

AKADEMIA EDUKACYJNO - INŻYNIERSKA

www.e-MECHANiK.com.pl

MATURA STUDIA PRAKTYKA STAŻ PRACA BIZNES PRZEMYSŁ STEAM

KOMPLEKSOWE WSPARCIE EDUKACYJNE **ON – LINE** NA KAŻDYM ETAPIE KSZTAŁCENIA INŻYNIERSKIEGO

email: **kontakt@e-mechanik.com.pl**
web: **www.e-MECHANiK.com.pl**
fb: www.facebook.com/groups/emechanik
tel: **(+48) - 697-165-075**

Wszystkie prawa zastrzeżone All rights reserved

TEORIA MECHANIZMÓW I MANIPULATORÓW

"ANALIZA KINEMATYCZNA – RÓWNANIA WEKTOROWE"

PROJEKT

Przeprowadź:

- analizę strukturalną
- analizę kinematyczną

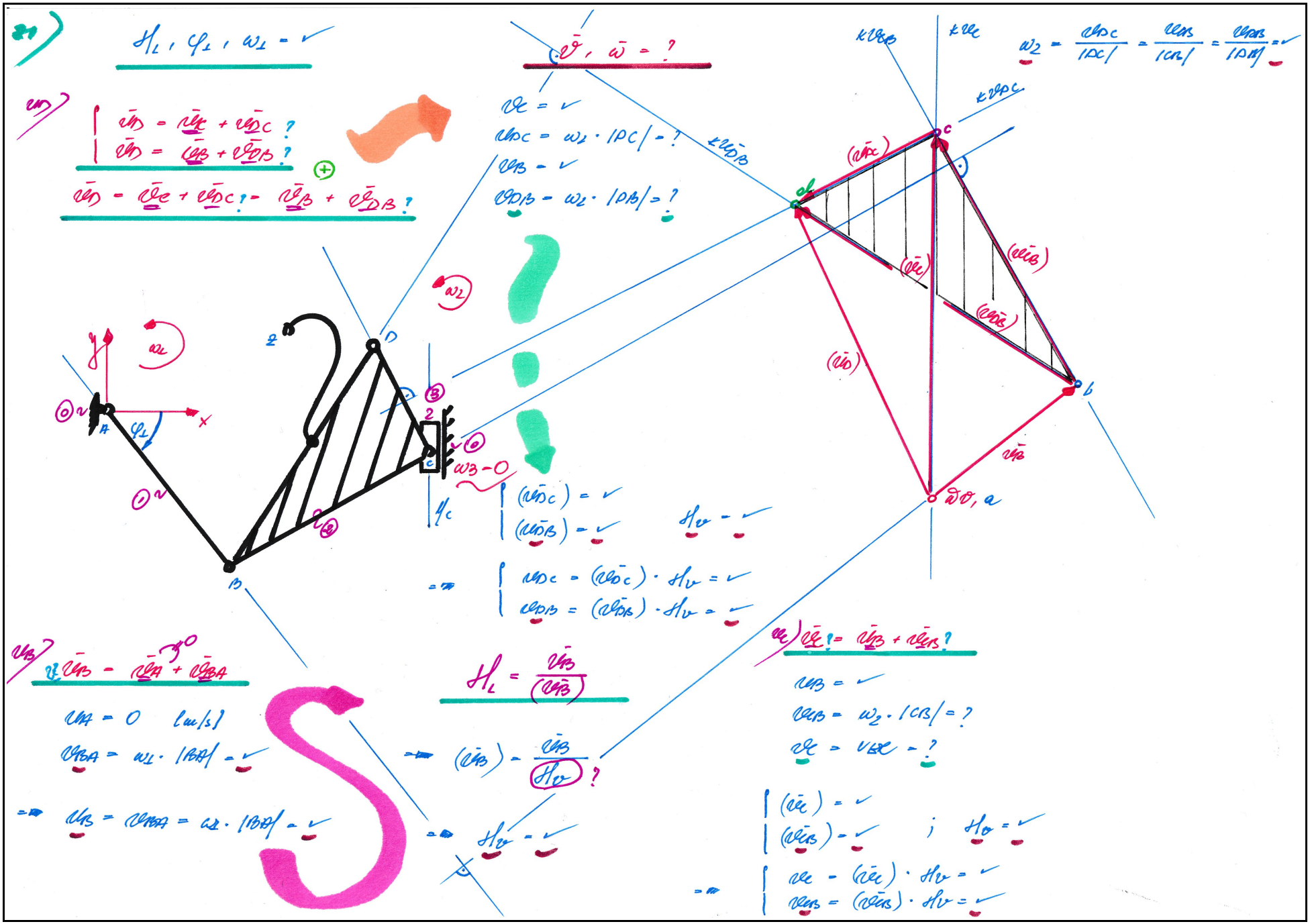
dla układu mechanicznego w zadanym położeniu.

