

Análisis de Aceleraciones

Método Gráfico

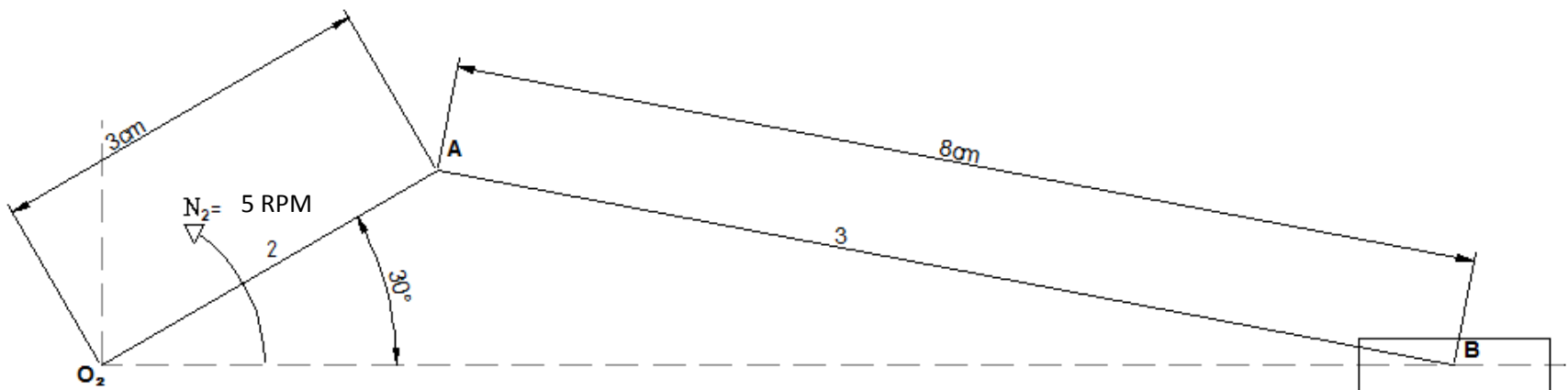
Diseño de Máquinas

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Datos



Calcular la Aceleración del punto B para la figura mostrada

Determinación de Velocidades

Calculo de V_a :

$$V_a = \omega_2 \times r_2 :$$

$$\omega_2 = (5 * 2\pi / 60) = 0,524 \text{ rad/s}$$

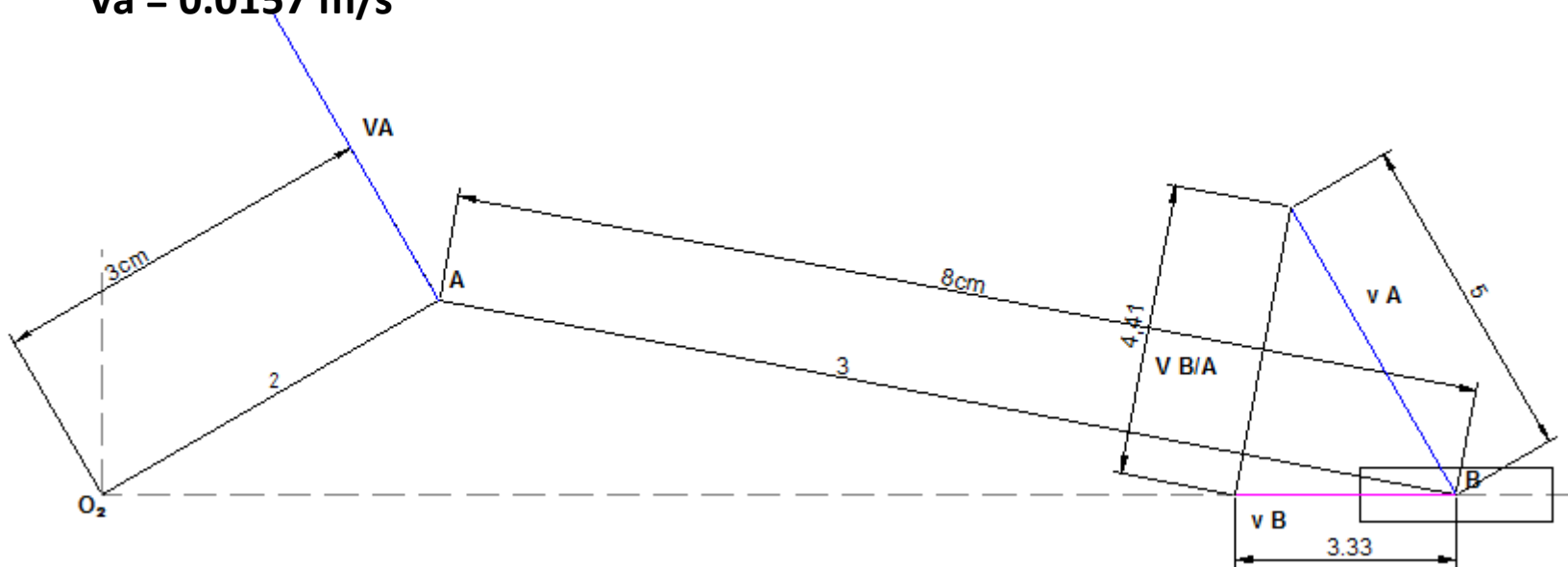
$$r_2 = 0.03 \text{ m}$$

$$V_a = 0.0157 \text{ m/s}$$

Calculo del Factor de Escala:

