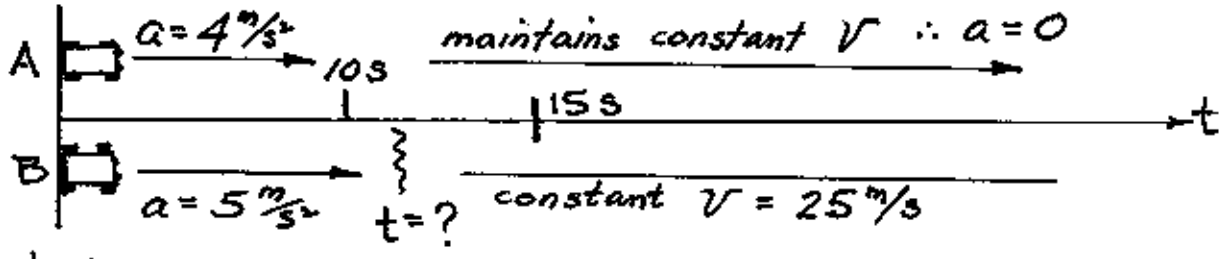
HIBBELER

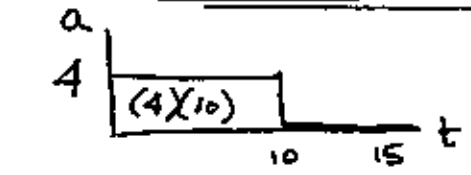
12.53

2 CARS TRAVEL A STRAIGHT PATH

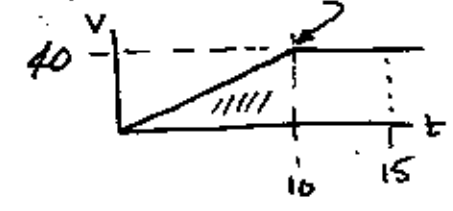


PLOT TO VISUALIZE MOTION ANALYSIS.

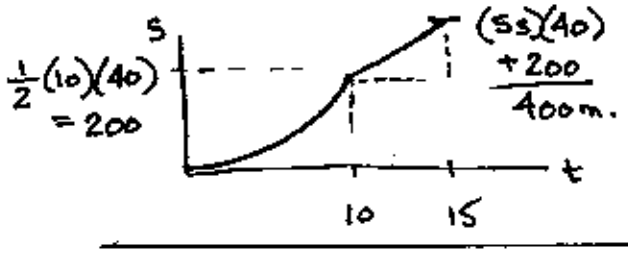
CAR A



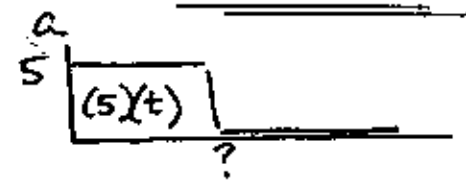
AREA UNDER CURVE = V

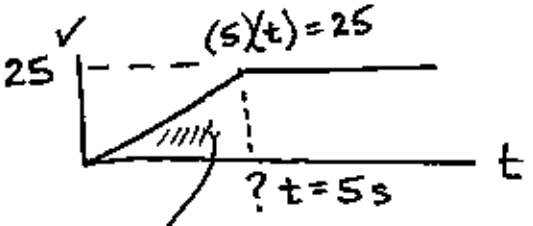


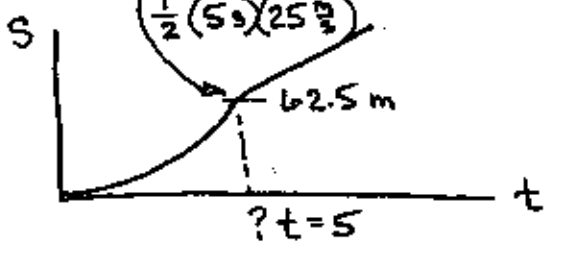
AREA UNDER CURSE = S



CAR B







G. MILANO

$0 \le t \le 10\,s$

$V = V_0 + at$

$V = 0 + 4\frac{m}{s^2}(10s)$

$\rightarrow V_{10} = 40\,m/s$

$S = S_0 + V_0 t + \frac{1}{2}at^2$

$= 0 + 0 + \frac{1}{2}(4)(10)^2$

$\rightarrow S_{10} = 200\,m.$

$t > 10\,s, \quad V = \text{constant}$

$\int_{200}^{S} ds = \int_{10}^{15} V\,dt$

$S - 200 = (40\frac{m}{s})(15-10)$

$\boxed{S_{15} = 400\,m}$

$0 \le t \le 10\,s$

$V = V_0 + at$

$V = 5\frac{m}{s^2}\,t \quad ?$

When $V = 25\frac{m}{s} = 5t$ $\therefore \underline{t = 5\,sec}$

$S = S_0 + V_0 t + \frac{1}{2}at^2$

$= 0 + 0 + \frac{1}{2}(5\frac{m}{s^2})(5s)^2$

$\rightarrow S_5 = 62.5\,m.$

$t > 5\,s \qquad V = \text{constant}$

$\int_{62.5}^{S} ds = \int_{5}^{15} V\,dt$

$S - 62.5 = (25\frac{m}{s})(15-5)$

$\boxed{S_{15} = 312.5\,m.}$ BEHIND CAR A

DIST. BETW., $\Delta S = S_A - S_B = 400 - 312.5 = \boxed{87.5\,m}$