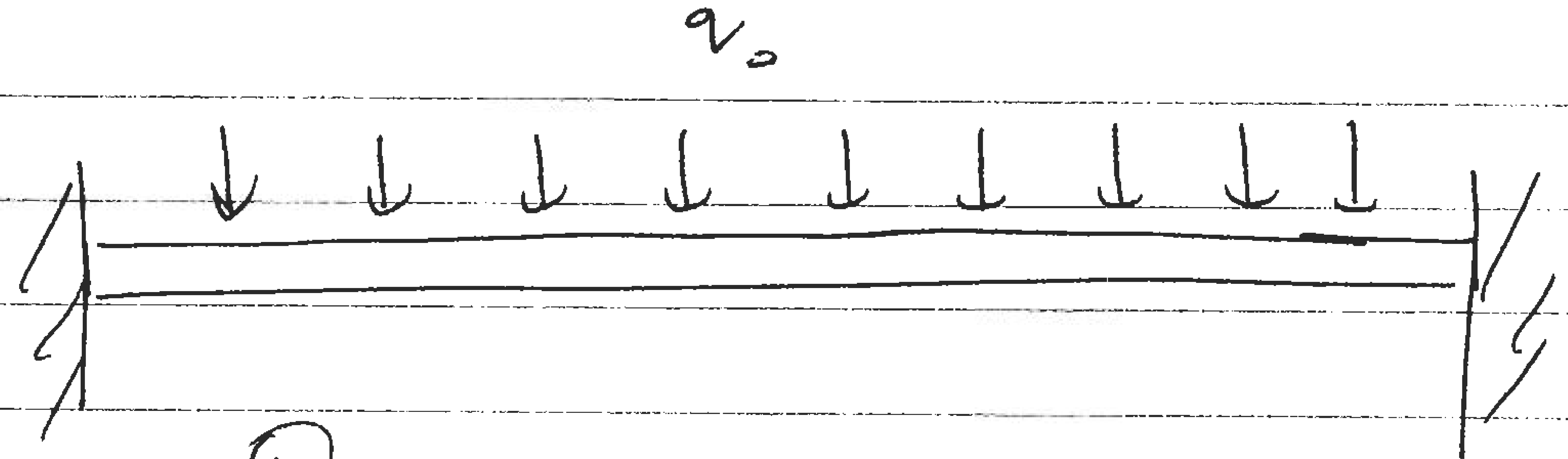
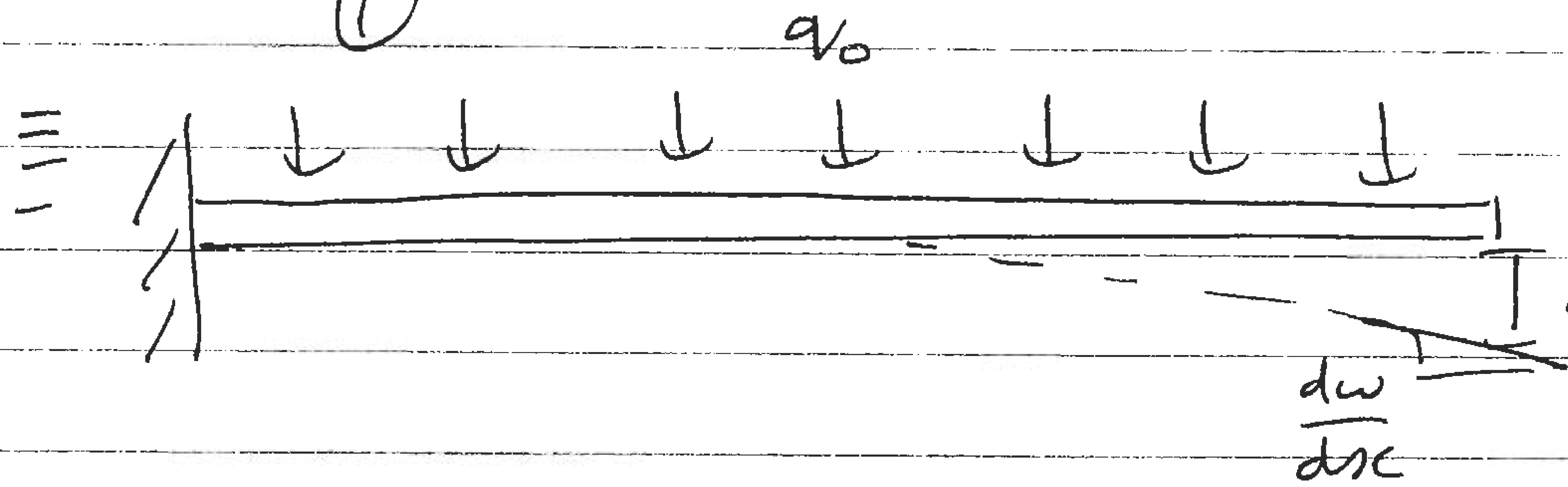
M9



