

C7(4)

Найти реакции опор конструкции (рис. 1). Дано:  $Q = 3 \text{ кН}$ ,  $G = 2 \text{ кН}$ ,

4

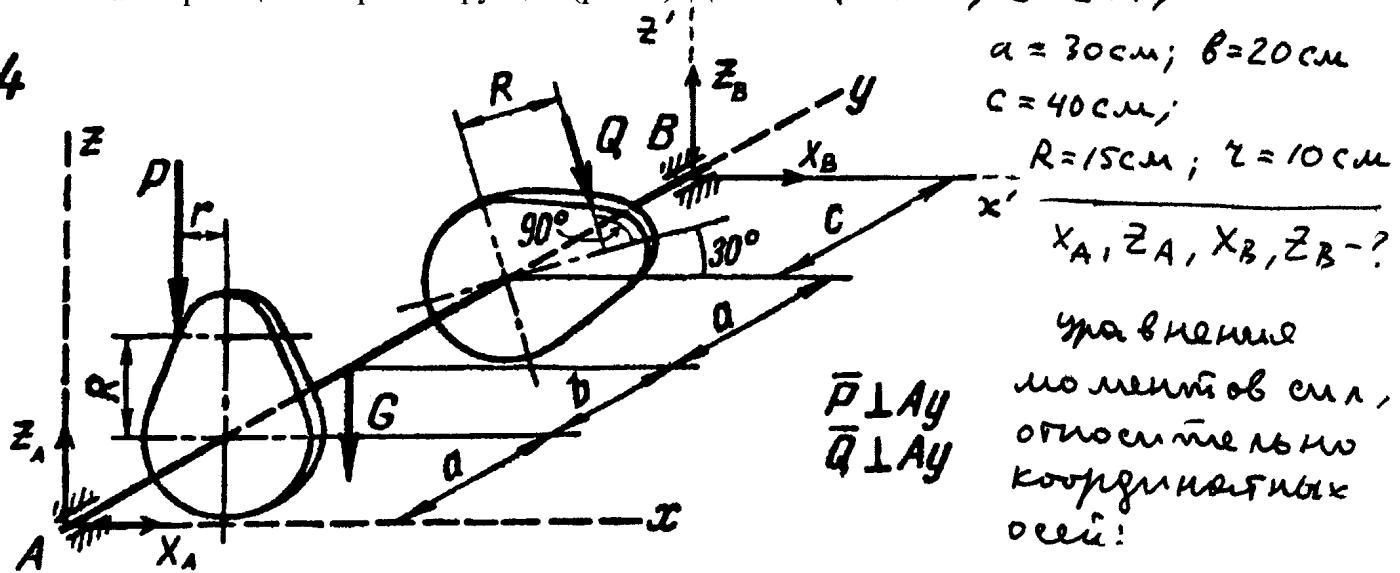


Рис. 1

$$\sum M_i y = 0: -P \cdot z + Q \cdot R = 0; P = \frac{R}{z} \cdot Q = \frac{15}{10} \cdot 3 = 4,5 \text{ кН};$$

$$\sum M_i x = 0: -P \cdot a - G(a+b) - Q \cdot \cos 30^\circ (2a+b) + z_B \cdot (2a+b+c) = 0;$$

$$z_B = \frac{P \cdot a + G(a+b) + Q \cos 30^\circ (2a+b)}{2a+b+c} = \frac{4,5 \cdot 30 + 2 \cdot 50 + 3 \cdot 0,866 \cdot 80}{120} = 3,69 \text{ кН}$$

$$\sum M_i z = 0: -Q \cdot \sin 30^\circ (2a+b) - x_B \cdot (2a+b+c) = 0;$$

$$x_B = \frac{-Q \cdot \sin 30^\circ (2a+b)}{2a+b+c} = -\frac{3 \cdot 0,5 \cdot 80}{120} = -1 \text{ кН};$$

$$\sum M_i x' = 0: Q \cdot \cos 30^\circ \cdot c + G \cdot (c+a) + P \cdot (c+a+b) - z_A \cdot (2a+b+c) = 0;$$

$$z_A = \frac{Q \cos 30^\circ \cdot c + G \cdot (c+a) + P \cdot (c+a+b)}{2a+b+c} = \frac{3 \cdot 0,866 \cdot 40 + 2 \cdot 70 + 4,5 \cdot 90}{120} = 5,41 \text{ кН}$$

$$\sum M_i z' = 0: Q \cdot \sin 30^\circ \cdot c + x_A \cdot (2a+b+c) = 0;$$

$$x_A = \frac{-Q \cdot \sin 30^\circ \cdot c}{2a+b+c} = -\frac{3 \cdot 0,5 \cdot 40}{120} = -0,5 \text{ кН}$$

$$\text{Проверка: } \sum x_i = x_A + Q \cdot \sin 30^\circ + x_B = -0,5 + 3 \cdot 0,5 - 1 = 0$$

$$\sum z_i = z_A - P - G - Q \cdot \cos 30^\circ + z_B = 5,41 - 4,5 - 2 - 3 \cdot 0,866 + 3,69 = 0$$

$$\text{Ответ: } P = 4,5 \text{ кН}; x_A = -0,5 \text{ кН}; z_A = 5,41 \text{ кН}; \\ x_B = -1 \text{ кН}; z_B = 3,69 \text{ кН.}$$