A car starts from rest & Accelerates uniformly at the rate of 1m/s for 5sec.It then maintains a constant velocity for 30 sec. Then brakes are applied & the car is uniformly retarded to rest in 10 sec. Find the maximum velocity attained by the car &; the total distance travelled by it.

1. Acceleration:

$v = at_a$ – maximum velocity

t_a – time of acceleration

a – acceleration

Distance travelled:

$l_a = \frac{at_a^2}{2}$

2. Uniform motion:

Distance travelled:

$l_u = v * t_u = at_a t_u$

t_u – time of uniform motion

3. Deceleration

$v = a't_d$

t_d – time of deceleration

$a' = \frac{v}{t_d}$

Distance travelled:

$l_d = \frac{a\prime t_d^2}{2} = \frac{vt_d}{2} = \frac{at_a t_d}{2}$

Total distance:

$$l = l_a + l_u + l_d = \frac{at_a^2}{2} + at_a t_u + \frac{at_a t_d}{2} = at_a\left(\frac{t_a}{2} + t_u + \frac{t_d}{2}\right)$$
$$= 1\frac{m}{s^2} * 5s\ \left(\frac{5}{2}s + 30s + \frac{10}{2}s\right) = 5\left(\frac{75}{2}\right)m = 187.5\ m$$

Maximum velocity:

$$v = at_a = 1\frac{m}{s^2} * 5s = 5\frac{m}{s}$$

Answer: $l = 187.5\ m$, $v_{max} = 5\frac{m}{s}$