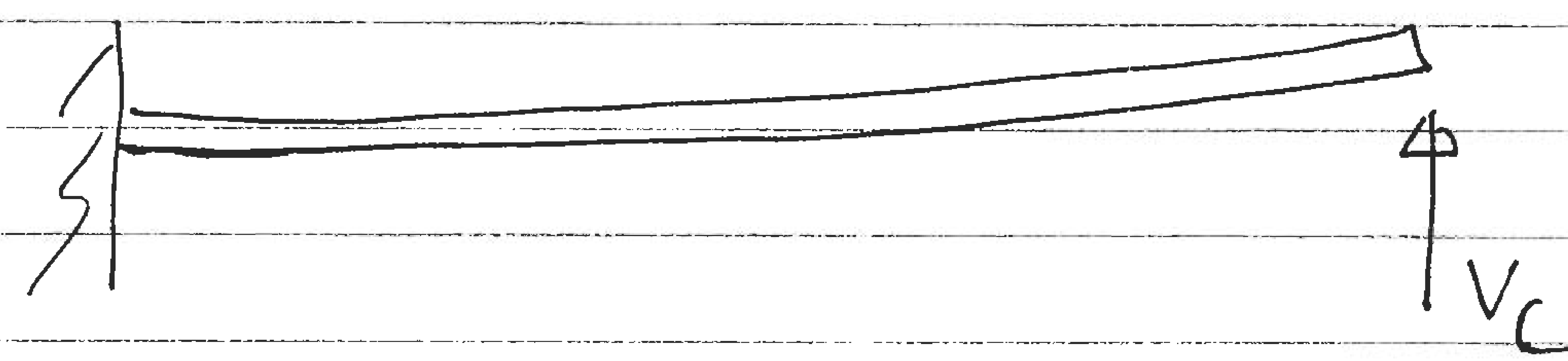
Statically indet.

①



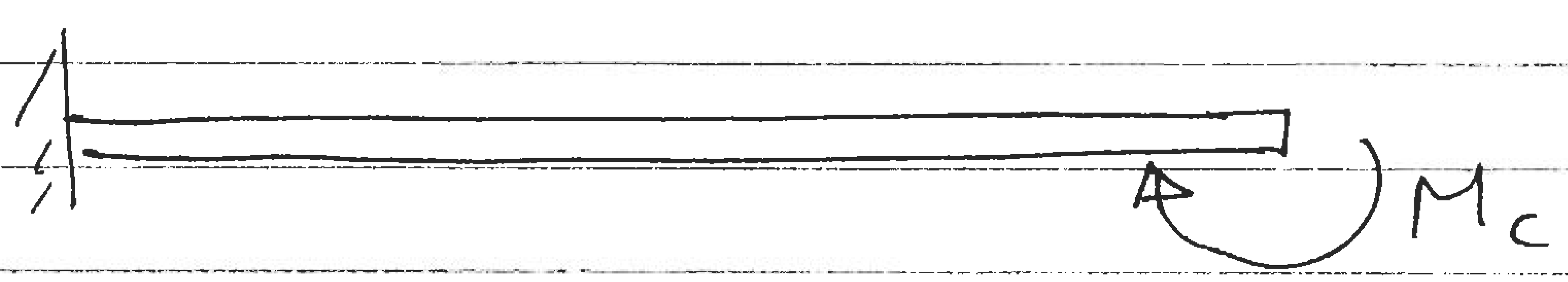
$$\delta^1 = \frac{q_o L^4}{8EI} \qquad \frac{dw^1}{dx} = \frac{q_o L^3}{6EI}$$

