

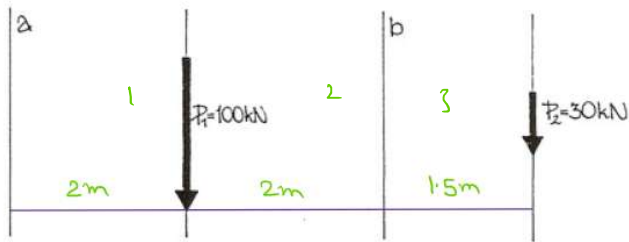
Statics: Force System: Parallel Force System Equilibrium

Solved Problem using **graphic method**

Please find forces R_A and R_B balancing the force system $P_1 = 100 \text{ kN}$ and $P_2 = 30 \text{ kN}$.

Forces R_A and R_B are on lines **a** and **b** parallel to lines of action of forces P_1 and P_2 .

Use graphic and numerical methods.



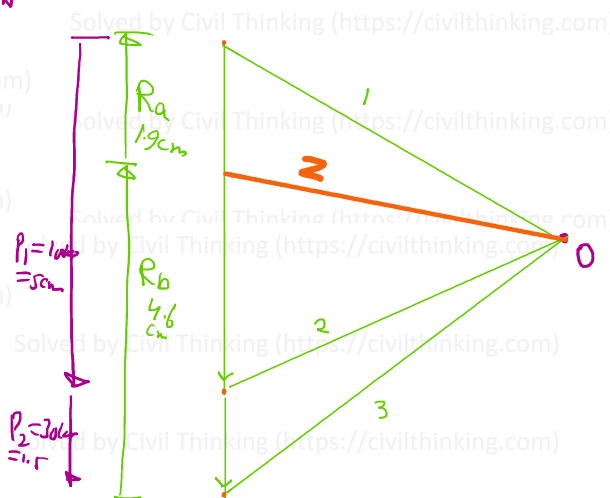
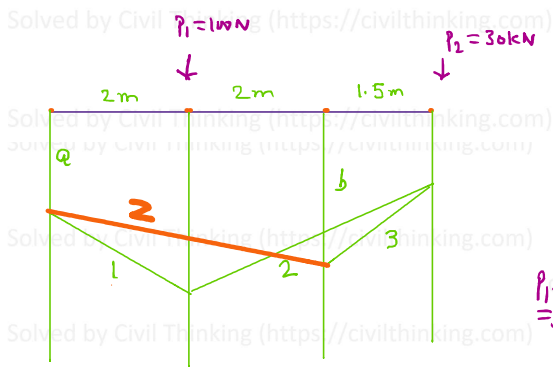
Solution using Graphic Method:

Space diagram (Scale: 1cm = 1m):

Vector Polygon:

Scale:

$$1 \text{ cm} = 20 \text{ kN} \Rightarrow 1 \text{ kN} = \frac{1}{20} \text{ cm} \Rightarrow 100 \text{ kN} = 5 \text{ cm}, 30 \text{ kN} = 1.5 \text{ cm}$$

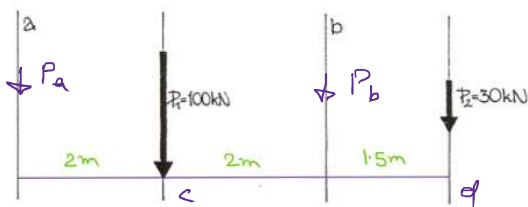


$$R_a = 1.9 \times 20 = 38 \text{ kN}$$

$$R_b = 4.6 \times 20 = 92 \text{ kN}$$

Check: Summation Forces;
 $F_y = -100 - 30 + 38 + 92 = 0$
 o.k.

Numeric method:



$$\sum M_a = 0:$$

$$(P_2 \times 5.5) + (P_b \times 4) + (P_1 \times 2) = 0$$

$$\Rightarrow P_b = \frac{-(100 \times 2) - (30 \times 5.5)}{4}$$

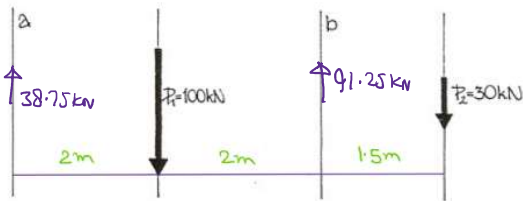
$$= \frac{-(-200) - (30 \times 5.5)}{4} = -91.25 \text{ kN}$$

$$\sum F_y = 0:$$

$$-P_a - 100 - (-91.25) - 30 = 0$$

$$\Rightarrow P_a = 100 - 91.25 + 30 = 38.75 \text{ kN}$$

Final Answer :



Check:


$$38.75 - 100 + 91.25 - 30 = 0 \text{ o.k.}$$

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