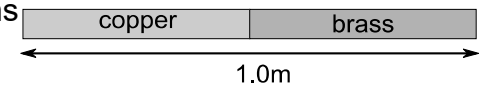
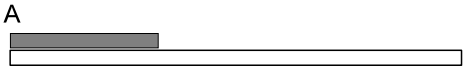
Centre of Gravity – Practice

1. A composite bar 1m long is made from equal lengths of brass, mass 0.85kg and copper, mass 0.89kg. Calculate the position of the centre of gravity from the copper end. *(0.494m)*



2. A uniform plank 3.0m long, mass 14kg has a uniform metal plate 1.0m long, mass 5kg attached to end A.



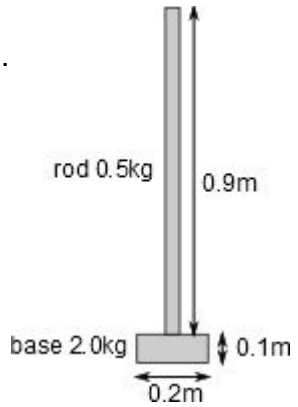
   (a) Calculate the distance of the centre of gravity from A. *(1.24m)*

   (b) A second metal plate, half the length and half the mass is now attached to the other end. Calculate the new distance of the centre of gravity from A. *(1.41m)*

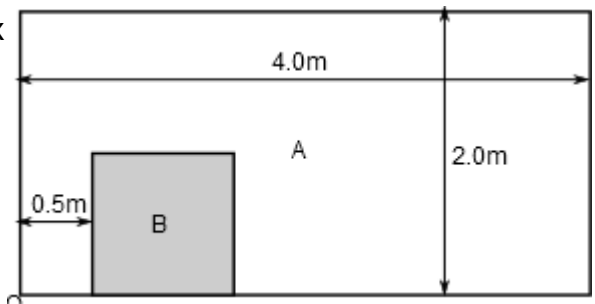
3. A stand is made from a cylindrical rod, length 0.90m, mounted on a circular base diameter 0.20m, which stands on the ground.
mass of the rod = 0.50kg
mass of the base = 2.0kg

   (a) Calculate the height above the ground of the centre of gravity of the stand. *(0.15m)*

   (b) Calculate the angle through which the stand can be tilted before it topples over. *(34°)*
   (hint: it will topple when the C of G is over the point it touches the ground – draw a diagram)



4. A 4m x 2m sheet of plywood, A, has a 1m x 1m piece of the same plywood, B, fixed on top, 0.5m from the edge, as shown. Calculate the *x* and *y* coordinates of the centre of gravity of the combined sheet from corner O. *(1.89m, 0.94m)*



5. With engine removed, the mass of a car is 1100kg, its centre of mass at C. When the engine mass 220kg is placed in the car at E, the centre of mass of the car is midway between the front wheels A and the rear wheels B. Calculate:
   (i) the distance *b*. *(2.1m)*
   (ii) the height of the centre of gravity of car+engine above the ground. *(0.475m)*