## Question \#79874, Physics / Other

A stone is dropped from a top a tower and one second later, a second stone is thrown vertically downward with a velocity $20 \mathrm{~m} / \mathrm{s}$. The second stone will overtake the first after travelling a distance of

## Solution

Write the displacement equations:

$$
\begin{gathered}
s_{1}=\frac{1}{2} g t^{2} \\
s_{2}=20(t-1)+\frac{1}{2} g(t-1)^{2}
\end{gathered}
$$

and

$$
\begin{gathered}
s_{1}=s_{2} \\
20(t-1)+\frac{1}{2} g(1-2 t)=0 \\
20 t-20+5-10 t=0
\end{gathered}
$$

SO

$$
t=\frac{3}{2} s
$$

Thus,

$$
s_{1}=\frac{1}{2} g t^{2}=\frac{1}{2} 10\left(\frac{3}{2}\right)^{2}=11.25 \mathrm{~m} .
$$

Answer: 11.25 m.

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