2023-Ph-H1-Q2

Section: Our Dynamic Universe
Topic: Motion, Equations and Graphs

Summary:
A sandbag is dropped from a balloon at 50 m height and takes 3.0 s to hit the ground. What was the vertical velocity of the balloon at the time?

Solution:
Using:

$$s = ut + \frac{1}{2}at^2$$

Where:

- $s = -50$ m (since downward is negative)
- $t = 3.0$ s
- $a = -9.8\ \text{m/s}^2$

Rearranged:

$$-50 = u(3.0) + \frac{1}{2}(-9.8)(3.0)^2 \Rightarrow -50 = 3u - 44.1 \Rightarrow 3u = -5.9 \Rightarrow u = -1$$

Answer: B. 2.0 m/s downwards

Guidance for Students:
Take downward direction as negative. Rearranging equations algebraically is key to solving for u.

Revision Tips:

- Watch signs: downward displacement and gravity should be negative.
- Use brackets in calculations.
- Check your answer makes physical sense.