Project Iteration Ø

3 meters → rough estimate of distance between floors

1) Estimate the time it takes to board and debark from the elevator

2) Estimate the speed when it's moving

3) Acceleration when stopping and starting

Base Elevation → 123 m } 25 m.
Peak Elevation → 148 m }
≈ 3.5 m per floor

All floors

1) Embarking and debarking time

= {8, 9.9, 11.0, 7.8} N=4
= 9.2 seconds ← Average

2) Speeds

$= \left\{ \frac{25\,m}{17.6\,s}, \frac{25\,m}{19.6\,s}, \frac{25\,m}{19.6}, \frac{25\,m}{22.5\,s} \right\}$

= 1.3 m/s

3) ↳ where average time is 19.8 s

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Per floor

1) Embarking and debarking time

$= \{6.5, 8.5, 7.7, 12.7, 8.4, 13.2\}$

$= 9.5s$ ← Average

2) Speed $\frac{3.5}{6.2}, \frac{3.5}{9.7}, \frac{3.5}{10.6}, \frac{3.5}{10.7}, \frac{3.5}{10.2}, \frac{3.5}{11}, \frac{3.5}{8.2}$

$= \{6.2, 9.7, 10.6, 10.7, 10.2, 11, 8.2\}$

$= 0.4 m/s$ ← Average

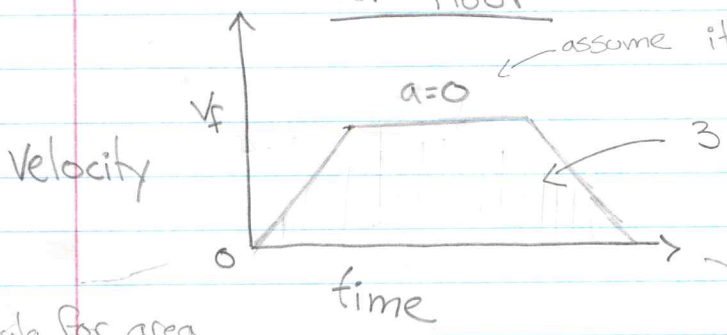
Average time it takes $9.5s$.

Acceleration:

$a = \frac{V_2 - V_1}{time}$

distance = 3.5 m.

Per floor



assume it never reaches max velocity so $t_{a=0}$, and it accelerates and decelerates at the same time and rate

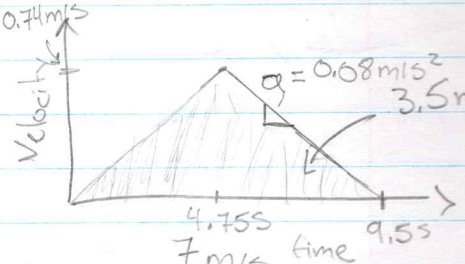
3.5m

Formula for area of trapezoid →

$3.5m = \frac{(t_{a=0} + 9.5s)}{2} V_f$

$V_f = = 7 \times \frac{1}{t_{a=0} + 9.5s}$

$a = \frac{V_f}{9.5s}$

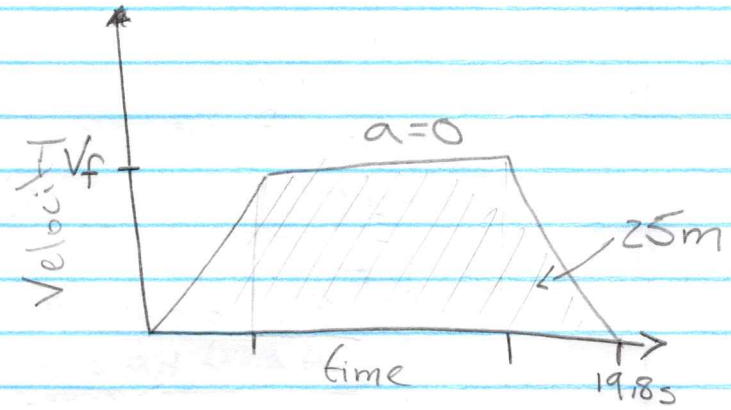


$V_f = \frac{7 m/s}{9.5s}$

$= 0.74 m/s$

$a = 0.08 m/s^2$

All floor



$$V_f = 50 \times \frac{1}{t_{a=0} + 19.8}$$

$$a = \frac{V_f - V_0}{19.8\,s} \rightarrow 0.08\frac{m}{s^2}(19.8)\,s = V_f$$

$$V_f = 1.54\ m/s$$

$$\frac{50}{V_f} - 19.8 = t_{a=0}$$

$$t_{a=0} = \frac{50}{1.54} - 19.8 = 12.76\,s$$

→ Embarking and debarking time (Avg of all floors and per floor)
9.4s
→ Maximum speed
1.5 m/s
→ Acceleration
0.08 m/s²