

Centre of Mass - Exercises (3 pages; 25/3/20)

Key to difficulty:

* easier

** moderate

*** harder

(1*) Centre of Mass of Lamina by Integration

Find the centre of mass of a semi-circular lamina of radius r .

(a) by integrating wrt x

(b) by integrating wrt y

(2**) Centre of mass of solid of revolution

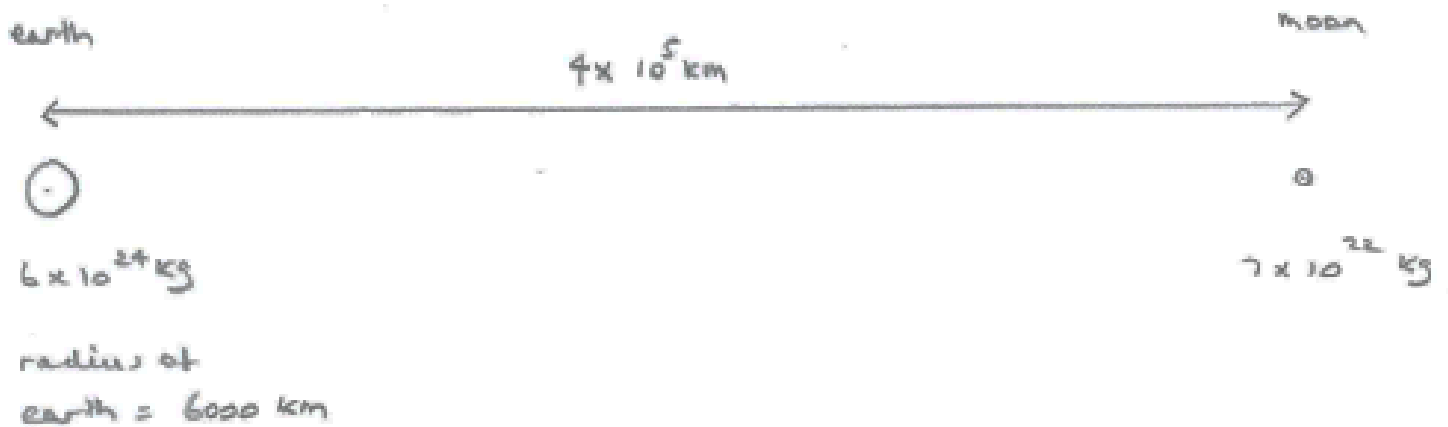
The region between the curve $y = x^3 - x^2$ and the x -axis is rotated by 360° about the x -axis. Find the centre of mass of the solid of revolution obtained.

(3**) Centre of mass of lamina

Find the centre of mass of the region between the curve $y = x^3 - x^2$ and the x -axis.

(4***) Show that the centre of mass of a parallelogram is at the intersection of the diagonals, by finding the centre of mass of two triangles, given the result that the diagonals bisect each other.

(5**) Find the centre of mass of the Earth-Moon system



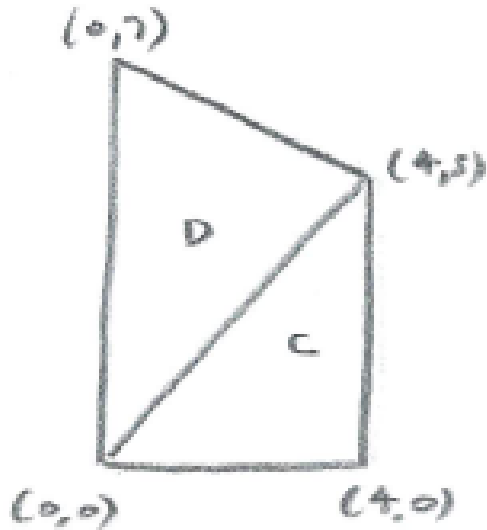
distance from earth to moon = $4 \times 10^5 \text{ km}$

radius of earth = 6000 km

mass of earth = $6 \times 10^{24} \text{ kg}$

mass of moon = $7 \times 10^{22} \text{ kg}$

(6**) Find the centre of mass of the trapezium in the diagram, by dividing it up as shown.



(7**) Find the centre of mass of the semi-circular lamina shown in the diagram.

