3. We use Eq. 2-2 and Eq. 2-3. During a time t_c when the velocity remains a positive constant, speed is equivalent to velocity, and distance is equivalent to displacement, with $\Delta x = v\, t_c$.

   (a) During the first part of the motion, the displacement is $\Delta x_1 = 40$ km and the time interval is

   $$t_1 = \frac{(40\,\text{km})}{(30\,\text{km/h})} = 1.33\,\text{h} \ .$$

   During the second part the displacement is $\Delta x_2 = 40\,\text{km}$ and the time interval is

   $$t_2 = \frac{(40\,\text{km})}{(60\,\text{km/h})} = 0.67\,\text{h} \,.$$

   Both displacements are in the same direction, so the total displacement is $\Delta x = \Delta x_1 + \Delta x_2 = 40\,\text{km} + 40\,\text{km} = 80\,\text{km}$. The total time for the trip is $t = t_1 + t_2 = 2.00\,\text{h}$. Consequently, the average velocity is

   $$v_{\text{avg}} = \frac{(80\,\text{km})}{(2.0\,\text{h})} = 40\,\text{km/h} \ .$$

   (b) In this example, the numerical result for the average speed is the same as the average velocity $40\,\text{km/h}$.

   (c) In the interest of saving space, we briefly describe the graph (with kilometers and hours understood): two contiguous line segments, the first having a slope of 30 and connecting the origin to $(t_1, x_1) = (1.33, 40)$ and the second having a slope of 60 and connecting (t_1, x_1) to $(t, x) = (2.00, 80)$. The average velocity, from the graphical point of view, is the slope of a line drawn from the origin to (t, x).