

Momentum – 2021 AS

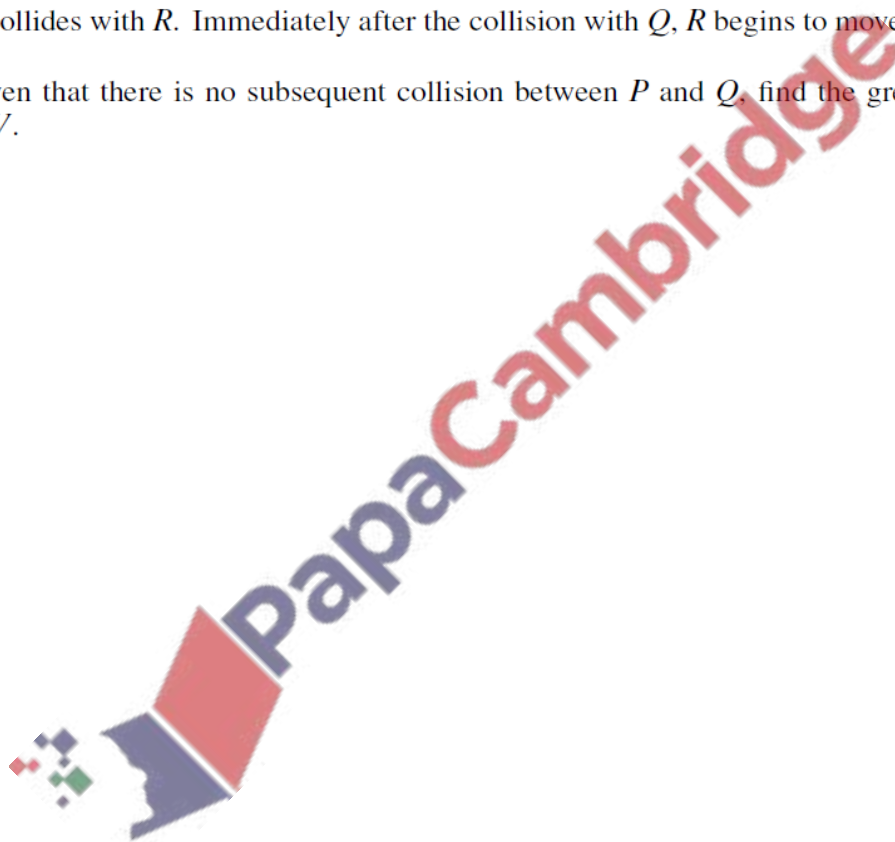
1. June/2021/Paper_9709/41/No.3

Three particles P , Q and R , of masses 0.1 kg, 0.2 kg and 0.5 kg respectively, are at rest in a straight line on a smooth horizontal plane. Particle P is projected towards Q at a speed of 5 m s^{-1} . After P and Q collide, P rebounds with speed 1 m s^{-1} .

- (a) Find the speed of Q immediately after the collision with P . [3]

Q now collides with R . Immediately after the collision with Q , R begins to move with speed $V \text{ m s}^{-1}$.

- (b) Given that there is no subsequent collision between P and Q , find the greatest possible value of V . [3]

