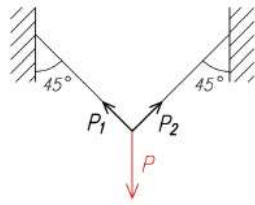


Statics: Force System: **Concurrent Force System** Solved Problem using **graphics method and analytical method**

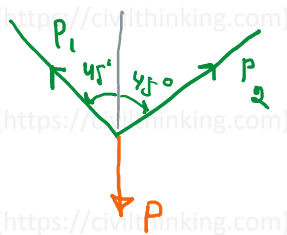
Please find the forces in two parts of the rope suspended between the walls and loaded by the force $P = 10 \text{ kN}$ as on diagram below.



Please use the ruler and set-square in the graphic method.

Solution:

Free body Diagram:



$$+\uparrow \sum F_y = 0:$$

$$-P + P_1 \cos 45^\circ + P_2 \cos 45^\circ = 0 \quad \text{--- ①}$$

$$\rightarrow \sum F_x = 0: -P_1 \sin 45^\circ + P_2 \sin 45^\circ = 0$$

$$-P_1 + P_2 = 0$$

$$\Rightarrow \boxed{P_1 = P_2}$$

$$-P + P_2 \cos 45^\circ + P_2 \cos 45^\circ = 0$$

$$-P + 2P_2 \cos 45^\circ = 0$$

$$\Rightarrow 2P_2 \cos 45^\circ = P$$

$$\Rightarrow P_2 = \frac{P}{2 \cos 45^\circ} = \frac{\sqrt{2}}{2} P = \frac{\sqrt{2}}{2} \times 10 \text{ kN} = 5\sqrt{2} \text{ kN} \approx 7.07 \text{ kN}$$

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$$2 \cos 45^\circ - \frac{1}{2} - \frac{1}{2} \times 10 \text{ kN} = 5\sqrt{2} \text{ kN} \approx 7.07 \text{ kN}$$

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$$\Rightarrow P_1 \approx 7.07 \text{ kN} \quad [\because P_1 = P_2]$$

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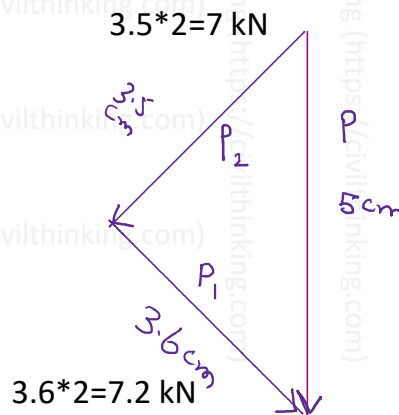
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Graphics Method:

Scale:
 2 kN = 1 cm
 1 kN = $\frac{1}{2}$ cm
 $P = 10 \text{ kN} = \frac{10}{2} = 5 \text{ cm}$



This problem was solved by Civil Thinking (<https://civilthinking.com>)
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