For Examiner's Use

3 **(a)** **(i)** Define *force*.

.....

.....[1]

(ii) State Newton's third law of motion.

.....

.....

.....

.....[3]

(b) Two spheres approach one another along a line joining their centres, as illustrated in Fig. 3.1.

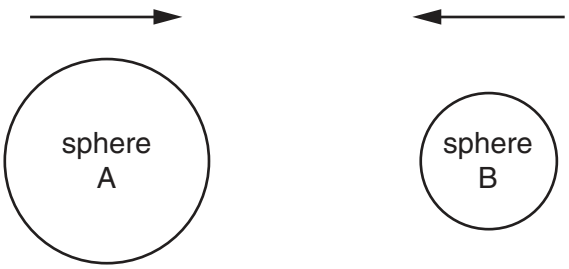

Fig. 3.1

When they collide, the average force acting on sphere A is F_A and the average force acting on sphere B is F_B.

The forces act for time t_A on sphere A and time t_B on sphere B.

(i) State the relationship between

1. F_A and F_B,

.....[1]

2. t_A and t_B.

.....[1]

(ii) Use your answers in **(i)** to show that the change in momentum of sphere A is equal in magnitude and opposite in direction to the change in momentum of sphere B.

.....

.....[1]

(c) For the spheres in **(b)**, the variation with time of the momentum of sphere A before, during and after the collision with sphere B is shown in Fig. 3.2.

For Examiner's Use

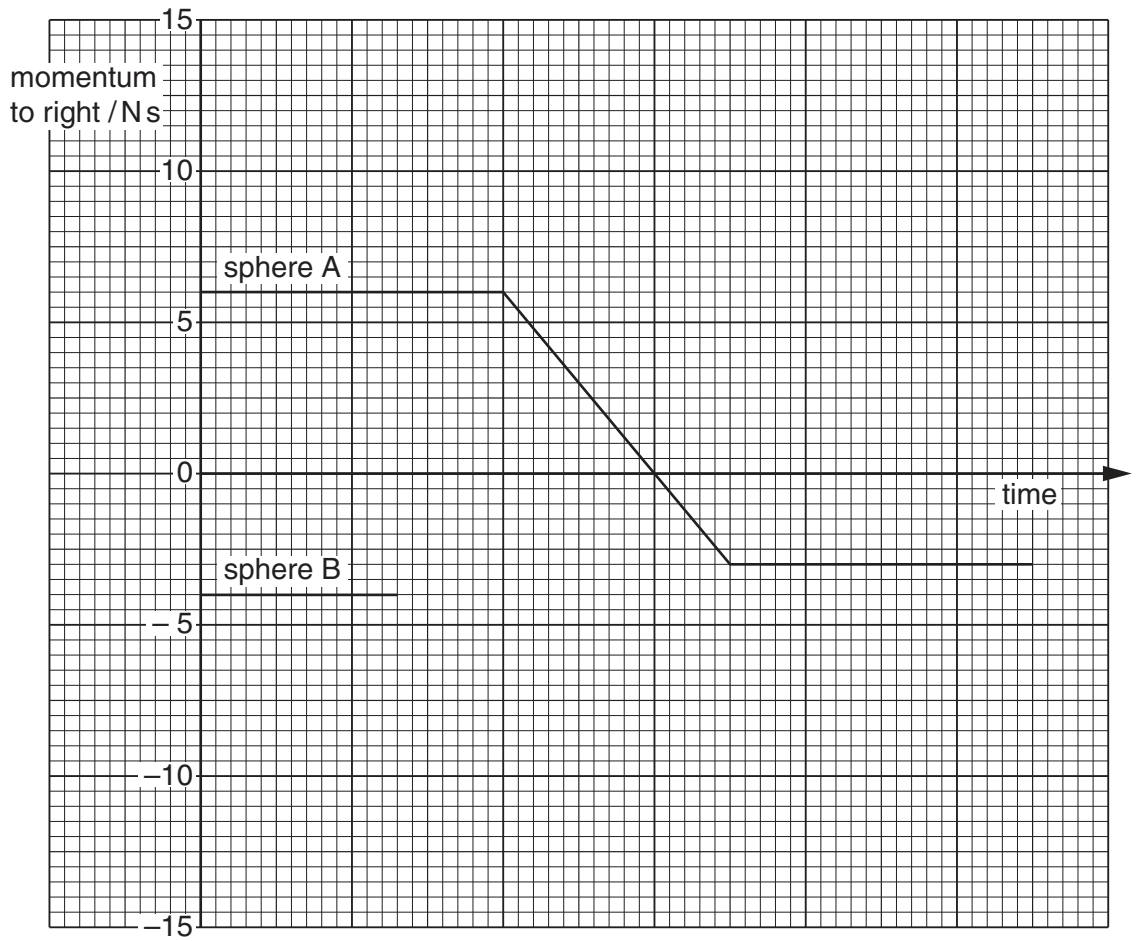

Fig. 3.2

The momentum of sphere B before the collision is also shown on Fig. 3.2.

Complete Fig. 3.2 to show the variation with time of the momentum of sphere B during and after the collision with sphere A. [3]