②



$$\delta^2 = -\frac{V_c L^3}{3EI} \qquad \frac{dw^2}{dx} = -\frac{V_c L^2}{2EI}$$

③



$$\delta^3 = \frac{M_c L^2}{2EI} \qquad \frac{dw^3}{dx} = \frac{M_c L}{EI}$$

Match B.C.'s at RHE, $x = L$ $\quad w = 0 \quad \frac{dw}{dx} = 0$

$$w = 0 : \quad \delta^1 + \delta^2 + \delta^3 = 0$$

$$\frac{L^2}{EI}\left(\frac{q_0 L^2}{8} - \frac{V_c L}{3} + \frac{M_c}{2}\right) = 0$$

$$12 M_c - 8 V_c L + 3 q_0 L^2 = 0 \quad (1)$$

$$\frac{dw}{dx} = 0 \quad \frac{dw^1}{dx} + \frac{dw^2}{dx} + \frac{dw^3}{dx} = 0$$

$$\frac{L}{EI}\left(\frac{q_0 L^2}{6} - \frac{V_c L}{2} + M_c\right) = 0$$

$$6 M_c - 3 V_c L + q_0 L^2 = 0 \quad (2)$$

Multiply (2) by 2 and subtract from (1)

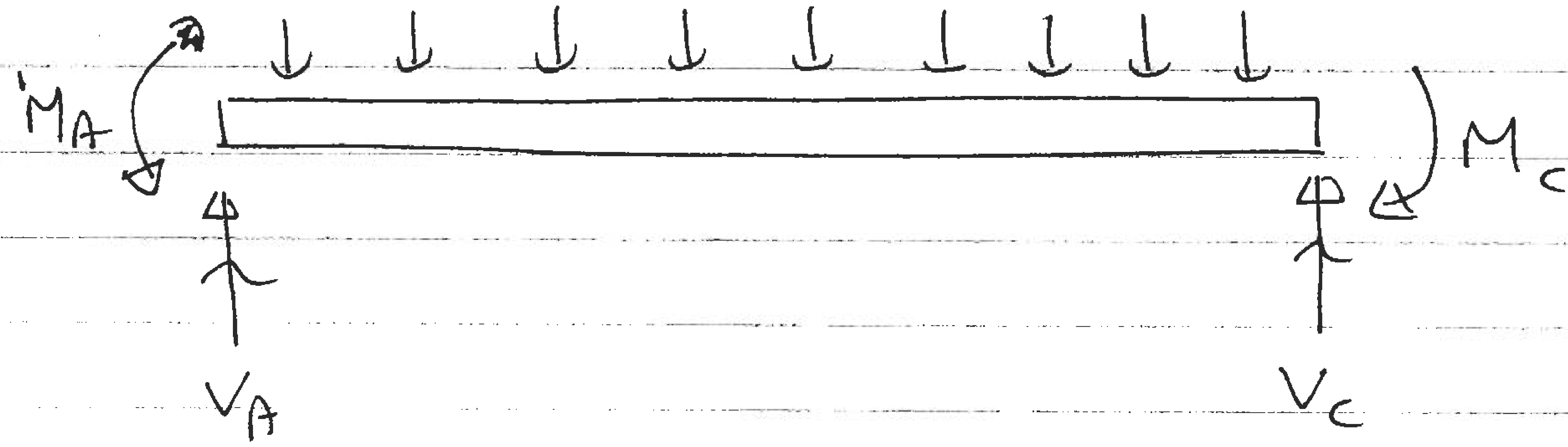
$$0 - 2 V_c L + q_0 L^2 = 0$$

$$V_A = V_c = \frac{q_0 L}{2} = \frac{q_0 L}{2} \Leftarrow \quad (!!)$$

Substitute back into (2)

$$6 M_c - \frac{3 q_0 L^2}{2} + q_0 L^2 = 0 : \quad M_c = M_A = \frac{q_0 L^2}{12} \Leftarrow$$

