

Solution to Lecture Quiz 2, Part Q1.

For a ball dropped from a vertical height h , we must construct the natural time and the natural velocity from h and g since those are the only dimensionful quantities characterizing this problem. Using either trial and error (since its simple in this case) or the method outlined in the statement of Lecture Quiz 2, Q1, you can see that:

$$\begin{aligned}t_{natural} &= \sqrt{\frac{h}{g}} \\[t_{natural}] &= \sqrt{\frac{[h]}{[g]}} \\T &= \sqrt{\frac{L}{L/T^2}} \\T &= T\end{aligned}$$

Similarly you can check that $v_{natural} = \sqrt{hg}$. Check that dimensions on both sides are L/T .