

Answer on Question 66724, Physics, Atomic and Nuclear Physics

Question:

A water balloon was dropped from a high window and struck its target 1.17 seconds later. If the balloon left the person's hand at -4.5 m/s , what was its velocity on impact?

Solution:

We can find the velocity of the water balloon on impact from the kinematic equation:

$$v = v_i + gt,$$

here, $v_i = -4.5 \text{ m/s}$ is the initial velocity of the water balloon, v is the velocity of the water balloon on impact, $g = -9.8 \text{ m/s}^2$ is the acceleration due to gravity and t is the time.

Then, we get:

$$v = v_i + gt = -4.5 \frac{\text{m}}{\text{s}} + \left(-9.8 \frac{\text{m}}{\text{s}^2}\right) \cdot 1.17 \text{ s} = -15.96 \frac{\text{m}}{\text{s}}.$$

The sign minus indicates that the velocity of the balloon is directed downward.

Answer:

$$v = -15.96 \frac{\text{m}}{\text{s}}.$$

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