2011 F=ma Exam: Problem 14

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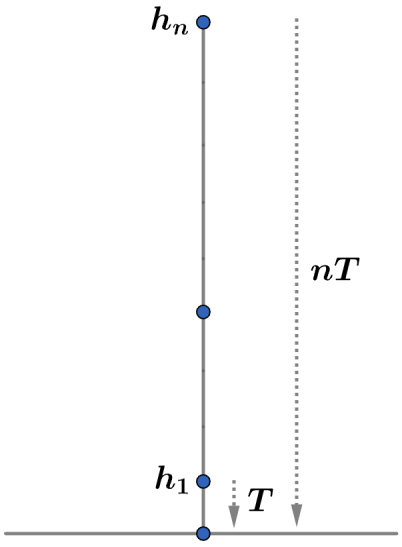
From kinematics, we have

$$h = \frac{1}{2}gt^2 \propto t^2$$

where h is the height an object is dropped and t is the time it takes to reach the ground.



Suppose the first ball above the ground at height h_1 takes time T to hit the floor. We want to find the height of the nth ball so that it takes time nT to hit the floor. Since $h \propto t^2$,

$$\frac{h_1}{T^2} = \frac{h_n}{(nT)^2}$$

$$h_n = n^2 h_1$$

so the balls should be placed at square multiples of the first height. Thus, the answer is $\boxed{\text{D}}$.