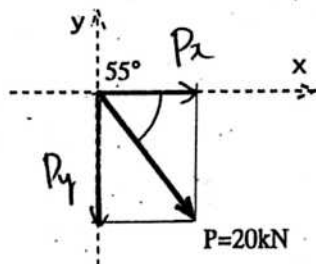


1. 下図に示す力 P の分力 P_x, P_y を図示せよ。また、解析的に値を求めよ (答えは小数点表示とする)。

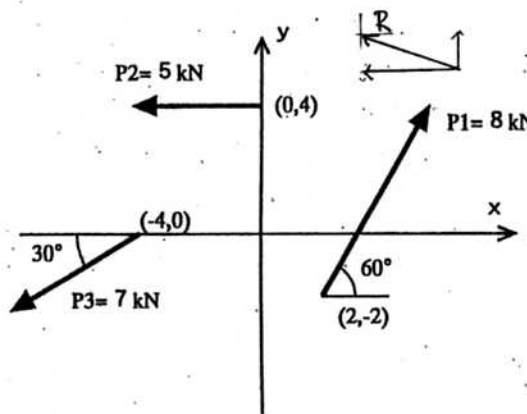


$$P_x = P \cos \theta = 20 \cos 55 = 11.47 \text{ kN}$$

$$P_y = -P \sin \theta = -20 \sin 55 = -16.38 \text{ kN}$$

3. 合力を解析的に求めよ。

(単位: 力はkN, 距離はmとする)



	$\vec{H}$	$\vec{V}$	$\vec{M}_H$	$\vec{M}_V$
P_1	$8 \cos 60 = 4.00$	$8 \sin 60 = 6.93$	$-(4 \times 2) = -8.00$	$-(6.93 \times 2) = -13.86$
P_2	-5.00	0	$-(5 \times 4) = -20.00$	0
P_3	$-7 \cos 30 = -6.06$	$-7 \sin 30 = -3.50$	0	$-(3.50 \times 4) = -14.00$
	-7.06	3.43	-28.00	-27.86

$$R = \sqrt{(5H)^2 + (2V)^2} = \sqrt{(-7.06)^2 + (3.43)^2} = 7.85 \text{ kN}$$

$$\theta' = \tan^{-1} \left(\frac{2V}{5H} \right) = \tan^{-1} \left(\frac{3.43}{-7.06} \right) = -25.91^\circ$$

$$\theta = \theta' + 180 = 154.09^\circ$$

$$-(\Sigma V) \cdot x_0 = \Sigma (Vx)$$

$$-3.43 x_0 = -27.86$$

$$x_0 = 8.12$$

$$-(\Sigma H) \cdot y_0 = \Sigma (Hy)$$

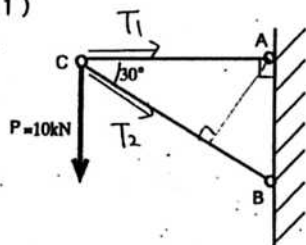
$$-7.06 y_0 = -28.00$$

$$y_0 = 3.97$$

$$(x_0, y_0) = (8.12, 3.97)$$

4. 部材ACに作用する力 T_1 , 部材BCに作用する力 T_2 を求めよ (答えは小数点表示とする)。

(1)



$$\Sigma V = -10 - T_2 \sin 30 = 0$$

$$T_2 = -\frac{10}{\sin 30} = -20 \text{ kN}$$

$$\Sigma H = T_1 + T_2 \cos 30 = 0$$

$$T_1 = -T_2 \cos 30$$

$$= -(-20) \cdot \cos 30 = 17.32 \text{ kN}$$

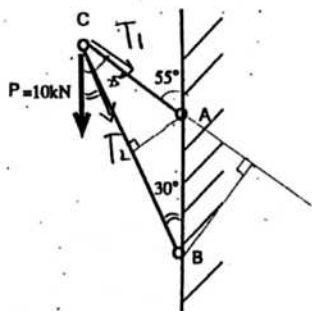
$$\Sigma M_{\text{at } B} = -(10 \cdot BC \cos 30) + T_1 \cdot BC \sin 30 = 0$$

$$T_1 = \frac{\cos 30}{\sin 30} \cdot 10 = 17.32 \text{ kN}$$

$$\Sigma M_{\text{at } A} = -(10 \cdot AC) - (T_2 \cdot AC \cos 30) = 0$$

$$T_2 = -\frac{10}{\cos 30} = -20 \text{ kN}$$

(2)



$$\Sigma H = T_1 \sin 55 + T_2 \sin 30 = 0$$

$$T_2 = -\frac{\sin 55}{\sin 30} T_1$$

$$\Sigma V = -T_1 \cos 55 - T_2 \cos 30 - 10 = 0$$

$$-T_1 \cos 55 + \left(\frac{\sin 55}{\sin 30} T_1 \right) \cos 30 - 10 = 0$$

$$T_1 = \frac{10}{\left(-\cos 55 + \frac{\sin 55}{\sin 30} \cos 30 \right)}$$

$$= 11.83 \text{ kN}$$

$$T_2 = -19.38 \text{ kN}$$

$$\Sigma M_{\text{at } A} = -(10 \cdot AC \sin 55) - (T_2 \cdot AC \sin 25) = 0$$

$$T_2 = -19.38 \text{ kN}$$

$$\Sigma M_{\text{at } B} = -(10 \cdot BC \sin 30) + (T_1 \cdot BC \sin 25) = 0$$

$$T_1 = 11.83 \text{ kN}$$