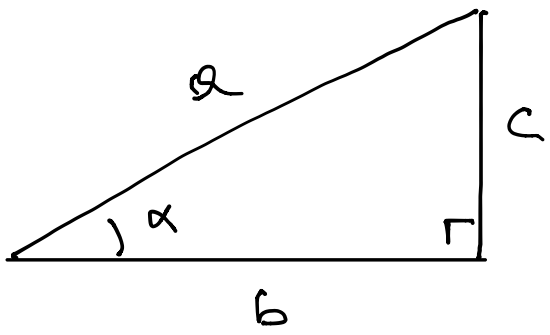
$$a_x = |\vec{a}_x| \qquad a_y = |\vec{a}_y|$$

$$|\vec{a}| = \sqrt{a_x^2 + a_y^2}$$

$\vec{a} \longrightarrow a_x \quad a_y$

$\begin{cases} a = |\vec{a}| \\ \alpha \end{cases}$

FUNZIONI GONIOMETRICHE




$$\frac{\text{CATETO OPPOSTO AD } \alpha}{\text{IPOTEN}} = SEN(\alpha)$$

$$\frac{\text{CATETO ADIAC. AD } \alpha}{\text{IPOTEN.}} = COS(\alpha)$$

$$\frac{\text{CAT. OPPOSTO AD } \alpha}{\text{CAT. ADIAC. } \alpha} = TAN(\alpha)$$

$$\frac{c}{Q} = SEN(\alpha)$$

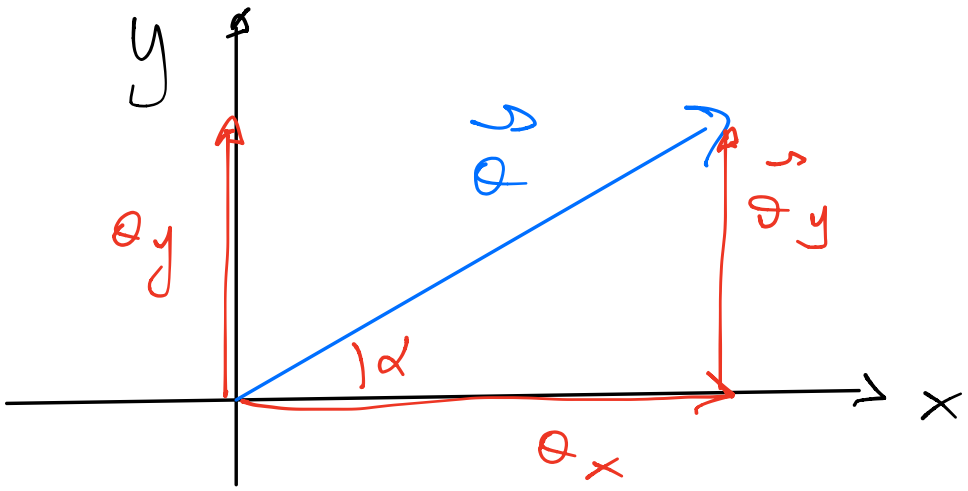
$$\frac{b}{Q} = COS(\alpha)$$

$$\frac{c}{b} = TAN(\alpha)$$

NOTO $Q$ , $\alpha$ :

$$c = Q \cdot SEN(\alpha)$$

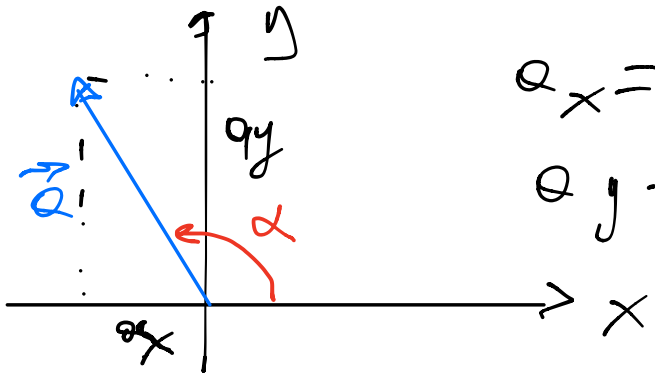
$$b = Q \cdot COS(\alpha)$$



$$\begin{cases} q_x = q \cdot \cos(\alpha) \\ q_y = q \cdot \operatorname{sen}(\alpha) \end{cases}$$

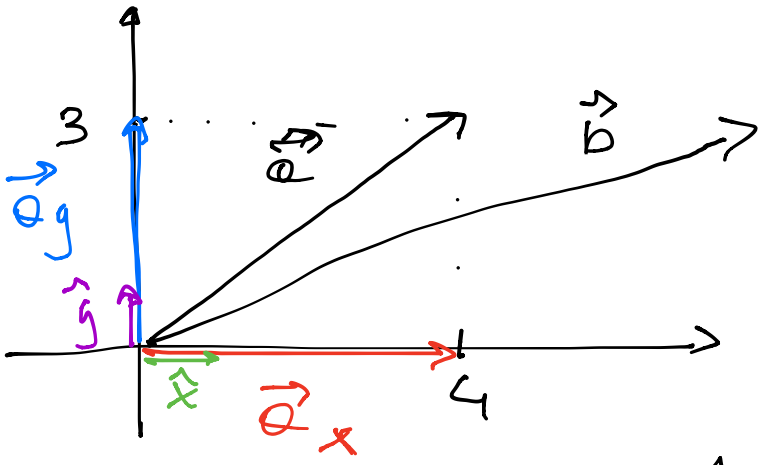
ANGOLI NOTEVOLI

| $\alpha$ | SEN($\alpha$) | COS($\alpha$) | TAN($\alpha$) |
|---|---|---|---|
| $0$ | $0$ | $1$ | $0$ |
| $30°$ | $1/2$ | $\sqrt{3}/2$ | $\sqrt{3}/3$ |
| $45°$ | $\sqrt{2}/2$ | $\sqrt{2}/2$ | $1$ |
| $60°$ | $\sqrt{3}/2$ | $1/2$ | $\sqrt{3}$ |
| $90°$ | $1$ | $0$ | / |




$q_x = q \cdot \cos(\alpha) < 0$

$q_y = q \operatorname{sen}(\alpha) > 0$




$$\vec{a}_x = 4 \cdot \hat{x} \qquad |\hat{x}| = 1$$

$$\vec{a}_y = 3 \cdot \hat{y}$$

$$\vec{a} = 4\hat{x} + 3\hat{y} \qquad a_x = 4 \qquad a_y = 3$$

$\vec{a}_x$ $\vec{a}_y$

$$\vec{b} = 5\hat{x} + 2\hat{y} \qquad b_x = 5 \qquad b_y = 2$$

$$\vec{s} = \vec{a} + \vec{b} =$$

$$= 4\hat{x} + 3\hat{y} + 5\hat{x} + 2\hat{y}$$

$$= 4\hat{x} + 5\hat{x} + 3\hat{y} + 2\hat{y}$$

$$= 9\hat{x} + 5\hat{y}$$

$$|\vec{S}| = \sqrt{9^2 + 5^2}$$

$$= \sqrt{106} \; .$$

$$\vec{a} = a_x \hat{x} + a_y \hat{y}$$

$$\vec{b} = b_x \hat{x} + b_y \hat{y}$$

$$\vec{a} + \vec{b} = (a_x + b_x)\hat{x} + (a_y + b_y)\hat{y}$$

$$|\vec{S}| = \sqrt{\underbrace{(a_x + b_x)}_{S_x}^2 + \underbrace{(a_y + b_y)}_{S_y}^2}$$