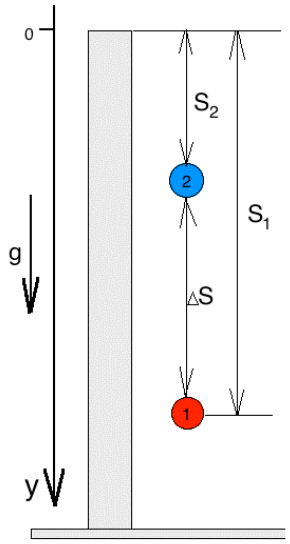
Answer on Question #42192 - Physics, Mechanics | Kinematics | Dynamics

11. A stone is dropped from the top of a tall building. Two second later another stone is dropped from the same point. Calculate the distance between the stones, 2.5 second after the 2nd stone was dropped. Ignore air resistance. Express your answer in meter.

Solution:



$t = 2s - \text{time after second stone was dropped}$
$T = 2.5s$
Equetion of motion for the first stone (initial speed is zero)

$$S_1 = \frac{g(t+T)^2}{2}$$

Equetion of motion for the first stone (initial speed is zero)

$$S_2 = \frac{gT^2}{2}$$

Distance between the stones:

$$\Delta S = S_1 - S_2 = \frac{g(t+T)^2}{2} - \frac{gT^2}{2} = \frac{gt^2 + 2gtT + gT^2}{2} - \frac{gT^2}{2} =$$

$$= \frac{gt^2}{2} + \frac{2gtT}{2} + \frac{gT^2}{2} - \frac{gT^2}{2} =$$

$$= \frac{g}{2}(t^2 + 2tT) = \frac{9.8\frac{m}{s^2}}{2}((2s)^2 + 2 \cdot 2s \cdot 2.5s) = 69m$$

Answer: distance between the stones will be $69m$