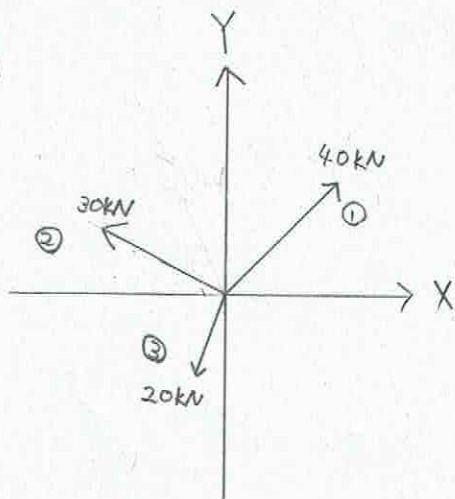


11

a)



$$\textcircled{1} \quad x_1 = 40 \cdot \cos 45^\circ \quad y_1 = 40 \cdot \sin 45^\circ$$

$$\quad \quad \quad \approx 28.28 \text{ kN} \quad \quad \quad \approx 28.28 \text{ kN}$$

$$\textcircled{2} \quad x_2 = 30 \cdot \cos 30^\circ \quad y_2 = 30 \cdot \sin 30^\circ$$

$$\quad \quad \quad = 25.98 \text{ kN} \quad \quad \quad = 15 \text{ kN}$$

$$\textcircled{3} \quad x_3 = 20 \cdot \cos 60^\circ \quad y_3 = 20 \cdot \sin 60^\circ$$

$$\quad \quad \quad = 10 \text{ kN} \quad \quad \quad \approx 17.32 \text{ kN}$$

$$R_x = 28.28 - 25.98 - 10 \quad R = \sqrt{(-7.70)^2 + 26^2}$$

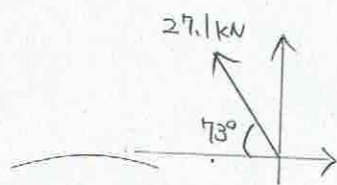
$$\quad \quad \quad = -7.70 \text{ kN} \quad \quad \quad \approx 27.1 \text{ kN}$$

$$R_y = 28.28 + 15 - 17.32$$

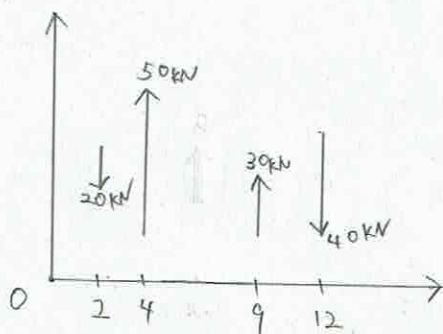
$$\quad \quad \quad \approx 26.0 \text{ kN}$$

$$\tan \theta = \frac{26}{7.7}$$

$$\theta = 73^\circ$$



b)