$$K_v = 0.0157 \text{ m/s} / (5\text{cm})$$

$$K_v = 0.00314$$



Cálculo de V_b y $V_{b/a}$:

$$V_b = 3.33 * 0.00314 = 0.0104 \text{ m/s}$$

$$V_{b/a} = 4.41 * 0.00314 = 0.0138 \text{ m/s}$$

Aceleración "A":

$$\overline{Aa} = Aa^t + Aa^n$$

$$Aa^t = A.coriolis + A.tang$$

$$A.coriolis = 2 \cdot \omega \cdot \frac{dr}{dt}$$

$$A.tang = \alpha \cdot r$$

$$Aa^n = A.centripeta + A.centrifuga$$

$$A.centripeta = -\omega^2 \cdot r$$
$$= -(0.524)^2 \cdot 0,03 = 0.0082 \text{ m/s}^2$$

$$A.centrifuga = \frac{d^2r}{dt^2}$$

$$A_A = A_A^n = 0.0082 \text{ m/s}^2$$

Aceleración "B":

$$\vec{A}_B = \vec{A}_A + \vec{A}_{B/A}$$

$$A_B^t + A_B^n = A_A^t + A_A^n + A_{B/A}^t + A_{B/A}^n$$

$$A_B^t = ?$$

$$A_{B/A}^t = 2 \cdot \omega_{B/A} \cdot \frac{dr_{AB}}{dt} + \alpha_{B/A} \cdot r_{AB} \quad A_{B/A}^t \perp A_{B/A}^n$$

$$A_{B/A}^n = -\frac{V_{B/A}^2}{r_{AB}} + \frac{d^2 r_{AB}}{dt^2} \quad A_{B/A}^n = -\frac{0.0138^2}{0,08} = 0.0024 \text{ m/s}^2$$

Determinación Factor de Escala de Aceleración:

