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

••9 You are to drive to an interview in another town, at a distance of 300 km on an expressway. The interview is at 11:15 A.M. You plan to drive at 100 km/h, so you leave at 8:00 A.M. to allow some extra time. You drive at that speed for the first 100 km, but then construction work forces you to slow to 40 km/h for 40 km. What would be the least speed needed for the rest of the trip to arrive in time for the interview?

THERE ARE 3 PARTS TO THE TRIP, EACH AT A CONSTANT VELOCITY $v_i = \frac{\Delta x_i}{\Delta t_i}$; $i = 1, 2, 3$

$$\Delta x^{total} = \Delta x_1 + \Delta x_2 + \Delta x_3 = x_f - x_i = 300\,km - 0\,km$$

$$\Delta t^{total} = \Delta t_1 + \Delta t_2 + \Delta t_3 = t_f - t_i = 11{:}15\,AM - 8{:}00\,AM$$

$$v_i = \frac{\Delta x_i}{\Delta t_i} \Rightarrow \Delta t_i = \frac{\Delta x_i}{v_i} \Rightarrow \Delta t_1 = \frac{100\,km}{100\,km/hr} = 1\,hr$$

$$\Delta t_2 = \frac{40\,km}{40\,km/hr} = 1\,hr$$

$$\Rightarrow \Delta t_3 = \Delta t^{total} - \Delta t_1 - \Delta t_2$$

$$= 3.25\,hr - 1\,hr - 1\,hr = 1.25\,hr$$

$$\Delta x_3 = \Delta x^{total} - \Delta x_1 - \Delta x_2$$

$$= 300\,km - 100\,km - 40\,km$$

$$= 160\,km$$

$$\Rightarrow v_3 = \frac{\Delta x_3}{\Delta t_3} = \frac{160\,km}{1.25\,hr} = 128\,\frac{km}{hr}$$

$$= 128\,\frac{km}{hr}\left(\frac{60\,mi/hr}{96.6\,km/hr}\right) = 79.5\,\frac{miles}{hr}$$