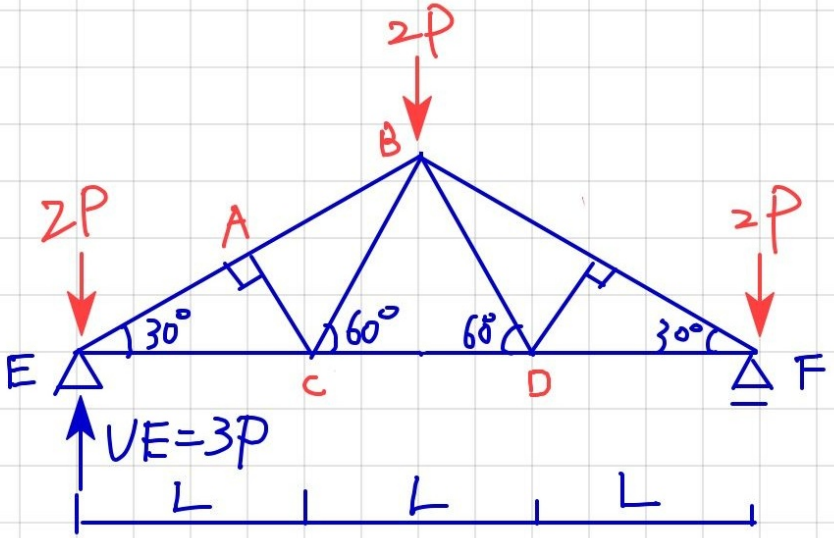
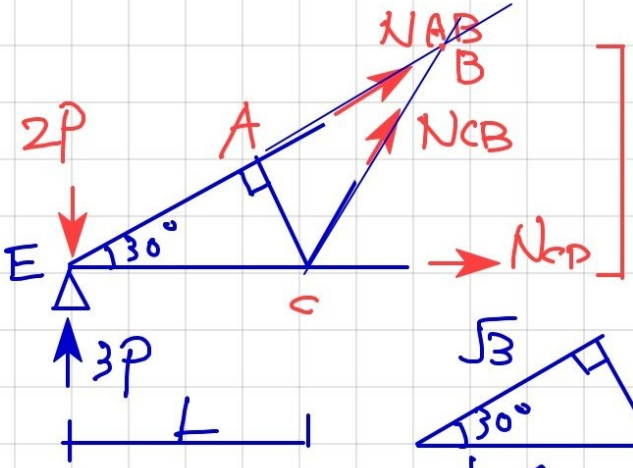
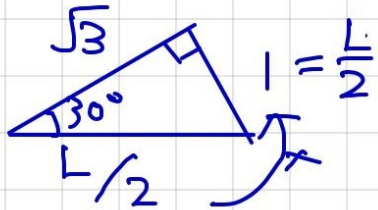
No1 トラス（H28-No6の類似）







部材AB，CB，CDに生じる軸方向力

引張力「+」，圧縮力「−」とする

$\Sigma M_C = 0$ より

$$+N_{AB}\times\frac{L}{2}+3P\times L-2P\times L=0$$

$$\frac{N_{AB}L}{2}=-PL \qquad N_{AB}=-2P\ (圧)$$

$\Sigma M_E = 0$ より

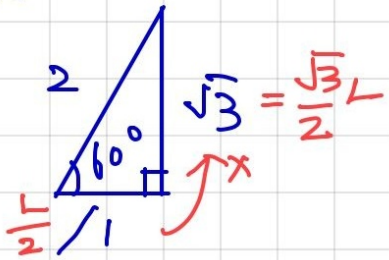
$$-N_{CB}\times(モヨリ)=0 \qquad N_{CB}=0$$

