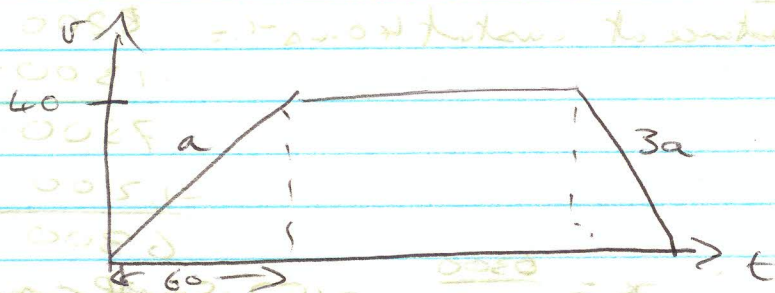


(1172) How Kinematics



Total $S = 2800 \text{ m}$.

Find t_1 :
 $u=0 \Rightarrow v = u + at$
 $v=40 \Rightarrow 40 = 0 + a \cdot 60$
 $a = ? \Rightarrow a = \frac{2}{3} \text{ ms}^{-2}$
 $t = 60$

Find t_2 :
 $a = -3(a) = -3(\frac{2}{3}) = -2 \text{ ms}^{-2}$
 $u = 40$
 $v = 0$
 $v = u + at$
 $\Rightarrow 0 = 40 - 2t$
 $\Rightarrow t = 20 \text{ sec}$

Area under curve = 2800 m
Find t_2 :
 $\frac{1}{2} \cdot 60 \cdot 40 + 40 \cdot t_2 + \frac{1}{2} \cdot 20 \cdot 40 = 2800$
 $\Rightarrow 40 [80 + t_2] = 2800$
 $t_2 = 220 - 80$
 $t_2 = 140 \text{ sec}$

$S_1 = \frac{1}{2} \cdot 60 \cdot 40 = 1200 \text{ m}$
 $40 + t_2 = 220$

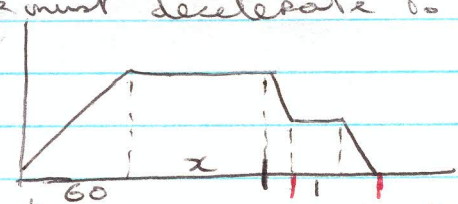
Find S_1 :
 $S_1 = \frac{1}{2} \cdot 60 \cdot 40 = 1200 \text{ m}$

Find S_2 :
 $S_2 = 40 \cdot (180) = 7200 \text{ m}$

Find S_3 :
 $S_3 = \frac{1}{2} \cdot 20 \cdot 40 = 400 \text{ m}$

Total time = $60 + 180 + 20 = 260 \text{ sec}$

If in final kilometer speed had been restricted to 20 ms^{-1} .
 New graph: Car must decelerate to 20 ms^{-1} before 1 km from end



Find time to decelerate 40 to 20: $v = u + at$
 $20 = 40 - 2t \Rightarrow t = 10 \text{ sec}$
 $S = 10 \cdot 20 + \frac{1}{2} \cdot 20 \cdot 10 = 300 \text{ m}$