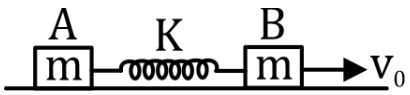
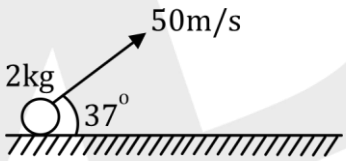
DPP – 05

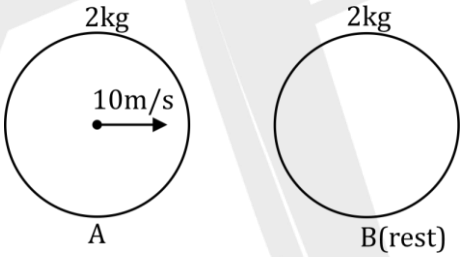
Q.1 Two blocks A&B of mass m are connected by a spring of spring constant as shown in figure, they are kept on a frictionless surfaces. Initially the velocity of A is zero & block B is moving with velocity v_0 and spring in natural length. the maximum extension in the spring is $v_0\sqrt{\frac{m}{\alpha K}}$. Find value of α.



Q.2 A particle is projected with Speed 50m/s at an angle 37°. The impulse due to gravitational force on the particle during the time of flight is 10K. Value of K _ _ _ _ _.



Q.3 The velocity A & B just before collision are shown in figure. The collision is head on find.



(A) v_A Just after collision = _ _ _ _

(B) v_B just after collision = _ _ _ _

(C) Common velocity = _ _ _ _

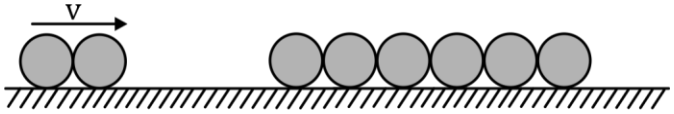
(D) $K \cdot E_{min}$ = _ _ _ _

(E) $|\Delta P_A|$= _ _ _ _

(F) $|\Delta P_B|$= _ _ _ _

(G) $|\Delta K \cdot E|$= _ _ _ _

Q.4 Six identical marbles are lined up in a straight groove made on a horizontal frictionless surface as shown in figure. Two similar marbles each moving with a velocity v collide with the row of 6 marbles from the left. What is observed?



(A) One marble from the right rolls out with a speed 2v, the remaining marbles do not move

(B) Two marbles from the right roll out with a speed v each, the remaining marbles do not move

(C) All six marbles in the row will roll out with a speed v/6 each, the two incident marbles will come to rest

(D) All eight marbles will start moving to the right, each with a speed of v/8

Q.5 A collision occurs between two identical balls each of mass m, moving with velocities $\vec{u}_1$ and $\vec{u}_2$, colliding head-on. The coefficient of restitution is 0.5. The energy lost in the collision is :

(A) $\frac{1}{4}m(\vec{u}_1+\vec{u}_2)^2$ (B) $\frac{1}{4}m(\vec{u}_1-\vec{u}_2)^2$ (C) $\frac{3}{16}m(\vec{u}_1+\vec{u}_2)^2$ (D) $\frac{3}{16}m(\vec{u}_1-\vec{u}_2)^2$

Q.6 A neutron moving at a speed v undergoes a head-on elastic collision with a nucleus of mass number A at rest. The ratio of the kinetic energies of the neutron after and before collision is :

(A) $\left(\frac{A-1}{A+1}\right)^2$ (B) $\left(\frac{A+1}{A-1}\right)^2$ (C) $\left(\frac{A}{A+1}\right)^2$ (D) $\left(\frac{A}{A-1}\right)^2$

Q.7 Sphere A of mass ' m ' moving with a constant velocity u hits another stationary sphere B of the same mass. If e is the co-efficient of restitution, then ratio of velocities of the two spheres $v_A : v_B$ after collision will be :

(A) $\frac{1-e}{1+e}$ (B) $\frac{1+e}{1-e}$ (C) $\frac{e-1}{1-e}$ (D) $\frac{e-1}{1+e}$

Q.8 A particle of mass m_1 makes an elastic, one dimensional collision with a stationary particle of mass m_2. What fraction of the kinetic energy of m_1 is carried away by m_2 ?

(A) $\frac{m_1}{m_2}$ (B) $\frac{m_2}{m_1}$ (C) $\frac{2m_1m_2}{(m_1+m_2)^2}$ (D) $\frac{4m_1m_2}{(m_1+m_2)^2}$

ANSWER KEY

1. 2 **2.** K=12

3. **(A)** 4m/s **(B)** 6m/s **(C)** 5m/s **(D)** 50J **(E)** 12kg-m/s **(F)** 12kg-m/s **(G)** 50J

4. (B) **5.** (C) **6.** (A) **7.** (A) **8.** (D)

Home Work

Ex. 1	Q. 17
Ex. 2	Q. 13,14
Ex.3	Q.10, 12,18
Ex.4	Q. 18,19,20, 25,27,28
Ex.5	Q.8,9,17,19