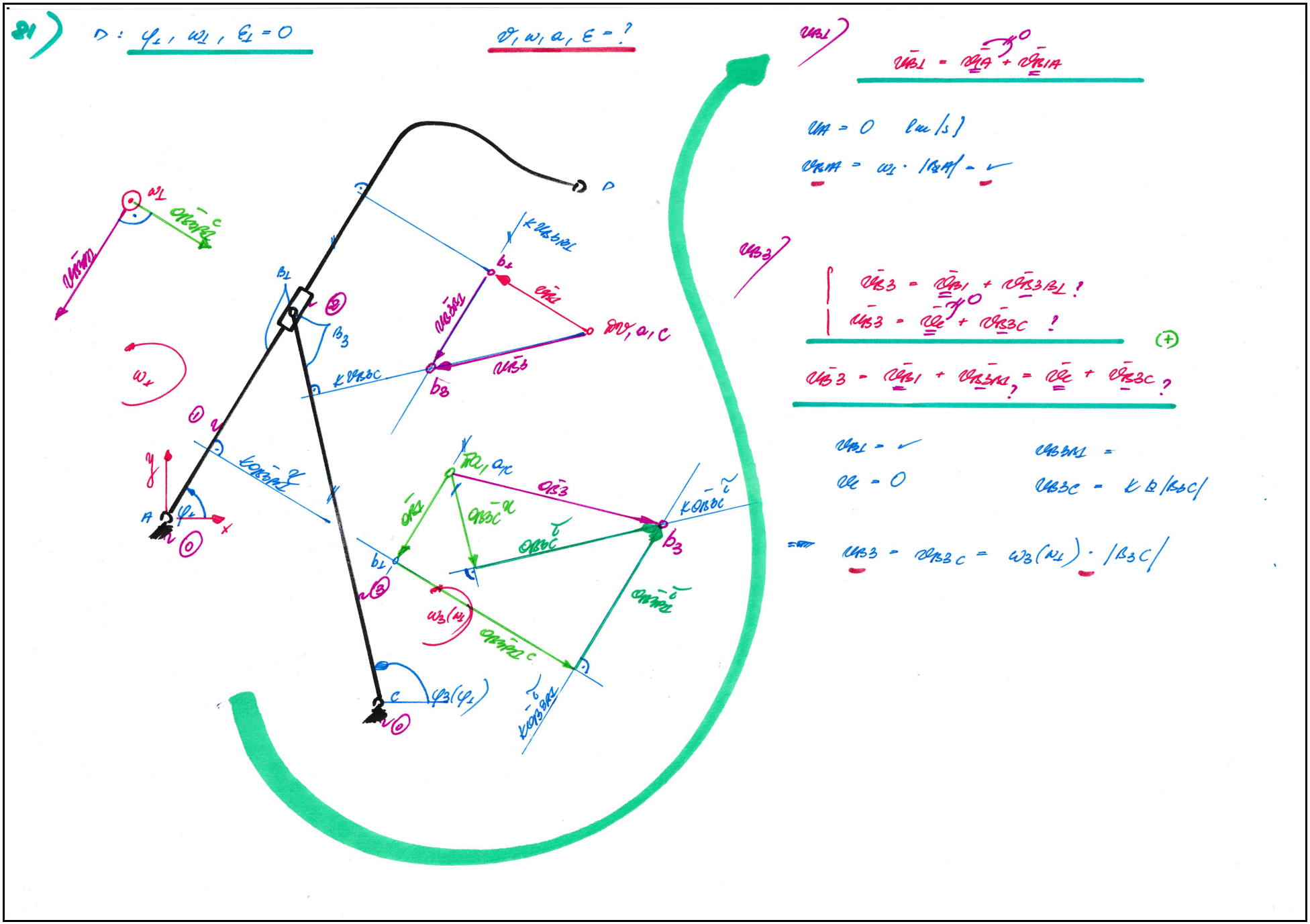
DANE:

