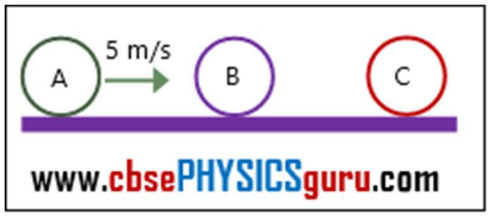
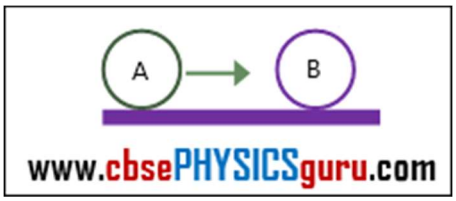
COLLISIONS

1. Two equal masses moving along same straight line with velocities +3 m/s and -5 m/s respectively collide elastically. Their velocities after collision will be respectively:
   (a) + 4 m/s for both (b) -3 m/s and + 5 m/s (c) -4 m/s and + 4 m/s **(d)** -5 m/s and + 3 m/s
2. A sphere of mass m moving with a constant velocity u hits another stationary sphere of the same mass and of coefficient of restitution (e). The ratio of velocities of the two spheres, after collision, will be:
   (a) $\frac{1-e}{1+e}$ (b) $\frac{e}{1+e}$ (c) $\frac{1}{1+e}$ (d) $\frac{1-e}{e}$
3. Particle A makes a perfectly elastic collision with another particle B at rest. They fly apart in opposite directions with equal speeds. The ratio of their masses m_A/m_B is:
   (a) 1/6 **(b)** 1/3 (c) 1/2 (d) 1
4. A body of mass m_1 hits a block of mass m_2. The transfer of energy is maximum, when:
   (a) $m_1 = 3m_2$ (b) $m_1 = 2m_2$ **(c)** $m_1 = m_2$ (d) $m_1 >> m_2$
5. A ball is dropped on to a horizontal plate from a height h = 9 m above it. If the coefficient of restitution is e = 1/2, the total distance travelled before the ball comes to rest is:
   (a) 10 m **(b)** 15 m (c) 20 m (d) 25 m
6. A light particle moving horizontally with a speed of 8 m/s strikes a very heavy block moving in the same direction at 6 m/s. The collision is one dimensional and elastic. After the collision, the particle will be:
   (a) moving at 2 m/s in its original direction **(b)** moving at 4 m/s in its original direction (c) moving at 2 m/s opposite to its original direction (d) move at 20 m/s opposite to its original direction
7. A 10 kg object collides with a stationary 5 kg object and after collision, they stick together and move forward with velocity 4 m/s. What is the velocity with which the 10 kg object hits the second one?
   (a) 4 m/s (b) 5 m/s **(c)** 6 m/s (d) 12 m/s
8. Three identical spherical balls A, B and C are placed on a table as shown in the figure along a straight line. B and C are at rest initially. The ball A hits B head on with a speed of 5 m/s. Then after all collisions (assumed to be elastic), the velocity of C will be:
   (a) 5 m/s (b) 10 m/s (c) 15 m/s (d) 3 m/s



9. Which of the following statements is correct?
   (a) Kinetic energy and momentum both are conserved in all types of collisions.
   (b) Kinetic energy is not conserved but momentum is conserved in inelastic collisions.
   (c) Momentum is conserved in elastic collisions but not in inelastic collisions.
   (d) Kinetic energy is conserved in inelastic collisions but momentum is not conserved in elastic collisions.
10. A block of mass 1.50 kg is moving with a speed of 4.00 m/s on a smooth surface. It strikes another mass of 2.00 kg which is at rest and then they move together as a single body. The energy which is lost during the collision is:
    (a) 4.36 J (b) 5.50 J **(c)** 6.86 J (d) 2.34 J
11. Ball A collides with another identical ball B at rest as shown in figure. For what value of coefficient of restitution e, the velocity of ball B becomes thrice that of ball A after collision?



(a) 1/4 (b) 1/3 **(c)** 1/2 (d) 1/6

12. A particle of mass m moving towards the east with speed v collides with another particle of the same mass and same speed v moving towards the north. If the two particles stick to each other, the new particle of mass 2m will have a speed of:
    (a) v/2 (b) v/3 (c) v/4 **(d)** $v/\sqrt{2}$
13. Two identical mass, m each, moving with velocity u_1 and u_2 collide perfectly in-elastically. The loss in kinetic energy is:
    (a) $\frac{m}{4}(u_1-u_2)^2$ (b) $\frac{m}{4}(u_1^2-u_2^2)$ (c) $\frac{m}{3}(u_1-u_2)^2$ (d) $\frac{m}{2}(u_1-u_2)^2$
14. A spherical ball A of mass 4 kg, moving along a straight line strikes another spherical ball B of mass 1 kg at rest. After the collision, A and B move with velocities v_1 m/s and v_2 m/s respectively making angles of 30°and 60° with respect to the original direction of motion of A. The ratio v_1/v_2 will be:
    (a) $\frac{\sqrt{3}}{2}$ **(b)** $\frac{\sqrt{3}}{4}$ (c) $\frac{1}{2}$ (d) $\frac{\sqrt{3}}{5}$
15. A ball mass m moving at 5 m/s collides elastically with a very heavy plank moving at 5 m/s towards the ball. The velocity of the ball after the collision is:
    (a) 5 m/s opposite to the original direction of the ball
    (b) 10 m/s opposite to the original direction of the ball
    (c) 10 m/s same as the original direction of the ball
    (d) 15 m/s opposite to the original direction of the ball