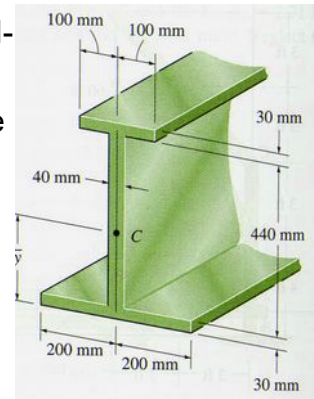# Centroids – Further

1. The diagram shows the dimensions of the cross-section of an I-beam.

   (a) Calculate the height, $\bar{y}$, of the centroid of the I-beam above the base. *(210mm)*

   (b) Calculate the angle through which the beam can be tilted before it topples over. *(43.6°)*

2. Calculate the *x* and *y* coordinates of the centroid of the following areas. Dimensions are in mm.

(c)

60

30   60

(x = 40, y = 20)

(d) 40

40   20

(x = 28.0, y = 20)

100

100

20   40

20

160

(x = 78.4, y = 47.7)

40

80

100

200

40

Hint: rectangle + rectangle + quadrant – semicircle
(x = 120, y = 136)

3. Calculate the x and y coordinates of the centroid of the area shown. Dimensions are in mm

Hint: divide into triangle, rectangle and semicircle, with a circular cutout.

(54.8mm, 36.6mm)