

7.22. (n-1) equal point masses each of mass m are placed at the vertices of a regular n-polygon. The vacant vertex has a position vector concerning the centre of the polygon. Find the position vector of the centre of mass.

**Answer:**

Given,

$$r_{cm} = \frac{(n-1)mb + ma}{(n-1)m + m}$$

Where,

$r_{cm}$  is the place where mass m is placed at the nth vertex

$r_{cm} = 0$

$$\frac{(n-1)mb + ma}{(n-1)m + m} = 0$$

$(n-1)mb + ma = 0$

$b = -ma/(n-1)m$

$$\vec{b} = -\frac{\vec{a}}{n-1}$$

Where,

$\vec{b}$  is the position vector. Also, the negative sign indicates that the centre of mass lies on the other side of

the nth vertex.