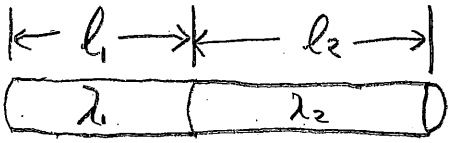
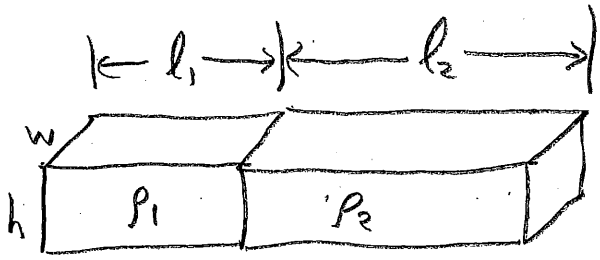
Worksheet – Physics 132
finding total charge
Matt Trawick

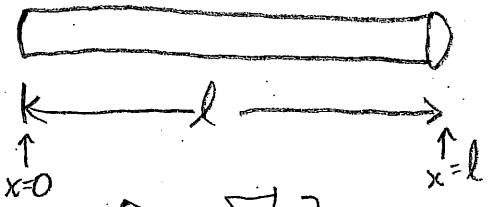


$$Q = \lambda_1 l_1 + \lambda_2 l_2$$

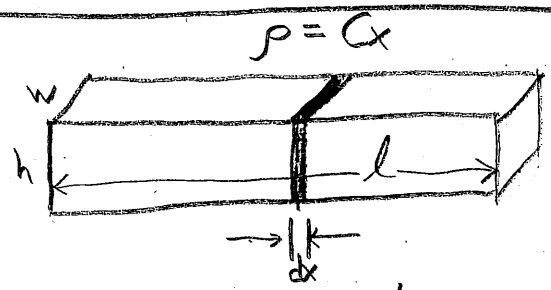


$$Q = \rho_1 l_1 w h + \rho_2 l_2 w h$$

Gradient: $\lambda = Cx$

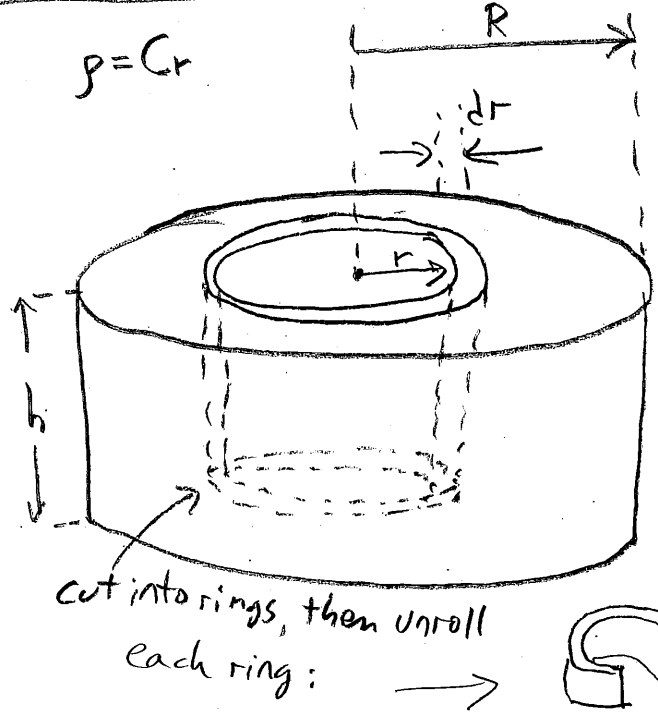


$$Q = \sum \lambda_i \Delta x$$
$$= \int \lambda dx$$
$$= \int_{x=0}^{x=l} (Cx)\, dx$$
$$= \frac{C}{2} l^2$$



$$Q = \sum \rho_i \Delta V$$
$$= \int \rho w h\, dx$$
$$= \int_{x=0}^{x=l} (Cx) w h\, dx$$
$$= \frac{whC}{2} l^2$$

$\rho = Cr$



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