上向きを正とし、

$$R = -20 + 50 + 30 - 40 = 20 \text{ kN}$$

$$R = 20 \text{ kN}$$

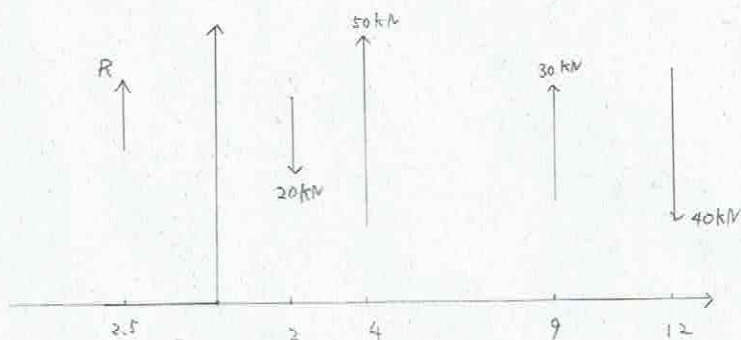
原点 O から 9 モーメントについて、時計回りを正とする

$$M_o = (\sum F_i \times x_i) = R x_o$$

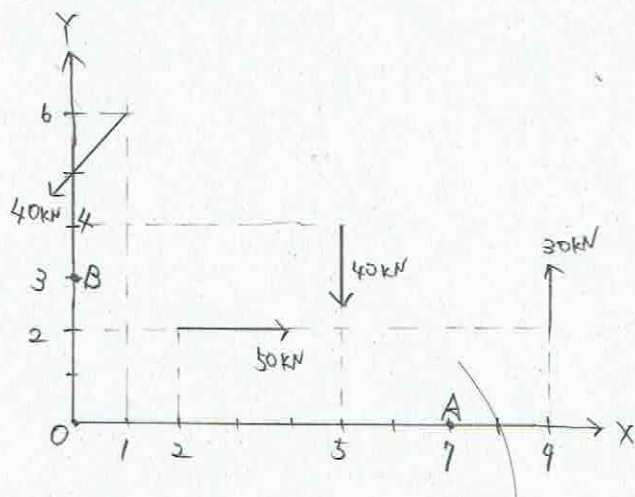
$$20 \cdot 2 - 50 \cdot 4 - 30 \cdot 9 + 40 \cdot 12 = R x_o$$

$$R x_o = -50 \text{ kNm}$$

$$x_o = -2.5 \text{ m}$$



2



$O(0,0)$, $A(7,0)$, $B(0,3)$ として

$$\sum M_O = 50 \cdot 2 + 40 \cdot 5 + 40 \cdot 1 \cdot \cos 45^\circ - (40 \cdot 6 \sin 45^\circ + 30 \cdot 9)$$

$$\approx -111 \text{ kNm}$$

$$\sum M_A = 50 \cdot 2$$

$$- (30 \cdot 2 + 40 \cdot 2 + 40 \cdot 6 \sin 45^\circ + 40 \cdot 6 \cdot \cos 45^\circ)$$

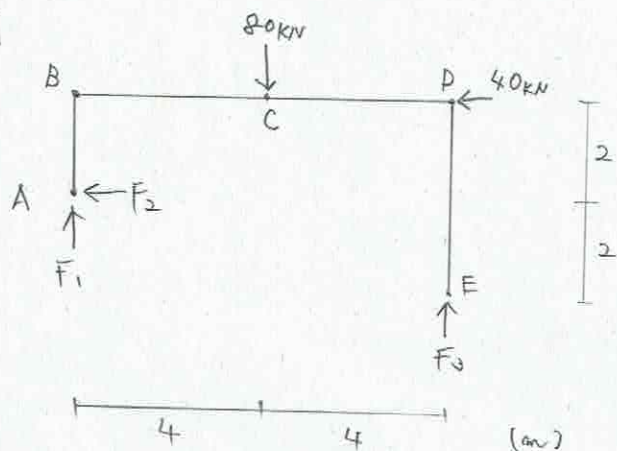
$$\approx -379 \text{ kNm}$$

$$\sum M_B = 40 \cdot 1 \cdot \cos 45^\circ + 40 \cdot 5$$

$$- (50 \cdot 1 + 30 \cdot 9 + 40 \cdot 3 \cdot \sin 45^\circ)$$

$$\approx -177 \text{ kNm}$$

3



x方向の力のつり合いから

$$40 + F_2 = 0 \quad F_2 = -40 \text{ kN}$$

点Aのモーメントのつり合いから

$$\sum M_A = 80 \cdot 4 - 40 \cdot 2 - F_3 \cdot 8 = 0$$

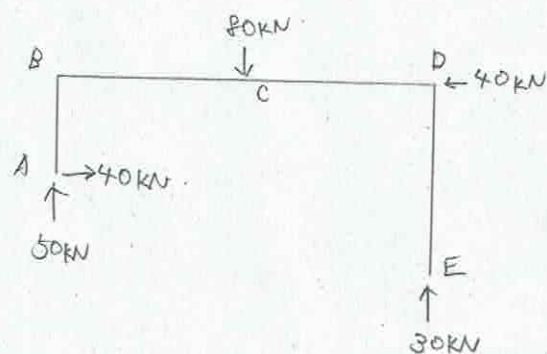
$$240 = 8F_3$$

$$F_3 = 30 \text{ kN}$$

y方向の力のつり合いから

$$F_1 + F_3 - 80 = 0$$

$$F_1 = 50 \text{ kN}$$



2) 別解

$$\sum M_O = 50 \times 2 + 40 \times 5 - 30 \times 9 - 40 \times \frac{5}{2} \sqrt{2}$$

$$= -111 \text{ kNm}$$

$$\sum M_A = 50 \times 2 - 40 \times 2 - 30 \times 2 - 40 \times 6 \sqrt{2}$$

$$= -379 \text{ kNm}$$

$$\sum M_B = -50 \times 1 + 40 \times 3 - 30 \times 9 - 40 \times \frac{2}{2} \sqrt{2}$$

$$= -177 \text{ kNm}$$