2 A block X slides along a horizontal frictionless surface towards a stationary block Y, as illustrated in Fig. 2.1.

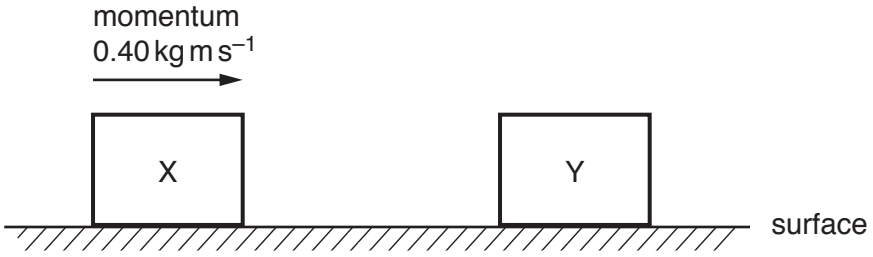

Fig. 2.1

There are no resistive forces acting on block X as it moves towards block Y. At time $t = 0$, block X has momentum $0.40\,\text{kg m s}^{-1}$. A short time later, the blocks collide and then separate.

The variation with time t of the momentum of block Y is shown in Fig. 2.2.

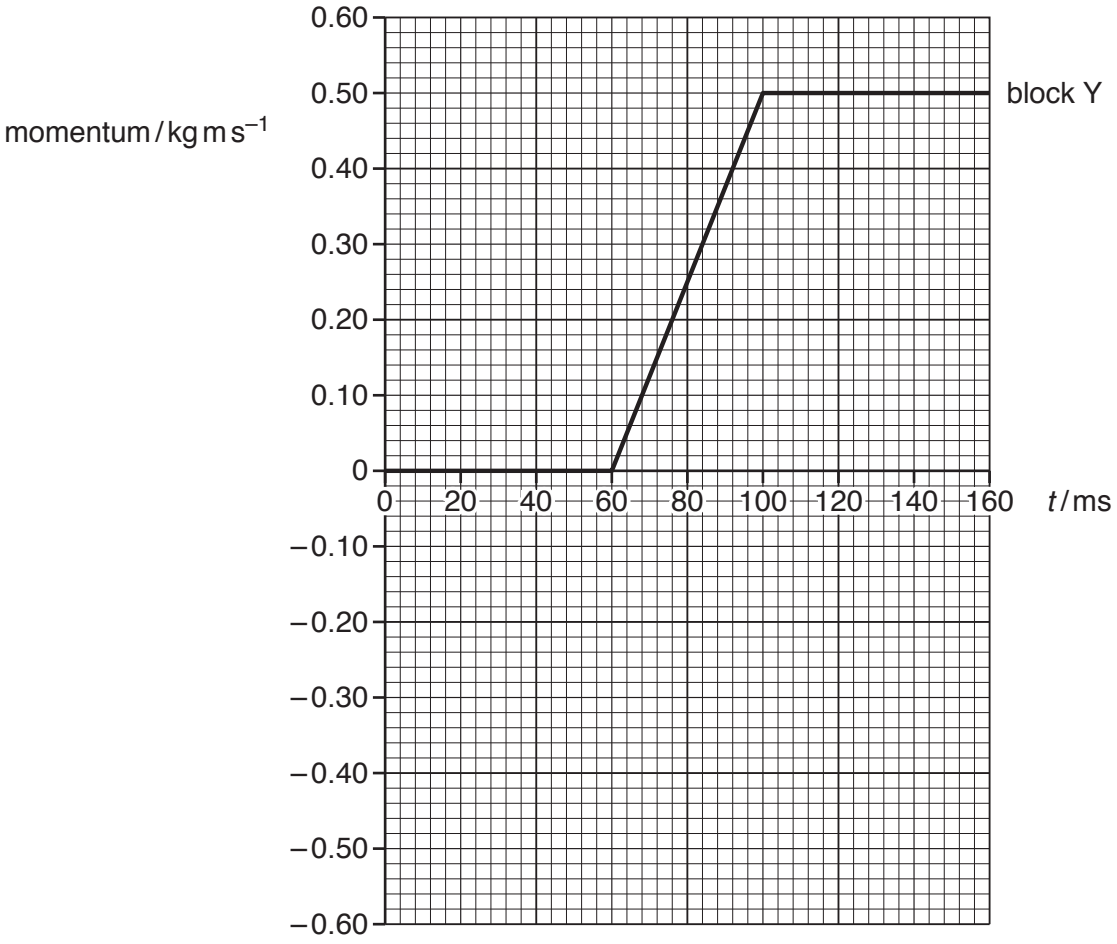

Fig. 2.2

(a) Define *linear momentum*.

.....[1]

(b) Use Fig. 2.2 to:

(i) determine the time interval over which the blocks are in contact with each other

time interval = ... ms [1]

(ii) describe, without calculation, the magnitude of the acceleration of block Y from:

1. time $t = 80$ ms to $t = 100$ ms

.....

2. time $t = 100$ ms to $t = 120$ ms.

.....
[2]

(c) Use Fig. 2.2 to determine the magnitude of the force exerted by block X on block Y.

force = ... N [2]

(d) On Fig. 2.2, sketch the variation of the momentum of block X with time t from $t = 0$ to $t = 160$ ms. [3]

[Total: 9]

[Turn over