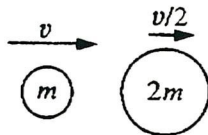


12. The graph above shows the force on an object of mass M as a function of time. For the time interval 0 to 4 s, the total change in the momentum of the object is

- (A) 40 kg·m/s
 (B) 20 kg·m/s
 (C) 0 kg·m/s
 (D) -20 kg·m/s
 (E) indeterminable unless the mass M of the object is known

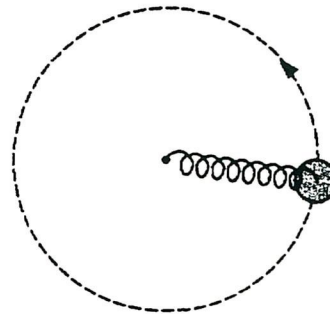


Top View

13. As shown in the top view above, a disc of mass m is moving horizontally to the right with speed v on a table with negligible friction when it collides with a second disc of mass $2m$. The second disc is moving horizontally to the right with speed $\frac{v}{2}$ at the moment of impact. The two discs stick together upon impact. The speed of the composite body immediately after the collision is

- (A) $\frac{v}{3}$
 (B) $\frac{v}{2}$
 (C) $\frac{2v}{3}$
 (D) $\frac{3v}{2}$
 (E) $2v$

Questions 14-15



Top View

A spring has a force constant of 100 N/m and an unstretched length of 0.07 m. One end is attached to a post that is free to rotate in the center of a smooth table, as shown in the top view above. The other end is attached to a 1 kg disc moving in uniform circular motion on the table, which stretches the spring by 0.03 m. Friction is negligible.

14. What is the centripetal force on the disc?
 (A) 0.3 N
 (B) 3 N
 (C) 10 N
 (D) 300 N
 (E) 1,000 N
15. What is the work done on the disc by the spring during one full circle?
 (A) 0 J
 (B) 94 J
 (C) 186 J
 (D) 314 J
 (E) 628 J