Remarks: See §2.2.1, pages 19 till 21
See §2.3, pages 24 till 26
See §2.6, pages 34 onwards

Answers :

a. 24 mm

b. 6 mm

Explanation:

$\Delta\ell = -\dfrac{F\ell}{EA} \rightarrow \Delta\ell$ is proportional to F

Specific weight of water: $10\ \text{kN/m}^3$

Initial force: $F = (200\ \text{kN}) + (100\ \text{m}^3)(10\ \text{kN/m}^3) = 1200\ \text{kN}$

a. $F = (200\ \text{kN}) + (60\ \text{m}^3)(10\ \text{kN/m}^3) = 800\ \text{kN}$

$$\Delta\ell = -\frac{800\ \text{kN}}{1200\ \text{kN}} \times (36\ \text{mm}) = -24\ \text{mm}\ \ \text{(shortening)}$$

b. $F = 200\ \text{kN}$

$$\Delta\ell = -\frac{200\ \text{kN}}{1200\ \text{kN}} \times (36\ \text{mm}) = -6\ \text{mm}\ \ \text{(shortening)}$$