8. Recognizing that the gap between the trains is closing at a constant rate of 60 km/h, the total time which elapses before they crash is $t = (60\,\text{km})/(60\,\text{km/h}) = 1.0$ h. During this time, the bird travels a distance of $x = vt = (60\,\text{km/h})(1.0\,\text{h}) = 60$ km.

31. We choose the positive direction to be that of the initial velocity of the car (implying that $a < 0$ since it is slowing down). We assume the acceleration is constant and use Table 2-1.

(a) Substituting $v_0 = 137\,\text{km/h} = 38.1\,\text{m/s}$, $v = 90\,\text{km/h} = 25\,\text{m/s}$, and $a = -5.2\,\text{m/s}^2$ into $v = v_0 + at$, we obtain

$$t = \frac{25\,\text{m/s} - 38\,\text{m/s}}{-5.2\,\text{m/s}^2} = 2.5\ \text{s} .$$

(b) We take the car to be at $x = 0$ when the brakes are applied (at time $t = 0$). Thus, the coordinate of the car as a function of time is given by

$$x = (38)t + \frac{1}{2}(-5.2)t^2$$

in SI units. This function is plotted from $t = 0$ to $t = 2.5\,\text{s}$ on the graph to the right. We have not shown the $v$-vs-$t$ graph here; it is a descending straight line from $v_0$ to $v$.