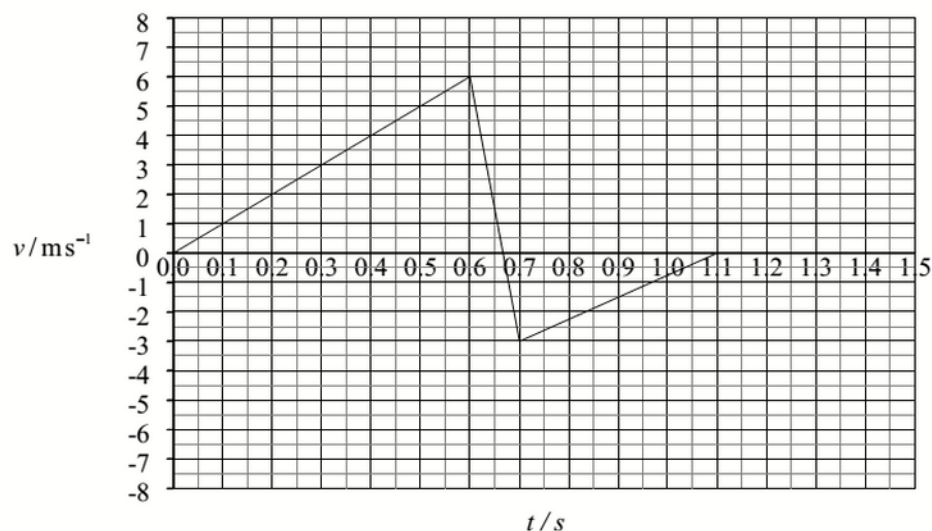


A soft rubber ball of mass 0.20 kg is dropped from rest on to a flat horizontal surface and it is caught at its maximum height of rebound. A sonic data logger is used to record the velocity of the ball as a function of time. The graph below shows how the velocity of the ball varies with time t from the instant it is released to the instant that it is caught.



- (a) Mark on the graph above the time t_1 where the ball hits the surface and the time t_2 where it just loses contact with the surface. [2]

- (b) Use data from the graph above to find the change in momentum of the ball between t_1 and t_2 . [3]

.....

- (c) Determine the magnitude of the average force that the ball exerts on the surface. [4]

.....

- (d) Explain how the collision between the ball and the surface is consistent with the principle of momentum conservation. [2]

.....

- (e) A hard rubber ball of the same mass as the soft rubber ball is dropped from the same height as that from which the soft rubber ball was dropped.

Given that the hard rubber ball exerts a greater force on the surface than the soft rubber ball, sketch on the graph opposite how you think the velocity of the hard rubber ball will vary with time. (Note that this is a sketch graph; you do not need to add any values.) [5]