Solution: 21-5-5.4-Mk-05

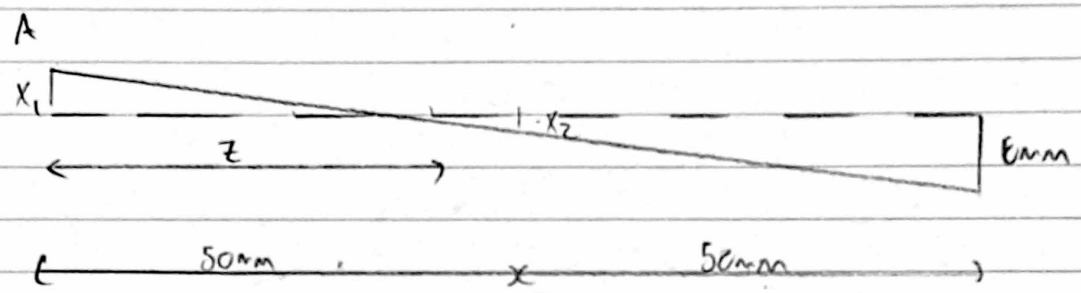
$k_1 = 3\ N/mm$

$k_2 = 6\ N/mm$

$d_1 = 50mm$

$d_2 = 50\ mm$

$d_3 = 8mm$



using similar triangles:

① $\frac{100 - z}{8} = \frac{z}{x_1} = \frac{50 - z}{x_2}$

$F = kx \rightarrow x = \frac{F}{k}$

② $x_1 = \frac{F}{k_1} \qquad x_2 = \frac{2F}{k_2}$

② → ① $\frac{zk_1}{F} = \frac{(50 - z)k_2}{2F}$

$2zk_1 = (50 - z)k_2$

$\frac{2zk_1}{k_2} = 50 - z \rightarrow \frac{2k_1}{k_2} = \frac{50 - z}{z}$

$$\frac{2k_1}{k_2} = \frac{50}{z} - 1$$

$$\frac{2k_1}{k_2} + 1 = \frac{50}{z}$$

$$z = \frac{50}{\frac{2k_1}{k_2} + 1} = z = \frac{50}{2\left(\frac{3}{6}\right) + 1} = 25\ mm$$

find x_1

$$\frac{100 - z}{6} = \frac{z}{x_1} \rightarrow x_1 = \frac{(25mm)(6mm)}{(100 - 25mm)} = 2.6667\ mm$$

find x_2

$$\frac{z}{x_1} = \frac{50 - z}{x_2}$$

$$x_2 = \frac{(50 - z)\,x_1}{z} = \frac{(50 - 25)(2.6667mm)}{25} = 2.6667\ mm$$

$$F = k_1 \cdot x_1 = (3N/mm)(2.6667) = 8\ N.$$