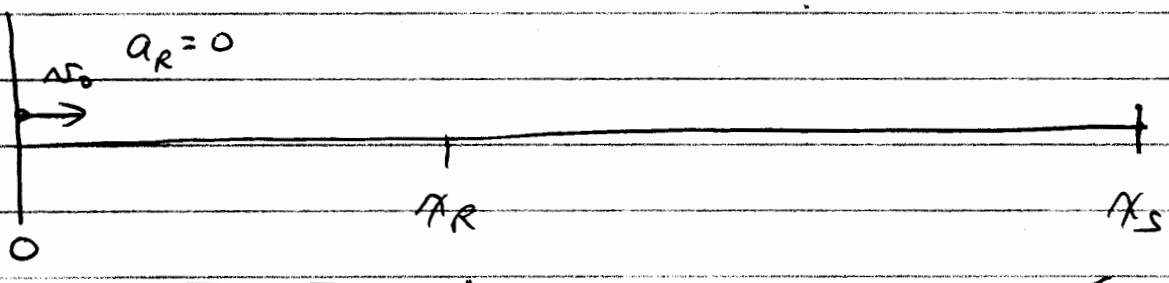
27. (II) Determine the stopping distances for an automobile with an initial speed of 90 km/h and human reaction time of 1.0 s: (*a*) for an acceleration $a = -4.0\ \text{m/s}^2$; (*b*) for $a = -8.0\ \text{m/s}^2$.

Giancoli Ch. 2 # 27 Stopping distance



const. speed
$t_R = 1.0\ s$

stopping
$a = -4.0\ m/s^2$

$v_0 = 90\ km/hr \times \frac{1000\ m}{km} \times \frac{1\ hr}{3600\ s} = 25\ m/s$

$x_R = v_0 t_R = (25\ m/s) \cdot (1.0\ s) = \boxed{25.0\ m}$

Stopping. Don't know time, but do know initial & final speeds.

$$v^2 = v_0^2 + 2a(x_S - x_R)$$

$$0 = (25)^2 + 2(-4\ m/s^2)(x_S - x_R)$$

$$x_S - x_R = \frac{625\ m^2/s^2}{8\ m/s^2} = 78.1\ m.$$

∴

Total stopping distance is $25.0 + 78.1$

$= \boxed{103\ m}$