Answer **all** the questions in the spaces provided.

1 **(a)** Use Newton's Laws to deduce the principle of conservation of momentum.

[3]

(b) Fig. 1.1 shows the variation with time of momentum for two colliding bodies P and Q.

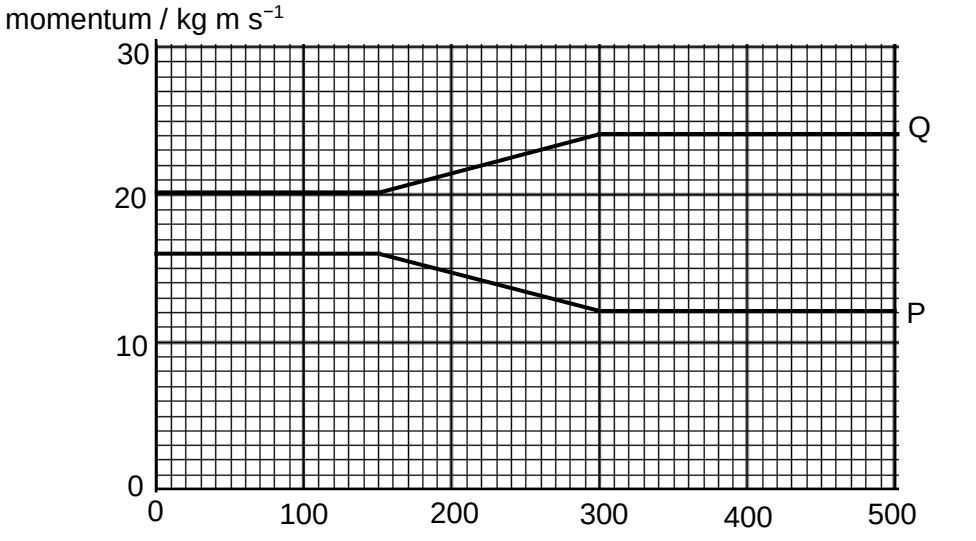

Fig. 1.1

The mass of bodies P and Q are 2.0 kg and 4.0 kg respectively.

(i) Explain why the gradients of the graphs during collision have opposite sign.

……

……

…… [1]

(ii) State the condition under which the momentum is conserved.

……

…… [1]

(iii) Show that the momentum is conserved when the two bodies collide.

[1]

(iv) Calculate the magnitude of the force acting on body P during the collision.

force = ……N [2]

(v) Calculate the magnitude of the impulse on body Q during the collision.

impulse = ……N s [1]

(vi) By considering quantitively the relative speeds of approach and of separation of the two bodies, deduce whether the collision is elastic, inelastic or perfectly inelastic.

type of collision: ……[3]

[Total: 12]