$\Sigma M_B = 0$ より

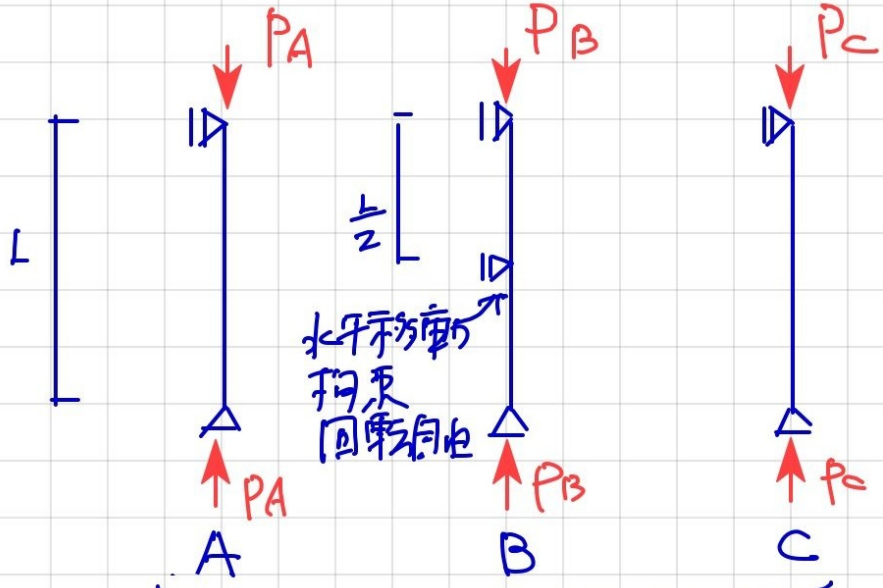
$$-N_{CD}\times\frac{\sqrt{3}}{2}L+3P\times\frac{3}{2}L-2P\times\frac{3}{2}L=0$$

$$-\frac{\sqrt{3}}{2}N_{CD}L=-\frac{3}{2}PL$$

$$N_{CD}=\frac{6PL}{2\sqrt{3}}=\frac{3PL}{\sqrt{3}}=\sqrt{3}PL\ (引)$$

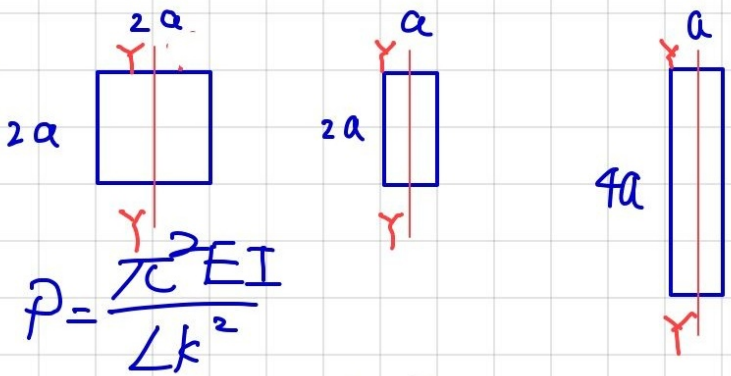


NO2 弾性座屈荷重（H06-No6の類似）



両端ピン，水平移動拘束

断面



公式 $P=\dfrac{\pi^2 EI}{Lk^2}$

$I=\dfrac{\text{幅}\times\text{高さ}^3}{12}$

柱A.B.Cの弾性座屈荷重の大小関係

同一材質，面外方向の座屈は無視

$${}_AI_y=\frac{2a\times(2a)^3}{12}=\frac{16}{12}a^4$$

$${}_BI_y=\frac{2a\times a^3}{12}=\frac{2}{12}a^4$$

$${}_CI_y=\frac{4a\times a^3}{12}=\frac{4}{12}a^4$$

$$P_A=\frac{\pi^2E\frac{16}{12}a^4}{L^2}=\frac{16\pi^2Ea^4}{12L^2}=\frac{16}{12}$$

$$P_B=\frac{\pi^2E\frac{2}{12}a^4}{\left(\frac{L}{2}\right)^2}=\frac{4\times2\pi^2Ea^4}{12L^2}=\frac{8}{12}$$

$$P_C=\frac{\pi^2E\frac{4}{12}a^4}{L^2}=\frac{4\pi^2Ea^4}{12L^2}=\frac{4}{12}$$

$$P_A>P_B>P_C$$