

Mathematics Questions by Topic

Motion and Force

Answer 30

Source: K11SM2Q15

Question 30

A hot air balloon is accelerating upwards with an acceleration of 1 m/s^2 . At a particular instant it is 250 metres above ground level and rising upwards with a speed of 3 m/s . A small stone falls from the balloon to the ground. Assuming air resistance is negligible, the time taken, for the stone to hit the ground in seconds, is closest to

- A. 7.89
- B. 7.54
- C. 7.46
- D. 7.20
- E. 7.14

ANSWER C

The stone takes on the initial upwards speed of the balloon, but its acceleration is just due to gravity. Taking upwards as positive and downwards as negative,

$$s = -250 \quad u = 3 \quad a = -9.8 \quad t = ? \quad \text{using} \quad s = ut + \frac{1}{2}at^2$$

$$-250 = 3t - 4.9t^2 \quad \text{solving} \Rightarrow t = 7.46$$