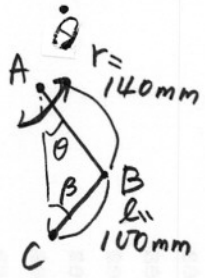
5. $\theta = \theta_0 \sin 2\pi t \qquad \theta_0 = \frac{\pi}{12}$

the time for one complete oscillation is 1 second.



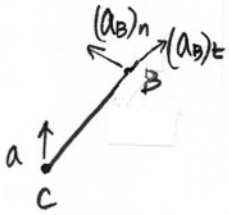
$\theta = \theta_0 \sin 2\pi t$

$\dot{\theta} = 2\pi\theta_0 \cos 2\pi t$

$\ddot{\theta} = -4\pi^2 \theta_0 \sin 2\pi t$

$\theta = 0$ 时 $\quad \dot{\theta} = 2\pi\theta_0 = \frac{\pi^2}{6} \quad \ddot{\theta} = 0 \quad \beta = 0$

$\theta = \frac{\pi}{12}$ " $\quad \dot{\theta} = 0 \quad \ddot{\theta} = -4\pi^2\theta_0 = \frac{-\pi^3}{3} \quad \beta = 21.2°$ (sine rule)



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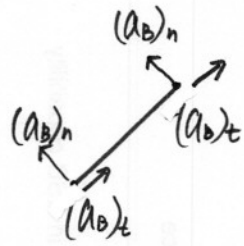

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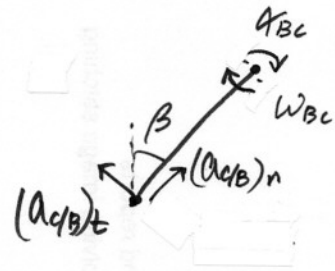
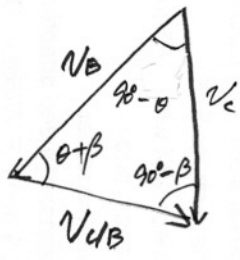


$\frac{100}{\sin 15°} = \frac{140}{\sin\beta}$

$a = (a_B)_n + (a_B)_t + (a_{C/B})_n + (a_{C/B})_t \qquad$ —— ①

$(a_B)_n = r\dot{\theta}^2 \qquad (a_{C/B})_n = l\omega_{BC}^2$

$(a_B)_t = r\ddot{\theta} \qquad (a_{C/B})_t = l\alpha_{BC}$



$$\frac{v_{C/B}}{\sin(90°-\theta)} = \frac{v_B}{\sin(90°-\beta)}$$

$$v_{C/B} = \frac{v_B \cos\theta}{\cos\beta}$$

$$\therefore \omega_{BC} = \frac{v_{C/B}}{l} = \frac{v_B\cos\theta}{l\cos\beta} = \frac{r\dot{\theta}\cos\theta}{l\cos\beta}$$

① 에서

$\overset{+}{\rightarrow} x$ $\quad 0 = -(a_B)_n \sin\theta + (a_B)_t \sin(90°-\theta) + (a_{c/B})_n \sin\beta - (a_{c/B})_t \cos\beta$

$$0 = -r\dot{\theta}^2 \sin\theta + r\ddot{\theta}\cos\theta + l\omega_{BC}^2 \sin\beta - l\alpha_{BC}\cos\beta \quad -②$$

$\overset{+}{\downarrow} y$ $\quad -a = -(a_B)_n \cos\theta - (a_B)_t \cos(90°-\theta) - (a_{c/B})_n \cos\beta - (a_{c/B})_t \sin\beta$

$$-a = -r\dot{\theta}^2 \cos\theta - r\ddot{\theta}\sin\theta - l\omega_{BC}^2 \cos\beta - l\sin\beta \cdot \alpha_{BC}. \quad -③$$

② & ③을 연립하면.

$$a = \frac{1}{\cos\beta}\left[r\dot{\theta}^2 \cos(\theta+\beta) + l\omega_{BC}^2 + r\ddot{\theta}\sin(\theta+\beta)\right]$$

(a) $\theta = 0$

$a = 0.909\ m/s^2 \uparrow$

(b) $\theta = \frac{\pi}{12}$

$a = 0.917\ m/s^2 \downarrow$