$\kappa_1, \varphi_1, \omega_1, \varepsilon_1 = OK$

SZUKAM:

$V, \omega, a, \varepsilon = ?$




21)
D : φ1 , ω1 , ε1 = 0
ϑ, ω, a, ε = ?
vB1
vB1 = vA + vB1A
vA = 0 [m/s]
vB1A = ω1 · |B1A| = ✓
vB3
vB3 = vB1 + vB3B1 ?
vB3 = vC + vB3C ?
vB3 = vB1 + vB3B1 ? = vC + vB3C ?
vB1 = ✓
vC = 0
vB3B1 =
vB3C = ✓ |B3C|
vB3 = vB3C = ω3(ω1) · |B3C|
ω1
ω2
ω3(ω1)
φ3(φ1)
A
B1
B3
C
D

$$\bar{a}_{A} = \bar{a}_{A}^{0} + \bar{a}_{BA}^{n} + \bar{a}_{BA}^{\tau}$$

$a_A = 0 \quad [m/s^2]$

$a_{BA}^{n} = \omega_1^2 \cdot |BA| = \checkmark$

$a_{BA}^{\tau} = \varepsilon_1 \cdot |BA| = 0 \; ; \; \varepsilon_1 = 0$

$$\bar{a}_{B_3} = \bar{a}_{B_1}^{0} + \bar{a}_{B_3B_1}^{n} + \bar{a}_{B_3B_1}^{\tau} + \bar{a}_{B_3B_1}^{c}$$

$$\bar{a}_{B_3} = \bar{a}_{C}^{0} + \bar{a}_{B_3C}^{n} + \bar{a}_{B_3C}^{\tau}$$

(+)

$$\bar{a}_{B_3} = \bar{a}_{B_1} + \bar{a}_{B_3B_1}^{n} + \bar{a}_{B_3B_1}^{\tau} + \bar{a}_{B_3B_1}^{c} =$$

$$= \bar{a}_{C} + \bar{a}_{B_3C}^{n} + \bar{a}_{B_3C}^{\tau}$$

$a_{B_1} = 0$

$a_{B_3B_1}^{n} = \omega_{B_3B_1}^2 \cdot |B_3B_1| = \dfrac{v_{B_3B_1}^2}{|B_3B_1|}$

$a_{B_3B_1}^{\tau} = \varepsilon_{B_3B_1} \cdot |B_3B_1| = ? \; ; \; \varepsilon_{B_3B_1} = ?$

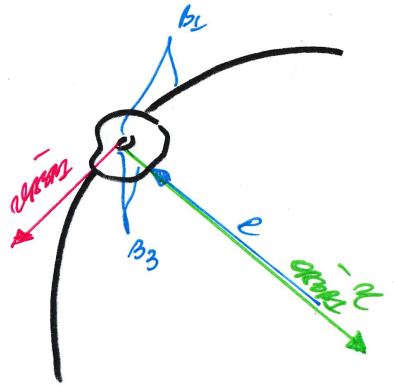
$a_{B_3B_1}^{c} = 2 \cdot \omega_1 \times v_{B_3B_1} = 2\omega_1 \cdot v_{B_3B_1} \cdot \sin(\omega_1; v_{B_3B_1}) =$