$$A_A = A_A^n = 0.0082 \text{ m/s}^2$$

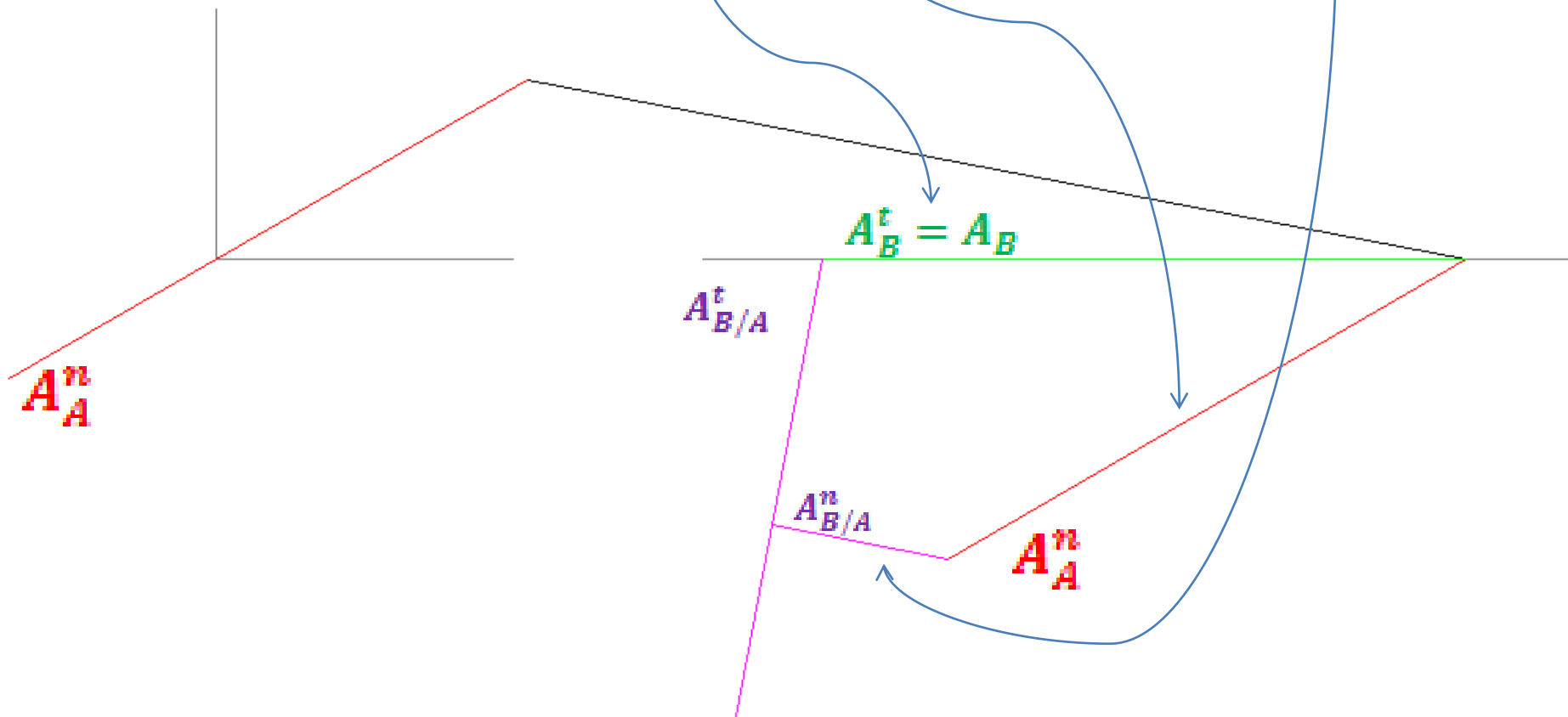
$$A_{B/A}^n = 0.0024 \text{ m/s}^2$$

$$K_A = \frac{0.0082 \text{ m/s}^2}{5 \text{ cm}} = 0.00164$$

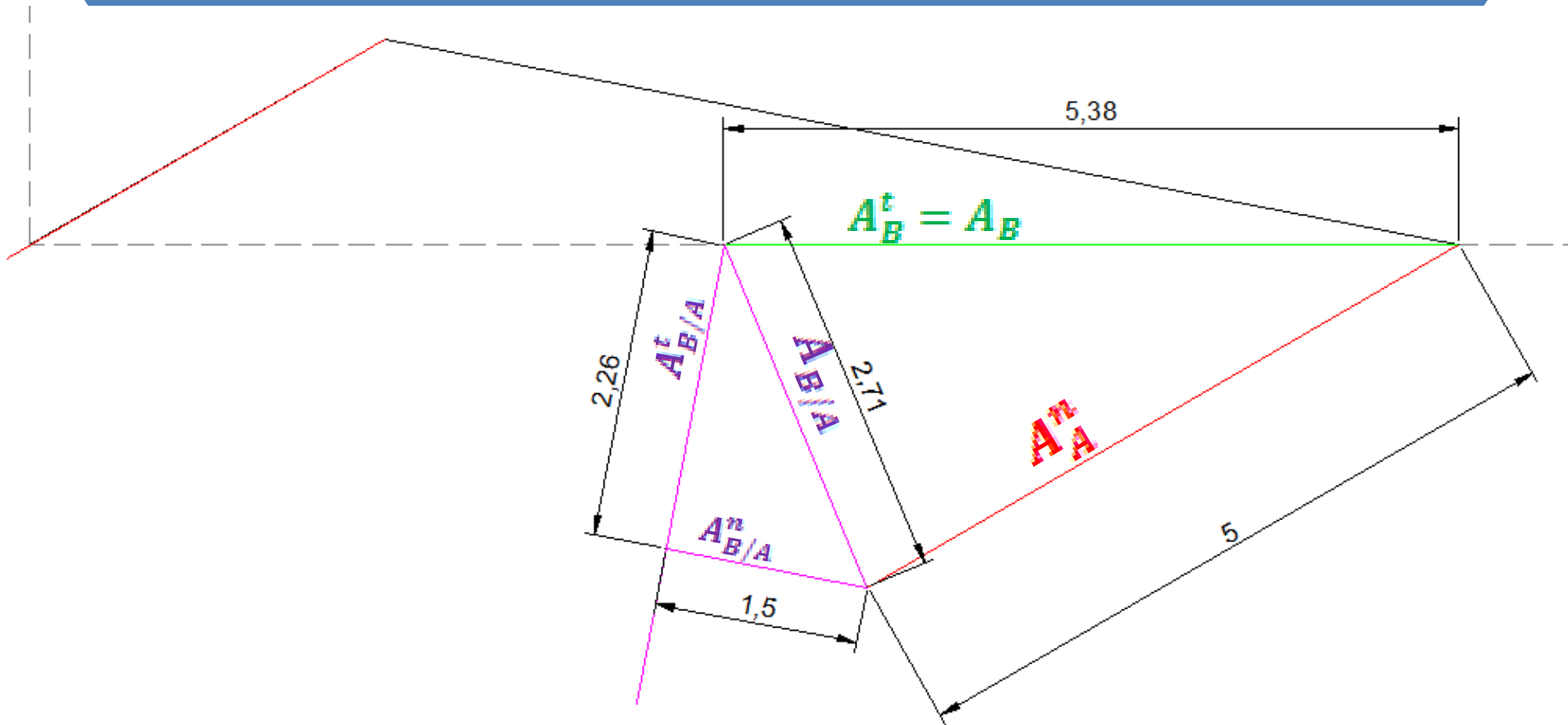
$$D_{AB/A}^n = \frac{0.0024}{0.00164} = 1.5 \text{ cm}$$

Cinema de Aceleraciones

$$A_B^t = A_A^n + A_{B/A}^t + A_{B/A}^n$$



Resultados:



Cálculo de A_b y $A_{b/a}$:

$$A_b = 5.38 * 0.00164 = 0.0088 \text{ m/s}^2$$

$$A_{b/a} = 2.71 * 0.00164 = 0.0044 \text{ m/s}^2$$