



COLLISIONS ASSIGNMENT

- 1 Two balls X and Y of equal diameter but different masses 0.24 kg and 0.12 kg respectively, slide towards each other on a frictionless horizontal surface, as shown in Fig. 1.1.

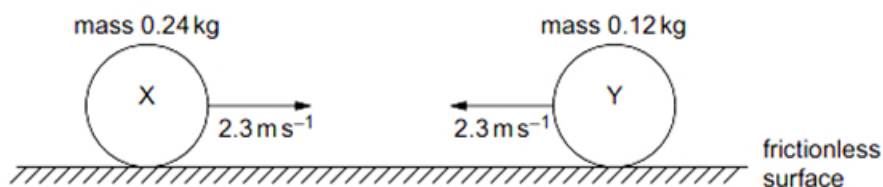


Fig. 1.1

Both balls have initial speed 2.3 m s^{-1} before they collide with each other. Fig. 1.2 shows the variation with time t of the force F_Y exerted on ball Y by ball X during the collision.

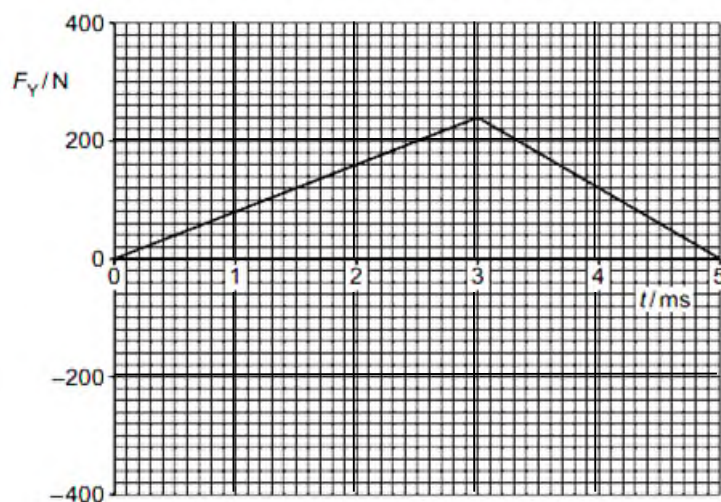


Fig. 1.2

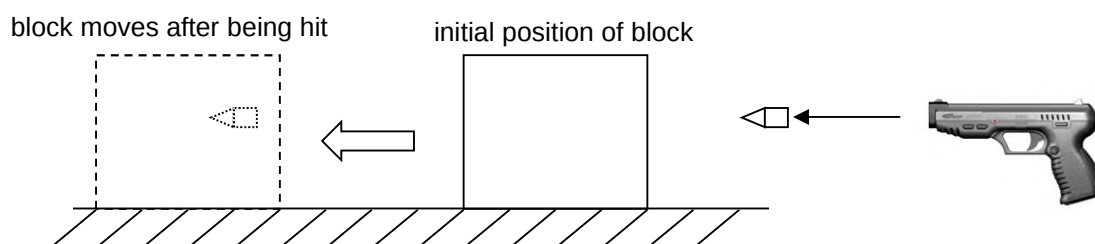
Calculate

- (a) the kinetic energy of ball X before the collision, [1]

- (b) the magnitude of the change in momentum of ball Y, [2]

- (c) the velocity of ball Y after the collision. [2]

- 2 A 100 g bullet fired from a gun penetrates a 4.00 kg stationary block with a speed of 300 m s^{-1} . The block then moves backwards along a frictionless ground, with the bullet remaining inside the block, as shown below.



(a) Calculate the speed of the block after being hit by the bullet. [2]

(b) Calculate the ratio of the kinetic energy of the system after the collision to that before the collision. [3]

(c) Deduce, with a reason, whether the collision is elastic or inelastic. [1]