

- 2 (a) State the principle of conservation of momentum.

.....
.....
.....

[2]

- (b) Two blocks, A and B, are on a horizontal frictionless surface. The blocks are joined together by a spring, as shown in Fig. 2.1.

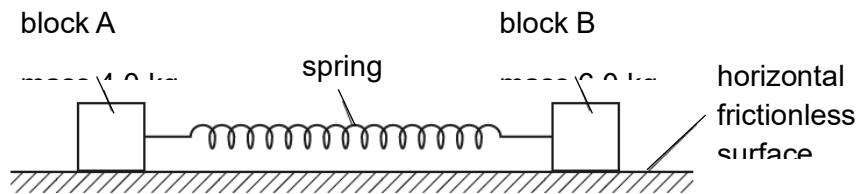


Fig. 2.1

Block A has mass 4.0 kg and block B has mass 6.0 kg. The two blocks are held apart so that the spring has an extension of 8.0 cm. The elastic potential energy of the spring at an extension of 8.0 cm is 0.48 J.

The blocks are released from rest at the same instant. When the extension of the spring becomes zero, block A has speed v_A and block B has speed v_B .

For the instant when the extension of the spring becomes zero,

- (i) use the conservation of momentum to show that

$$\frac{\text{kinetic energy of block A}}{\text{kinetic energy of block B}} = 1.5$$

[3]

- (ii) use the information in (b)(i) to determine the kinetic energy of block A. It may be assumed that the spring has negligible kinetic energy and that air resistance is negligible.

kinetic energy of block A =J [2]

(iii) The blocks are released at time = 0.

On Fig. 2.2, sketch a graph to show the variation with time of the momentum of block A, until the extension of the spring becomes zero.

Numerical values of momentum and time are not required.

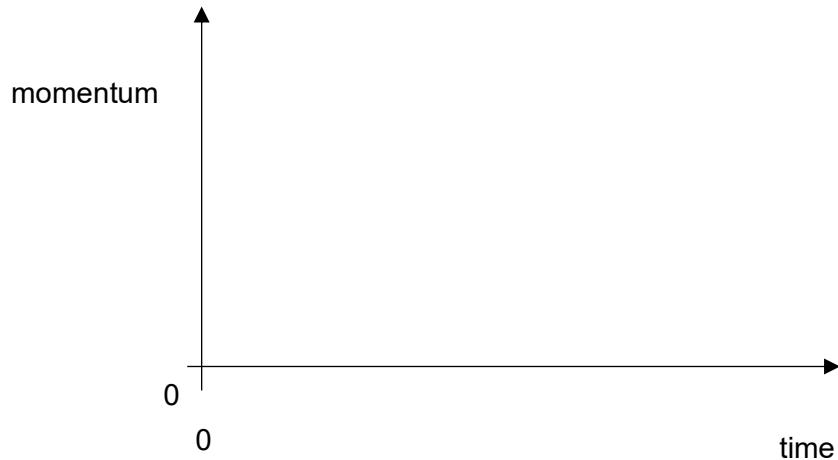


Fig. 2.2

[2]