$= \checkmark$

$a_C = 0$

$a_{B_3C}^{n} = \omega_3^2(\omega_1) \cdot |B_3C| = \checkmark$

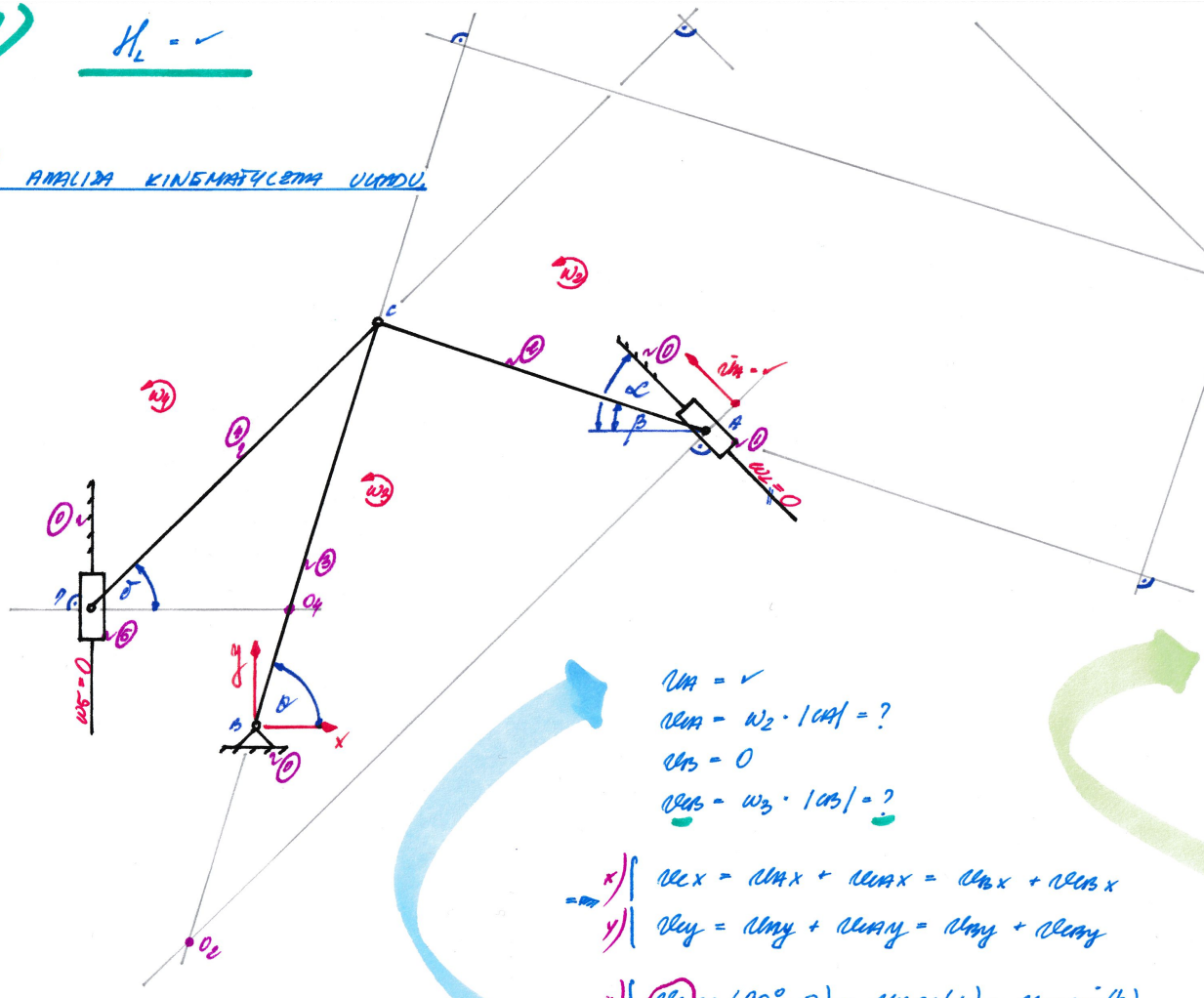
$a_{B_3C}^{\tau} = \varepsilon_3(\varepsilon_1) \cdot |B_3C| = ? \; ; \; \varepsilon_3 = ?$

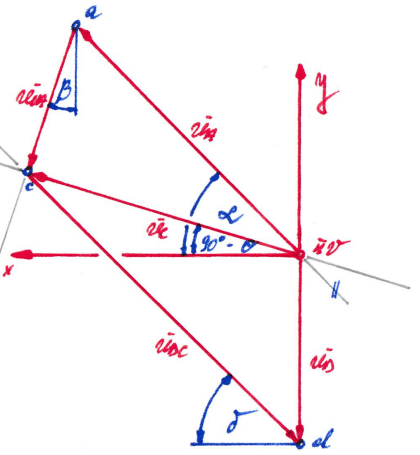


a)

$H_L = \checkmark$

1) ANALIZA KINEMATYCZNA UKŁADU





$\vec{v}_A = \checkmark$

$v_A = \omega_2 \cdot |CA| = ?$

$\vec{v}_B = 0$

$v_B = \omega_3 \cdot |CB| = ?$

$$\begin{cases} \vec{v}_C = \vec{v}_A + \vec{v}_{CA} \\ \vec{v}_C = \vec{v}_B + \vec{v}_{CB} \end{cases}$$

$$\vec{v}_C = \vec{v}_A + \vec{v}_{CA}^{\,?} = \vec{v}_B^{\,90^\circ} + \vec{v}_{CB}^{\,?}$$

