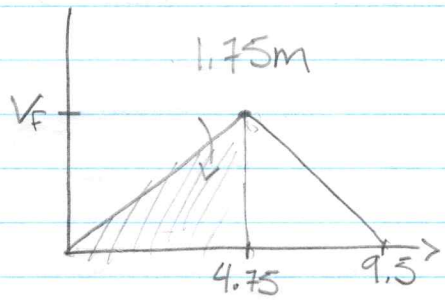
Per Floor



Area of a triangle

$1.75m = \frac{1}{2} V_f \times 4.75s$

$V_f = \frac{3.5m}{4.75s} = 0.74\ m/s$

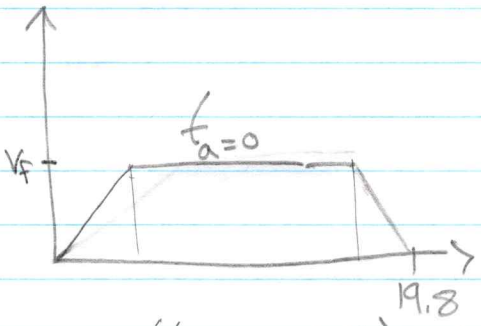
Acceleration

$a = \frac{V_f - V_0^{\,0}}{\Delta t} = \frac{0.74\ m/s}{4.75s}$ $\boxed{= 0.16\ m/s^2}$

All Floor

$a = \frac{V_f}{0.5(19.8 - t_a)}$, $a = 0.16 m/s^2$

$V_f = 0.08(19.8 - t_a)$



time when velocity is constant

V_f and $t_{a=0}$ are unknown

$25m = \left(\frac{t_{a=0} + 19.8}{2}\right) V_f$

$25m = 0.08(19.8 - t) \cdot (0.5(19.8 - t_a)) + t_a(0.08(19.8 - t_a))$

$25m = (1.584 - 0.08t_a)(9.9 - 0.5t_a) + (9.9t_a - 0.08t_a^2)$

$25m = 15.6815 - 0.792t_a - 0.792t_a + 0.04t_a^2 + 9.9t_a - 0.08t_a^2$

$0 = -0.04t_a^2 + 8.316t_a - 9.3185$ ← solve quadratic

$t_{a_1} = 206.7733s$, $t_{a_2} = 1.1267$ ← in time frame

$V_f = 0.08(19.8 - t_a) = 1.4939\ m/s \Rightarrow 1.5\ m/s$

Max Velocity

Hilroy