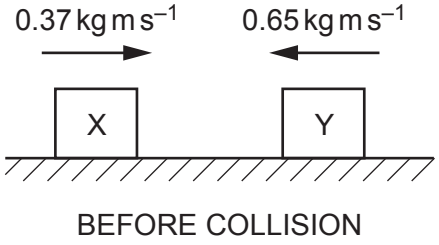
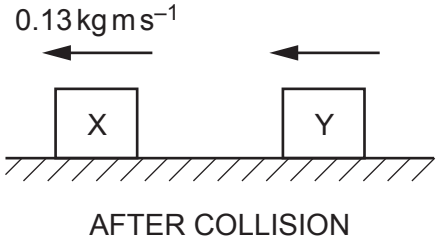
4 Two blocks slide directly towards each other along a frictionless horizontal surface, as shown in Fig. 4.1. The blocks collide and then move as shown in Fig. 4.2.



BEFORE COLLISION

Fig. 4.1



AFTER COLLISION

Fig. 4.2

Block X initially moves to the right with a momentum of $0.37\,kg\,m\,s^{-1}$. Block Y initially moves to the left with a momentum of $0.65\,kg\,m\,s^{-1}$. After the blocks collide, block X moves to the left back along its original path with a momentum of $0.13\,kg\,m\,s^{-1}$. Block Y also moves to the left after the collision.

(a) Block X has an initial kinetic energy of 0.30 J.

Calculate the mass of block X.

mass = ... kg [3]

(b) Determine the magnitude of the momentum of block Y after the collision.

momentum = ... $kg\,m\,s^{-1}$ [1]

(c) Block X exerts an average force of 7.7 N on block Y during the collision.

Calculate the time that the blocks are in contact with each other.

time = ... s [2]

[Total: 6]