

Mathematics Questions by Topic

Motion and Force

Answer 40

Source: K9SM2S21

Question 40

A sand bag of mass 9 kg is dropped from a stationary hot-air balloon, which is 150 metres above the ground. Which of the following is true?

- A. The sand bag hits the ground after 5.48 seconds, with a speed of 54.78m/s.
- B. The sand bag hits the ground after 5.48 seconds, with a speed of 53.68 m/s.
- C. The sand bag hits the ground after 5.53 seconds, with a speed of 55.33m/s.
- D. The sand bag hits the ground after 5.53 seconds, with a speed of 54.22m/s.
- E. The sand bag hits the ground after 5.68 seconds with a speed of 50m/s.

ANSWER D

Using constant acceleration formulae $a = -9.8$ $u = 0$ $s = -150$ $t = ?$ $v = ?$

$$s = ut + \frac{1}{2}at^2 \Rightarrow -150 = 0 - \frac{1}{2} \times 9.8t^2 \Rightarrow t = \sqrt{\frac{2 \times 150}{9.8}} = 5.533$$

$$v = u + at \Rightarrow v = 0 - 9.8 \times 5.533 = -54.22$$

The sandbag hits the ground after 5.533 seconds, with a speed of 54.22 m/s.