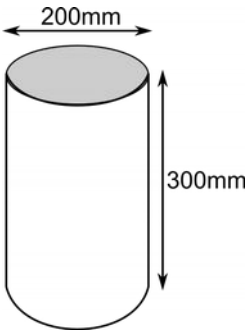
Centre of Gravity – Further

1. A drum to contain liquid is made from a circular base, diameter 0.20m and a cylinder, height 0.30m.
mass of base = 100g
mass of cylinder = 600g
density of water = 1000kg/m^3

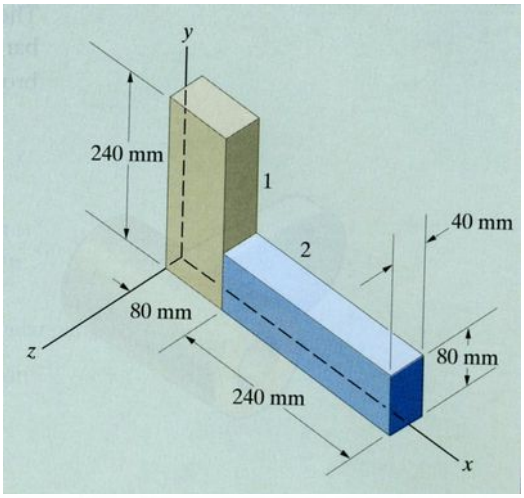


   (a) Calculate the height of the centre of gravity of the empty drum above the base. *(0.129m)*

   (b) Calculate:
      (i) the volume of the drum. *($9.4x10^{-3}m^3$)*
      (ii) the mass of water to completely fill the drum *(9.4kg)*

   (c) Calculate the height of the centre of gravity of the drum above the base, when it is:
      (i) completely full to the top *(0.149m)*
      (ii) half full *(0.082m)*

2. The L-shaped machine part consists of two uniform bars.
Bar 1 is tungsten alloy, density 14000kgm^{-3}.
Bar 2 is steel, density 7800kgm^{-3}.



   (a) Calculate
      (i) the mass of bar 1 *(10.8kg)*
      (ii) the mass of bar 2 *(5.99kg)*
      (iii) the x and y coordinates of the centre of gravity of the machine part. *(97.2mm, 91.4mm)*

   (b) Bar 1 is replaced with a bar the same size of aluminium alloy, density 2600kgm^{-3}. Calculate the x coordinate of the centre of gravity of the machine part. *(160mm)*

3. The diagram shows a tube fitted with a plug. The tube is made of aluminium, density 2700kgm^{-3}. The plug is made of steel, density 7800kgm^{-3}.

   Calculate the x coordinate of the centre of gravity of the composite object. *(120mm)*