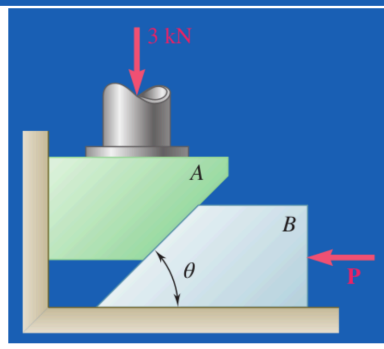
Block A supports a pipe column and rests as shown on wedge B. Knowing that the coefficient of static friction at all surfaces of contact is 0.25 and that $\theta = 45°$, determine the smallest force **P** required to raise block A.

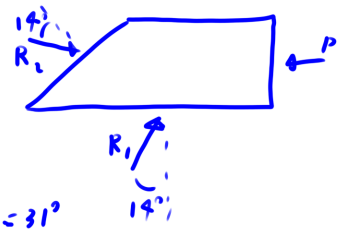


$\phi_s = \tan^{-1}(0.25)$

$= 14°$

$F = \mu_s N$

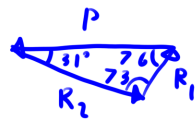
$\tan(\phi_s) = \frac{F}{N} = \frac{\mu_s N}{N} = \mu_s$



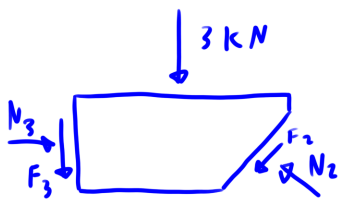
$45° - 14° = 31°$

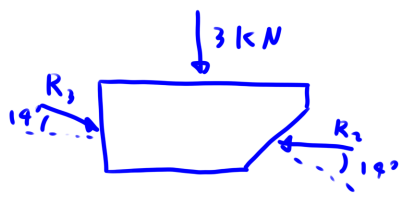
$90° - 14° = 76°$

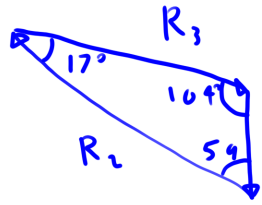
$180° - 31° - 76° = 73°$



$$\frac{R_2}{\sin 76} = \frac{P}{\sin 73}$$







$90 + 14 = 104$

$14 + 45 = 59°$

$180 - 104 - 59 = 17$

$$\frac{3}{\sin 17} = \frac{R_2}{\sin 104}$$

$$\frac{3 \sin 104}{\sin 17} = R_2 = 9.96 \text{ kN}$$

$$\frac{R_2}{\sin 76} = \frac{P}{\sin 73}$$

$$\frac{9.96}{\sin 76} = \frac{P}{\sin 73}$$

$$\frac{9.96 \sin 73}{\sin 76} = \boxed{9.31 \text{ kN} = P}$$