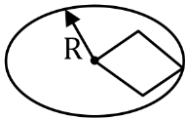
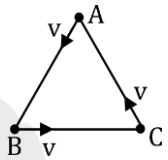
DPP-2

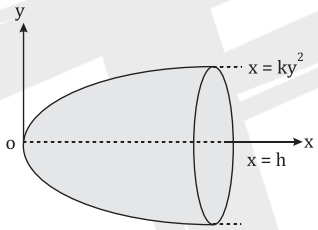
1. The centre of mass of the disc show in figure is $\frac{R}{k(k\pi-1)}$ .A square is removed from the disc as shown. Find value of k_ _ _ _



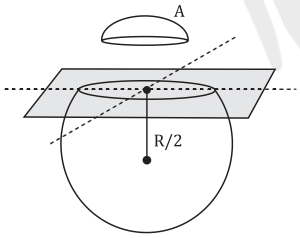
2. In the given figure three equal masses at the equilateral triangle, the displacement of the centre of mass of the three particles A, B & C after time t is $\gamma - 1$ is value of γ is



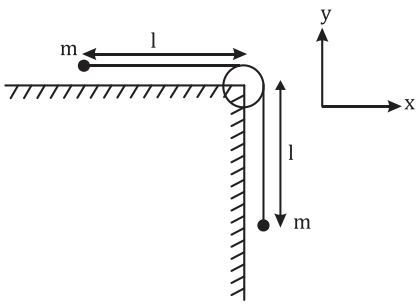
3. A solid generated by the rotation of a parabola is called a paraboloid. Find the location of centre of mass of such a paraboloid (from) of uniform density formed by rotating a parabola $x = ky^2$ about x-axis. Assume that the height of object is h as shown in Figure. The x_{cm} of system is $\frac{\alpha h}{\beta}$. find $\alpha + \beta$



4. A small part A is cut from a solid sphere by a plane at a distance $\frac{R}{2}$ from its centre as shown in Figure. the location of centre of mass of object A from the centre of the sphere $Y_{CM}=\frac{(\alpha+\beta)}{\gamma}R$. VALUE OF $\alpha + \beta + \gamma$= _ _ _ _ _



5.



The system is released from rest at $t = 0$ find.

(a) Position of com at $t = 0$

(b) $\vec{v}_{cm}$ at $t = 0$

(c) $\vec{v}_{cm}$ at time t $\cdot\longrightarrow$

(d) $\vec{a}_{cm}$ at time t.

(e) $\vec{r}_{cm}$ at time t.

(f) Eq^n of trajectory.

6. Which statement is correct

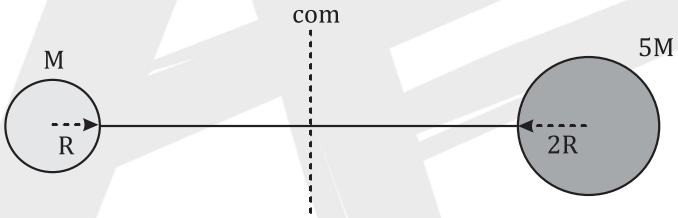
(A) If v_{com} & $\vec{a}_{com}$ are collinear then trajectory of com is st-line.

(B) If $\vec{v}_{com}$ & $\vec{a}_{com}$ are non-collinear & $\vec{a}_{com}$ is constant then trajectory of com is parabolic.

(C) Internal forces can't charge the trajectory of com of system.

(D) All of these

7. Two spherical bodies of mass M and $5M$ and radii R and $2R$ are released in free space with initial separation between their centres equal to$12R$. If they attract each other due to gravitational force only, then the distance covered by the smaller body before collision is :-

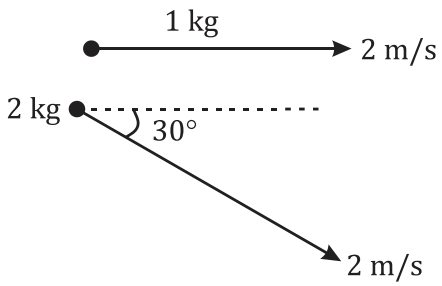


(A) 7.5R (B) 1.5R (C) 3R (D) 4.5R

Q.8 A block of Mass M is placed on the top of a bigger of Mass 10M. All the surfaces are frictionless. The system released from the rest. find then 10 times of distance moved by the bigger block at the instant. when smaller reaches the ground.

(A) 2.2 m (B) 2m (C) 22/6m (D) 5m

Q.9 velocity of center of mass of the system as shown in the figure is –



(A) $\left(\frac{2-2\sqrt{3}}{3}\right)i - \frac{1}{3}j$ (B) $\left(\frac{2+2\sqrt{3}}{3}\right)i - \frac{2}{3}j$

(C) 4i (D) None of these.

10. In a gravity free room a man of mass M is standing at a height h above the floor. He throws a ball of mass m vertically downward with a speed u. Find the distance of the man from the floor when the ball reaches the ground.

(A) 2h/m

(B) h+h/m

(C) h+mh/M

(D)N.O.T

ANSWER KEY

1. (2) **2.** (1) **3.** (5) **4.** (67)

5. **(a)** $\vec{r}_{com} = -\frac{l}{2}\hat{i} - \frac{l}{2}\hat{j}$ **(b)** $\vec{v}_{com} = 0$ **(c)** $\vec{V}_{com} = \frac{gt}{4}i - \frac{gt}{4}\hat{j}$ **(d)** $\vec{a}_{com} = \frac{g}{4}i - \frac{g}{4}\hat{j}$

(e) $\vec{r}_f = \left(\frac{gt^2}{8} - \frac{l}{2}\right)i - \left(\frac{gt^2}{8} + \frac{l}{2}\right)\hat{j}$ **(f)** $x + y + l = 0$

6. (D) **7.** (A) **8.** (B) **9.** (B) **10.** (C)