1. A canon shell moving along a straight line bursts in to two parts. Just after the burst one part moves with momentum 20 Ns making an angle 30º with the original line of motion. The minimum momentum of the other part of shell just after the burst is

(A) 0 Ns (B) 5 Ns (C) 10 Ns (D) 17.32 Ns

2. **Assertion :** When a body collides elastically and head on with another identical stationary body on a frictionless surface, it losses all of its kinetic energy (No external forces on the system of the two bodies and no rotation of the bodies).

Reason : In elastic collisions, only momentum is conserved.

(A) If both assertion and reason are true and reason is the correct explanation of assertion

(B) If both assertion and reason are true but reason is not the correct explanation of assertion.

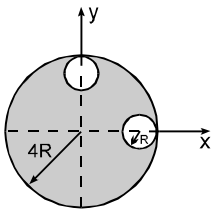
(C) If assertion is true but reason is false

(D) If assertion is false but reason is true

3. A rigid system consists of two point masses, A and B of masses 1 kg and 2 kg respectively. At an instant the kinetic energy of A with respect to the centre of mass is 2 Joules and the velocity of centre of mass is 2 m/s. The kinetic energy of the system at this instant is :

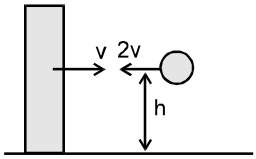
(A) 9 J (B) 11 J (C) 13 J (D) None of these

4. From the circular disc of radius 4 R two small disc of radius R are cut off. The centre of mass of the new structure will be



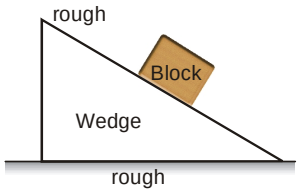
(A) $i\frac{r}{5} + j\frac{r}{5}$ (B) $-i\frac{r}{5} + j\frac{r}{5}$ (C) $-i\frac{r}{5} - j\frac{r}{5}$ (D) $-\frac{3R}{14}(\hat{i}+\hat{j})$

5. A ball collides elastically with a massive wall moving towards it with a velocity of v as shown. The collision occurs at a height of h above ground level and the velocity of the ball just before collision is 2v in horizontal direction. The distance between the foot of the wall and the point on the ground where the ball lands, at the instant the ball lands, will be



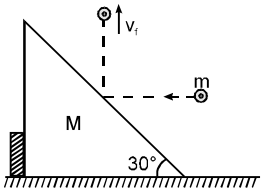
(A) $v\sqrt{\frac{2h}{g}}$ (B) $2v\sqrt{\frac{2h}{g}}$ (C) $3v\sqrt{\frac{2h}{g}}$ (D) $4v\sqrt{\frac{2h}{g}}$

6. When a block is placed on a wedge as shown in figure, the block starts sliding down and the wedge also start sliding on ground. All surfaces are rough. The centre of mass of (wedge + block) system will move



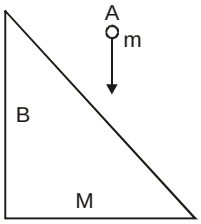
(A) leftward and downward. (B) right ward and downward.
(C) leftward and upwards. (D) only downward

7. As shown in the figure a body of mass m moving horizontally with speed $\sqrt{3}$ m/s hits a fixed smooth wedge and goes up with a velocity v_f in the vertical direction. If $\angle$ of wedge is 30º, the velocity v_f will be



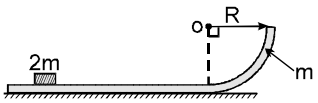
(A) $\sqrt{3}$ m/s (B) 3 m/s (C) $\frac{1}{\sqrt{3}}$ m/s (D) this is not possible

8. A wedge B of mass is kept on a smooth horizontal surface and a particle, A of mass m falls vertically on the inclined surface of the wedge as shown consider the situation of elastic collision between the particle and the wedge and assume that there is no displacement of the wedge during the collision : match the conservation of physical quantities in column-I with the system in column-II

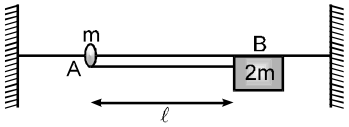


Column-I	**Column-II**
(A) Linear momentum along horizontal direction	(p) for Particle A
(B) Linear momentum along inclined plane of wedge B	(q) for particle A plus wedge B
(C) Net linear momentum	(r) for particle A plus wedge B plus earth
(D) Kinetic energy	(s) for particle A plus wedge B

9. Mass 2m is kept on a smooth circular track of mass m which is kept on a smooth horizontal surface. The circular track is given a horizontal velocity $\sqrt{2gR}$ towards left and released. Find the maximum height reached by 2m.



10. A small ring of mass m attached at an end of a light string the other end of which is tied to a block B of mass 2 m. The ring is free to move on a fixed smooth horizontal rod. Find the velocity of the ring when the string becomes vertical.



Answers

RACE # 32

1. (C) **2.** (C) **3.** (A) **4.** (D) **5.** (C) **6.** (B) **7.** (D) **8.** A-q ; B-p ; C-r ; D-rs

9. R/3 **10.** $V = \sqrt{\frac{8g\ell}{3}}$