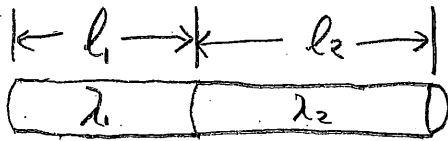
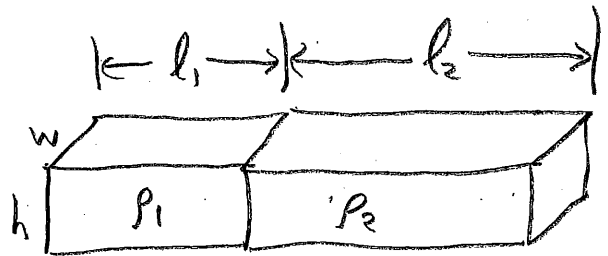


Worksheet - Physics 132  
 finding total charge  
 Matt Trautwick

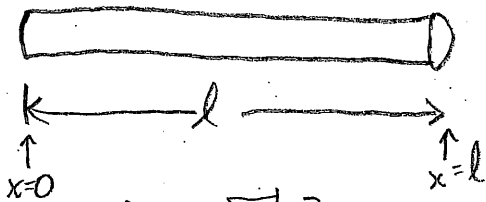


$$Q = \lambda_1 l_1 + \lambda_2 l_2$$

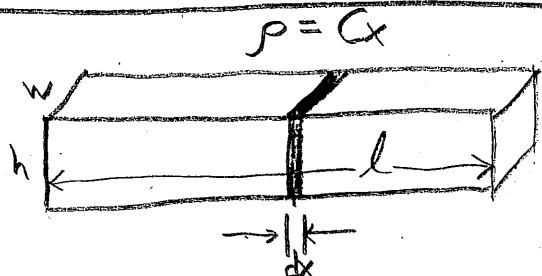


$$Q = \rho_1 l_1 w h + \rho_2 l_2 w h$$

Gradient:  $\lambda = Cx$

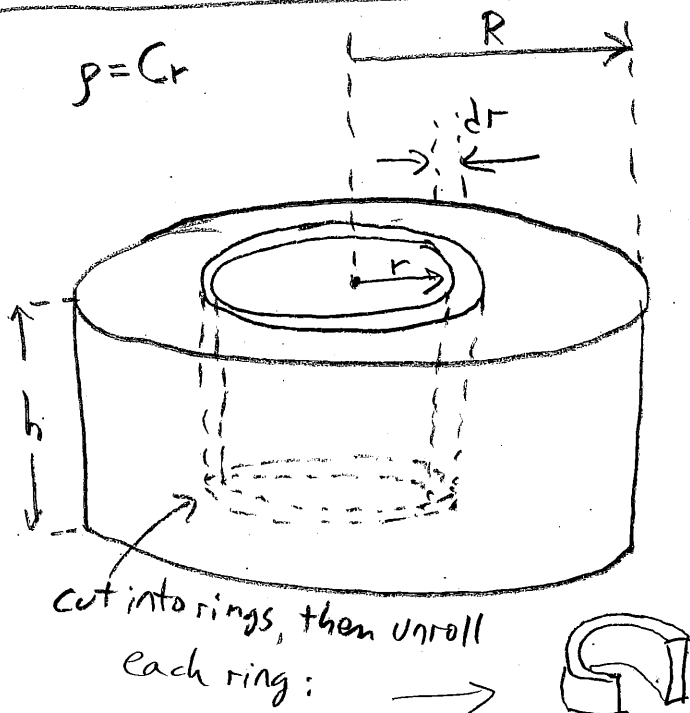


$$\begin{aligned} Q &= \sum \lambda_i \Delta x \\ &= \int \lambda dx \\ &= \int_{x=0}^{x=l} (Cx) dx \\ &= \frac{C}{2} l^2 \end{aligned}$$



$$\begin{aligned} Q &= \sum \rho_i \Delta V \\ &= \int \rho w h dx \\ &= \int_{x=0}^{x=l} (Cx) w h dx \\ &= \frac{w h C}{2} l^2 \end{aligned}$$

$\rho = Cr$



$$\begin{aligned} Q &= \sum \rho \Delta V \\ &= \sum \rho (2\pi r h \Delta r) \\ &= \int_{r=0}^{r=R} (Cr) (2\pi r h) dr \\ &= 2\pi C h \int_{r=0}^{r=R} r^2 dr \\ Q &= \frac{2\pi C h}{3} R^3 \end{aligned}$$