$$\begin{cases} x) \; v_{Cx} = v_{Ax} + v_{CAx} = v_{Bx} + v_{CBx} \\ y) \; v_{Cy} = v_{Ay} + v_{CAy} = v_{By} + v_{CBy} \end{cases}$$

$$\begin{cases} x) \; v_C \cos(90^\circ - \Theta) = v_A \cos(\alpha) + v_{CA} \sin(\beta) \\ y) \; v_C \sin(90^\circ - \Theta) = v_A \sin(\alpha) - v_{CA} \cos(\beta) \end{cases}$$

$$\Rightarrow \begin{cases} v_C = \checkmark \\ v_{CA} = \checkmark \end{cases}$$

$$\Rightarrow \begin{cases} v_C = \omega_3 \cdot |CB| \\ v_{CA} = \omega_2 \cdot |CA| \end{cases} \Rightarrow \begin{cases} \omega_3 = \dfrac{v_C}{|CB|} \\ \omega_2 = \dfrac{v_{CA}}{|CA|} \end{cases}$$

$\vec{v}_D = \vec{v}_C + \vec{v}_{DC}$

$v_C = \checkmark$

$v_{DC} = \omega_4 \cdot |DC| = ?$

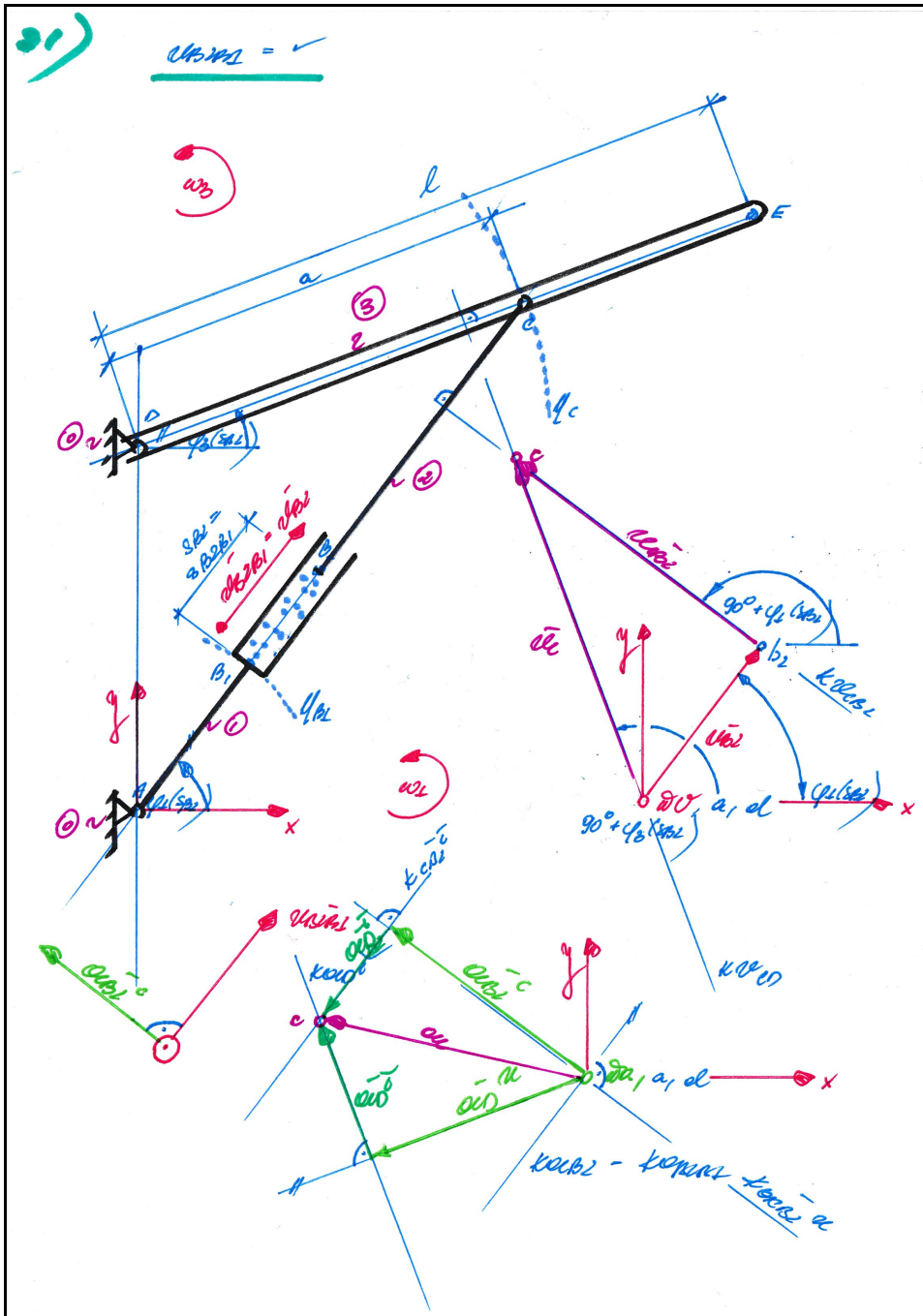
$v_D = \text{kierunek}$

$$\begin{cases} x) \; v_{Dx} = v_{Cx} + v_{DCx} \\ y) \; v_{Dy} = v_{Cy} + v_{DCy} \end{cases}$$

$$\begin{cases} 0 = v_C \cos(90^\circ - \Theta) - v_{DC} \cos(\varepsilon) \\ -v_D = v_C \sin(90^\circ - \Theta) - v_{DC} \sin(\varepsilon) \end{cases}$$

$$\Rightarrow \begin{cases} v_{DC} = \checkmark \\ v_D = \checkmark \end{cases}$$

$$\Rightarrow \begin{cases} v_{DC} = \omega_4 \cdot |DC| \\ v_D = \checkmark \end{cases} \Rightarrow \omega_4 = \frac{v_{DC}}{|DC|}$$



$$\vec{v}_E = \vec{v}_O^{\,0} + \vec{v}_{EO}$$

$$\vec{v}_E = \vec{v}_{B_2} + \vec{v}_{EB_2}$$

