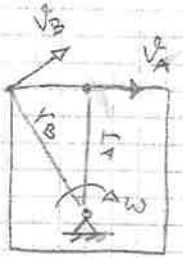
Seminarie pass 18

Sp 18 forts. ...

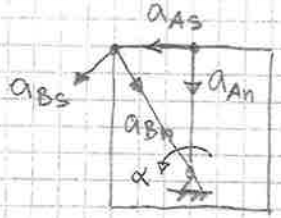
1)



$\boxed{v = \omega \cdot r}$ $\quad \omega = 6\ rad/s$

$$\begin{cases} r_A = 45\ mm = 0.045\ m \\ r_B = \sqrt{30^2 + 45^2} = 0.0541\ m \end{cases}$$

$$\begin{cases} v_A = 6 \cdot 0.045 = \underline{0.27\ m/s} \\ v_B = 6 \cdot 0.0541 = \underline{0.32\ m/s} \end{cases}$$



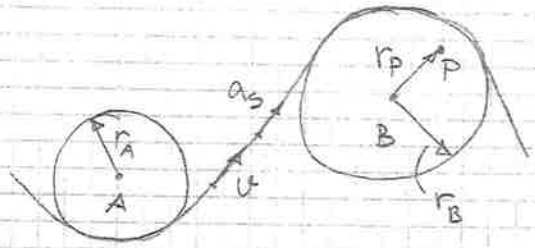
$\boxed{a_S = \alpha r}$, $\boxed{a_n = \omega^2 r}$

$$\begin{cases} a_{SA} = 4 \cdot 0.045 = 0.18\ m/s^2 \\ a_{nA} = 6^2 \cdot 0.045 = 1.62\ m/s^2 \end{cases}$$

$a_A = \underline{1.63\ m/s^2}$

$$\begin{cases} a_{SB} = 4 \cdot 0.0541 = 0.22\ m/s^2 \\ a_{nB} = 6^2 \cdot 0.0541 = 1.95\ m/s^2 \end{cases} \Rightarrow \underline{a_B = 1.96\ m/s^2}$$

2)



a) Vinkelhast. $\begin{cases} \omega_A = \frac{v}{r_A} = \frac{2.4}{0.06} = \underline{40\ rad/s} \\ \omega_B = \frac{v}{r_B} = \frac{2.4}{0.12} = \underline{20\ rad/s} \end{cases}$

Acceleration:

$$a_S = (v_1^2 - v_0^2)/2s = \frac{2.4^2 - 1.2^2}{2 \cdot 0.6} = 3.6\ m/s^2$$

$$\begin{cases} \alpha_A = \frac{a_S}{r_A} = \frac{3.6}{0.06} = \underline{60\ rad/s^2} \\ \alpha_B = \frac{a_S}{r_B} = \frac{3.6}{0.12} = \underline{30\ rad/s^2} \end{cases}$$

b) $v_P = \omega_B r_P = 20 \cdot 0.09 = \underline{1.8\ m/s}$

$$\begin{cases} a_{Ps} = \alpha_B r_P = 30 \cdot 0.09 = 2.7\ m/s^2 \\ a_{Pn} = \omega_B^2 r_P = 20^2 \cdot 0.09 = 36\ m/s^2 \end{cases}$$

$\Rightarrow a_P = \underline{36.1\ m/s^2}$

Sp 18 forts 2.

3) a) $\alpha = \omega \frac{d\omega}{d\varphi}$ alt uttryck för vinkel acc.

$\alpha = -0.1\,\omega^2 \Rightarrow$

$-0.1\,\omega^2 = \omega \frac{d\omega}{d\varphi}$; $d\varphi = -10\,\frac{d\omega}{\omega}$

$\int_0^{\varphi} d\varphi = -10 \int_{12}^{4} \frac{d\omega}{\omega}$; $\varphi = 10\,[\ln\omega]_{4}^{12}$;

$\varphi = 10 \ln\frac{12}{4} = 10 \ln 3 = \underline{11.0 \text{ rad}}$ (1,75 varv)

b) tiden

$a = \frac{d\omega}{dt}$; $\frac{d\omega}{dt} = -0.1\,\omega^2$

$dt = -10\,\frac{d\omega}{\omega^2}$

$\int_0^{t} dt = -10 \int_{12}^{4} \frac{d\omega}{\omega^2}$

$t = -10\,\left[-\frac{1}{\omega}\right]_{12}^{4} = 10\left(\frac{1}{4} - \frac{1}{12}\right) = \frac{10}{6} = \underline{1.67 \text{ s}}$