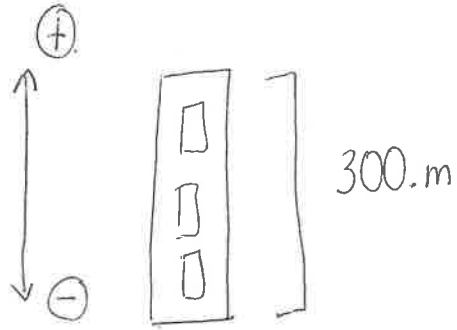
Superman Board Problem

Wanting to measure some effects of gravity, a physics student carrying a stopwatch steps off a skyscraper. The student accelerates downward at the usual rate of 9.80 m/s^2. The building is 300. m high. 5.00 s after the student drops off the building, Superman arrives and dives straight down at some v_0 off the roof. Assume that Superman, after hurling himself down, can only accelerate like the rest of us, at 9.80 m/s^2. What does v_0 have to be for a rescue just at ground level?

$\vec{V}_{i\,student} = 0\ m/s \qquad \vec{a} = -9.80\ m/s^2$

$\vec{d} = -300.\ m$



$t_{super} + 5s = t_{student}$

$\vec{d}_{of\ student} = \vec{d}_{of\ super}$

#1) solve for t

#2) $\vec{V}_{i\ super}$

$\boxed{\vec{d}_{st}} = \cancel{\vec{V}_i t} + \frac{1}{2}\vec{a}t^2 = \vec{V}_{i_{su}} t + \frac{1}{2}\vec{a}t^2 = \boxed{\vec{d}_{su}}$

$-300.\ m = \frac{1}{2}(-9.80\ m/s^2)t^2$

$t_{st} = 7.82\ s$

$t_{su} = 2.82\ s \qquad \vec{d}_{st} = \vec{d}_{su}$

$\frac{1}{2}(-9.80\ m/s^2)(7.82\ s)^2 = V_{i_{su}}(2.82\ s) + \frac{1}{2}(-9.80\ m/s^2)(2.82\ s)^2$

$\boxed{V_{i_{su}} = -92.6\ m/s}$