Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

2 Kinematics in one dimension

Exercise C, Question 14

Question:

When a ball hits the ground it rebounds with half of the speed that it had when it hit the ground. If the ball is dropped from rest, at a height h, calculate the height to which it rebounds.

Solution:

1st part, $v^2 = u^2 + 2as$, $\downarrow$

$v_1^2 = 0^2 + 2(g)(h)$, i.e. $v_1^2 = 2gh$

$\therefore v_1 = \sqrt{2gh}$

2nd part, $v^2 = u^2 + 2as$, $\uparrow$

$0^2 = \left(\frac{v_1}{2}\right)^2 + 2(-g)(h_1)$

$\therefore 2gh_1 = \frac{v_1^2}{4}$

$\therefore 2gh_1 = \frac{2gh}{4}$,

i.e. $h_1 = \frac{1}{2g} \times \frac{2gh}{4}$ [cancel top and bottom by $2g$]

i.e. $h_1 = \frac{h}{4}$