

P112 Extra problems Kinematics - Superman problem

Lois Lane falls from the top of a 300.0 m high building. If superman arrives on the scene 5.0 s after she falls. how fast downward ( $v_i$ ) must he jump in order to catch her at the bottom?

*Handwritten notes:*  
 300m  
 $v_i = 0$   
 $t_i = 5.0s$   
 $v_f = ?$   
 $a = -9.81$   
 $t = ?$   
 $v_f = ?$   
 $t = \frac{v_f - v_i}{a}$   
 $t = \frac{(-76.7) - (-49.05)}{-9.81}$   
 $= 2.82s$   
 $v_f = 0 + (-9.81)(5.0)$   
 $= -49.05 \frac{m}{s}$   
 $v_f^2 = 0^2 + 2(-9.81)(300)$   
 $v_f = \sqrt{2(-9.81)(-300)}$   
 $= -76.7 \frac{m}{s}$   
 $d = v_i t + \frac{1}{2} a t^2$   
 $v_i = \frac{d - \frac{1}{2} a t^2}{t}$   
 $v_i = \frac{(-300) - \frac{1}{2}(-9.81)(2.82^2)}{2.82}$   
 $= \frac{(-300) + 39.007}{2.82}$   
 $= -92.55 \frac{m}{s}$   
 Superman  
 Superman  
 Superman

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