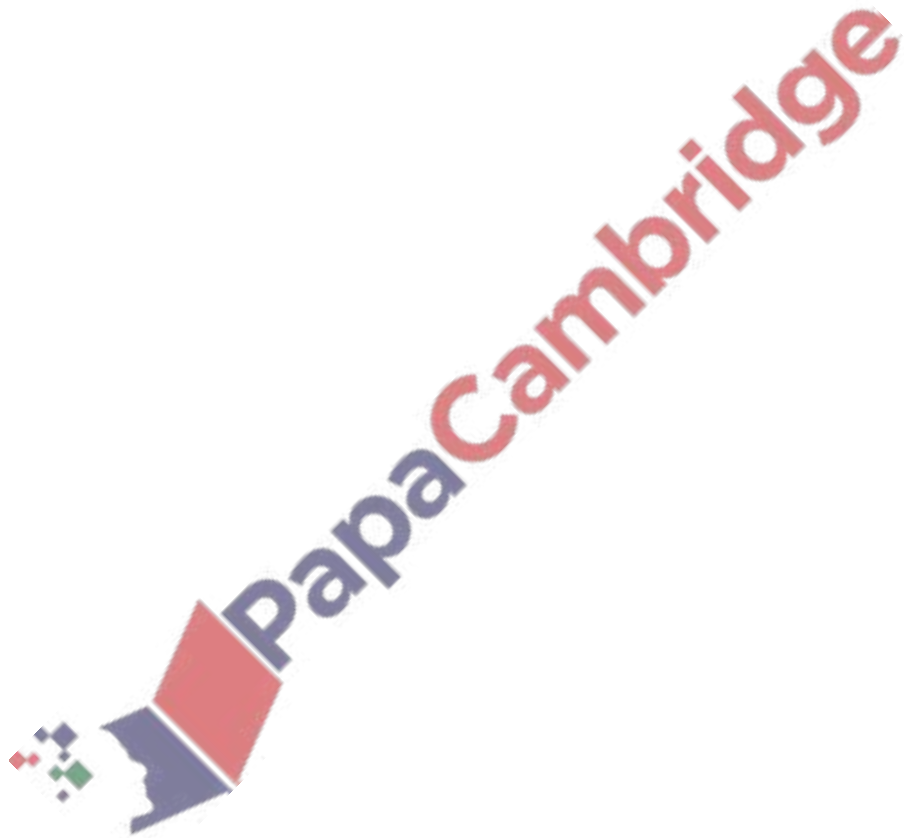


2. June/2021/Paper_9709/42/No.6

A particle A is projected vertically upwards from level ground with an initial speed of 30 m s^{-1} . At the same instant a particle B is released from rest 15 m vertically above A . The mass of one of the particles is twice the mass of the other particle. During the subsequent motion A and B collide and coalesce to form particle C .

Find the difference between the two possible times at which C hits the ground.

[8]

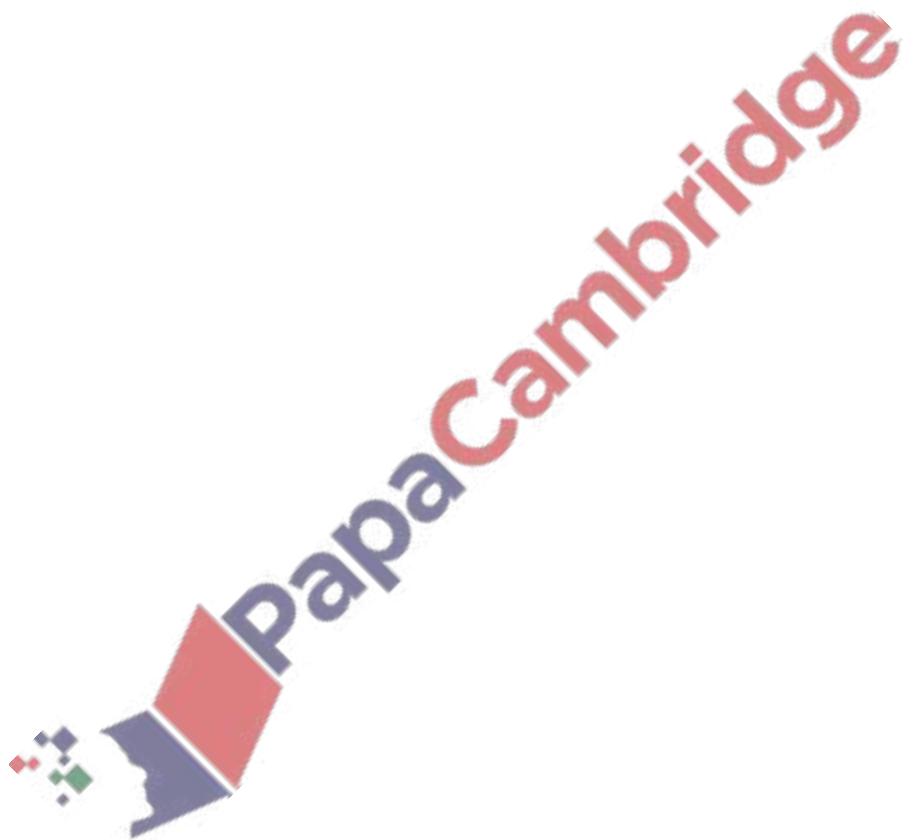


3. June/2021/Paper_9709/43/No.1

Particles P of mass 0.4 kg and Q of mass 0.5 kg are free to move on a smooth horizontal plane. P and Q are moving directly towards each other with speeds 2.5 m s^{-1} and 1.5 m s^{-1} respectively. After P and Q collide, the speed of Q is twice the speed of P .

Find the two possible values of the speed of P after the collision.

[4]



4. March/2021/Paper_9709/42/No.1

Two particles P and Q of masses 0.2 kg and 0.3 kg respectively are free to move in a horizontal straight line on a smooth horizontal plane. P is projected towards Q with speed 0.5 m s^{-1} . At the same instant Q is projected towards P with speed 1 m s^{-1} . Q comes to rest in the resulting collision.

Find the speed of P after the collision.

[3]

