

FIG. 2-28 Problems 40 and 41.

••41 Figure 2-28 shows a red car and a green car that move toward each other. Figure 2-29 is a graph of their motion, showing the positions $x_{g0} = 270$ m and $x_{r0} = -35.0$ m at time $t = 0$. The green car has a constant speed of 20.0 m/s and the red car begins from rest. What is the acceleration magnitude of the red car?

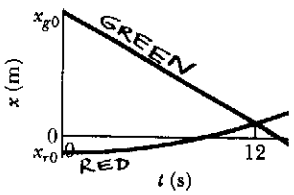


FIG. 2-29 Problem 41.

WRITE THE POSITION AS A FUNCTION OF THE TIME FOR BOTH CARS:

$$x_G(t) = x_{0G} + v_{0G}t + \frac{1}{2}a_g t^2$$
$$= 270 + (-20.0)t + \frac{1}{2}0\,t^2$$
$$x_R(t) = x_{0R} + v_{0R}t + \frac{1}{2}a_R t^2$$
$$= -35.0 + 0\,t + \frac{1}{2}a_R t^2$$

THE GRAPH SHOWS $x_G(t=12) = x_R(t=12)$

$$x_G(t=12) = 270 - 20.0(12) = 30\ \text{m}$$
$$\Rightarrow x_R(t=12) = 30\ \text{m} = -35.0 + \frac{1}{2}a_R 12^2$$
$$a_R = 0.90\ \text{m/s}^2$$

STAEDTLER® No. 937 811E Engineer's Computation Pad