$$\vec{v}_E = \vec{v}_O^{\,0} + \vec{v}_{EO} - \vec{v}_{B_2} + \vec{v}_{EB_2} \quad (2?)$$

x) $v_{Ex} = v_{Ox} - v_{B_2 x} + v_{EB_2 x}$

y) $v_{Ey} = v_{Oy} - v_{B_2 y} + v_{EB_2 y}$

~~$v_E \cos(90° + \varphi_3(s_{B_2})) = v_{B_2} \cos(90° + \varphi_2(s_{B_2}))$~~

x) $v_E \cos(90° + \varphi_3(s_{B_2})) = v_{B_2} \cos(\varphi_2(s_{B_2})) + v_{EB_2} \cos(180° + \varphi_2(s_{B_2}))$ (2?)

y) $v_E \sin(90° + \varphi_3(s_{B_2})) = v_{B_2} \sin(\varphi_2(s_{B_2})) + v_{EB_2} \sin(180° + \varphi_2(s_{B_2}))$

$\Rightarrow v_E, v_{EB_2} = \checkmark$

$$\omega_3 = \frac{v_{EO}}{|CO|} = \checkmark$$

$$\omega_2 = \frac{v_{EB_2}}{|CB_2|} = \checkmark$$

$\bar{a}_C = \bar{a}_{C1}^{=0} + \bar{a}_{C1}^{n} + \bar{a}_{C1}^{\tau}$?

$\bar{a}_{C2} = \bar{a}_{B2}^{=0} + \bar{a}_{CB2}^{n} + \bar{a}_{CB2}^{\tau}$? $+ \bar{a}_{CB2}^{c}$

$\bar{a}_C = \bar{a}_{C1}^{=0} + \bar{a}_{C1}^{n} + \bar{a}_{C1}^{\tau}$? $- \bar{a}_{B2}^{=0} + \bar{a}_{CB2}^{n} + \bar{a}_{CB2}^{\tau}$? $+ \bar{a}_{CB2}^{c}$

$a_{C1} = 0$

$a_{C1}^{n} = \omega_3^2 \cdot |C1| =$ ✓

$a_{C1}^{\tau} = \varepsilon_3 \cdot |C1| =$? ; $\varepsilon_3 =$?

$a_{B2} = 0$

$a_{CB2}^{n} = \frac{v_{B2C2}^2}{\infty \text{ (R)}} = 0$

$a_{CB2}^{c} = 2 \cdot \omega_2 \cdot v_{C2B2} \cdot \sin(\omega_2 ; v_{C2B2}) =$

$a_{CB2}^{\tau} =$?


e
-mechanik
.COM
.PL