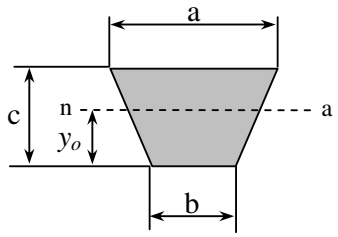
UNIVERSITY of PLYMOUTH
BSc MECHANICAL DESIGN AND MANUFACTURE

MECH115 - ENGINEERING SCIENCE 1 - FORMULAE

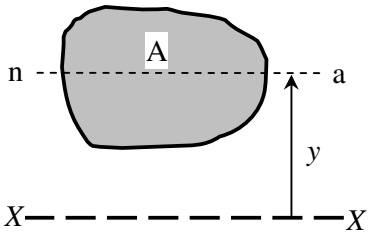
Bending: $\frac{M}{I} = \frac{E}{R} = \frac{\sigma}{y}$ $I_{circle} = \frac{\pi D^4}{64}$ $I_{rectangle} = \frac{bd^3}{12}$



$y_0 = \frac{(2a+b)c}{3(a+b)}$ $I_{na} = \frac{(a^2+4ab+b^2)c^3}{36(a+b)}$

Centroid location: $\overline{y} = \frac{\sum Ay}{\sum A}$

Parallel Axis theorem: $I_{XX} = I_{na} + Ay^2$



Torsion: $\frac{T}{J} = \frac{G\theta}{L} = \frac{\tau}{r}$ $J_{circle} = \frac{\pi D^4}{32}$

Thin cylinders: $\sigma_c = \frac{pD}{2t}$ $\sigma_L = \frac{pD}{4t}$ Thin spheres: $\sigma_c = \frac{pD}{4t}$

2-D stress: $\varepsilon_x = \frac{1}{E}\{\sigma_x - \nu\sigma_y\}$ etc.

Elastic constant relationships: $E = 2G(1+\nu)$

Mohr's circle - diameter points $(\sigma_x, +\tau)$ and $(\sigma_y, -\tau)$