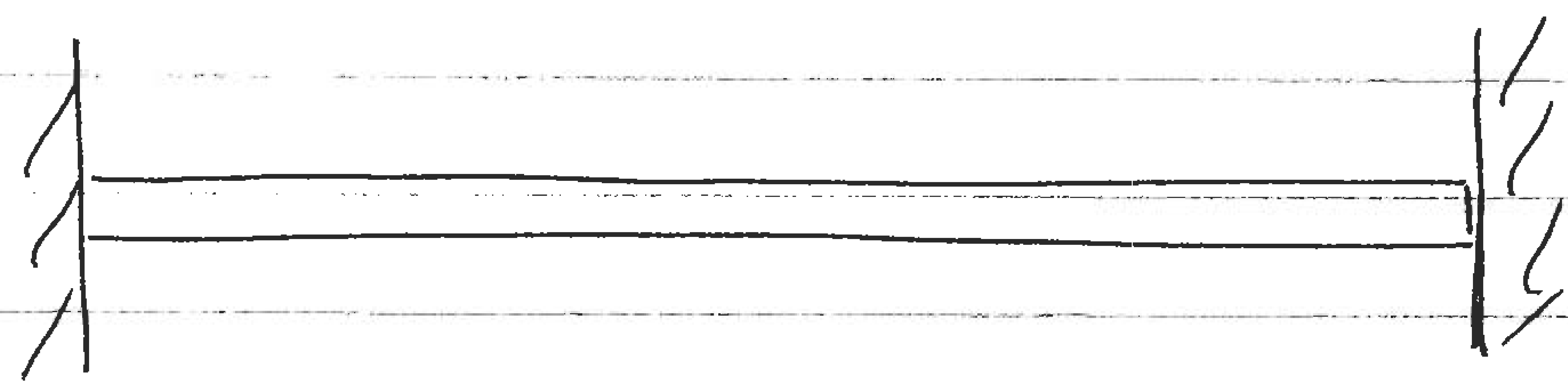
M9



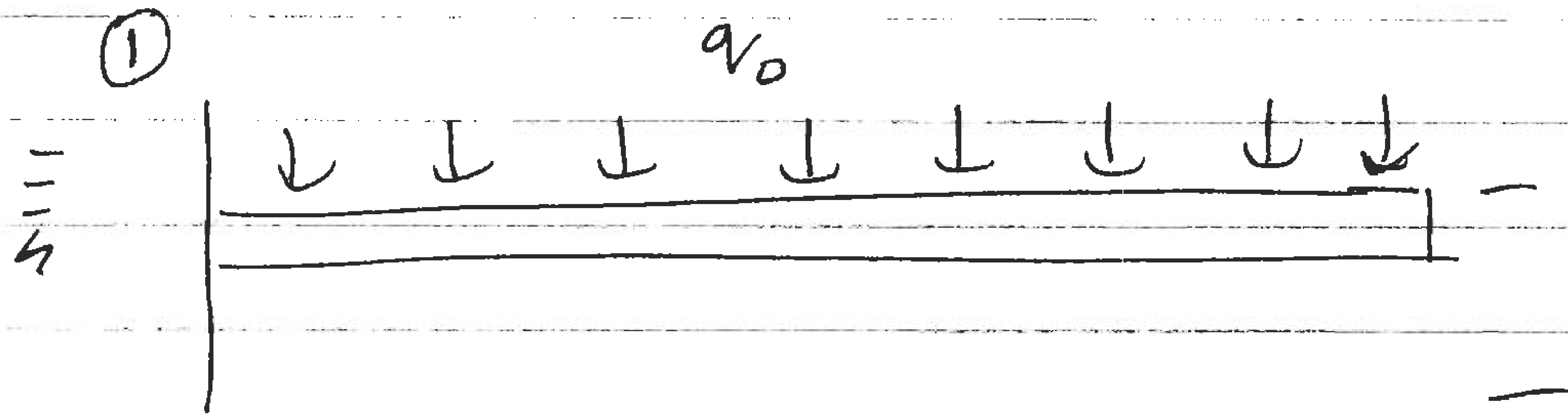
By symmetry $M_A = M_C$

$V_A = V_C$.

But



①



$\delta = \dfrac{q_0 L^4}{8EI}$ $\dfrac{dw}{dx}$

dw