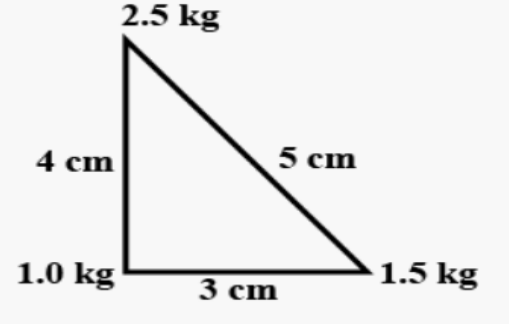
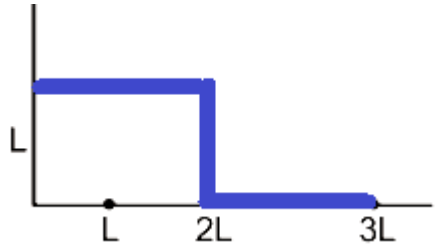
ROTATIONAL MOTION

1	Three point-particles of masses 1.0 kg, 1.5 kg and 2.5 kg are placed at three corners of a right-angle triangle of sides 4.0 cm, 3.0 cm and 5.0 cm as shown in the figure. The center of mass of the system is at a point  (a) 2 cm right and 0.9 cm above 1 kg mass (b) 0.9 cm right and 2 cm above 1 kg mass (c) 0.6 cm right and 2 cm above 1 kg mass (d) 1.5 cm right and 1.2 cm above 1 kg mass
2	Two particles of mass 1kg and 3kg have position vectors 2 i + 3 j + 4 k and -2 i+ 3j- 4k respectively. The position vector of centre of mass of the system is: (a) - i + 3 j - 2 k (b) - i + 3 j + 2 k (c) - i - 3 j - 2 k (d) i + 3 j - 2 k
3	Two particles of mass 5 kg and 10 kg respectively are attached to the two ends of a rigid rod of length 1 m with negligible mass. The centre of mass of the system from the 5 kg particle is nearly at a distance of (a) 50 cm (b) 67 cm (c) 80 cm (d) 33 cm
4	Three identical spheres each of mass M are placed at the corners of a right-angled triangle with mutually perpendicular sides equal to 3 m each. Taking point of intersection of mutually perpendicular sides as origin, the magnitude of position vector of centre of mass of the system will be $\sqrt{}$ x m. The value of x is
5	The position vector of the center of mass r_{cm} of an asymmetric uniform bar of negligible area of cross-section as shown in figure is: 

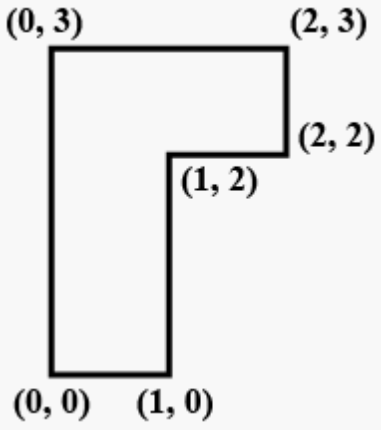
(1) $\bar{r}cm = \frac{13}{8}L\hat{x} + \frac{5}{8}L\hat{y}$

(2) $\bar{r}cm = \frac{3}{8}L\hat{x} + \frac{11}{8}L\hat{y}$

(3) $\bar{r}cm = \frac{11}{8}L\hat{x} + \frac{3}{8}L\hat{y}$

(4) $\bar{r}cm = \frac{5}{8}L\hat{x} + \frac{13}{8}L\hat{y}$

6 The coordinates of center of mass of a uniform flag shaped lamina (thin flat plate) of mass 4 kg (the coordinates of the same are shown in figure) are



(a) 1.25 m, 1.50 m	(b) 0.75 m, 0.75 m
(c) 0.75 m, 1.75 m	(d) 1 m, 0.75 m

7 A rod of length *l* has an non-uniform linear mass density given by

$$\rho(x) = a + b\left(\frac{x}{l}\right)^2$$

where a and b are constants and $0 \le x \le l$. The value of x for the centre of mass of the rod is at :

A $\frac{4}{3}\left(\frac{a+b}{2a+3b}\right)l$ B $\frac{3}{2}\left(\frac{2a+b}{3a+b}\right)l$ C $\frac{3}{4}\left(\frac{2a+b}{3a+b}\right)l$ D $\frac{3}{2}\left(\frac{a+b}{2a+b}\right)l$

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8	A circular disc of radius R is removed from a bigger circular disc of radius 2R such that the circumferences of the discs coincide. The centre of mass of the new disc is α R from the centre of the bigger disc. The value of α is (a) 1 / 4 (b) 1 / 3 (c) 1 / 2 (d) 1 / 6
9	Consider a two-particle system with particles having masses m_1 and m_2 . If the first particle is pushed towards the centre of mass through a distance d, by what distance should the second particle be moved, so as to keep the centre of mass at the same position? (a) d (b) m_2d / m_1 (c) $m_1d / m_1 + m_2$ (d) m_1d / m_2
10	Two masses m_1 and m_2 ($m_1 > m_2$) are connected by massless flexible and inextensible string passed over massless and frictionless pulley. The acceleration of centre of mass is A $\left(\frac{m_1 - m_2}{m_1 + m_2}\right)^2 g$ B $\frac{m_1 - m_2}{m_1 + m_2} g$ C $\frac{m_1 + m_2}{m_1 - m_2} g$ D Zero