

**4.4** If the line charge density is given by  $\rho_l = 12y^2$  (mC/m), find the total charge distributed on the y axis from  $y = -5$  to  $y = 5$ .

**Solution:**

$$Q = \int_{-5}^5 \rho_l \, dy = \int_{-5}^5 12y^2 \, dy = \left. \frac{12y^3}{3} \right|_{-5}^5 = 1000 \text{ mC} = 1 \text{ C}.$$

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